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Noxious Weed Treatment Project

Final Environmental Impact Statement
Appendix S-X

Volume 2 – Part 2

Modoc National Forest

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Botany Biological Assessment

Appendix S1: Plants Biological Assessment

Biological Assessment
For Threatened and Endangered Plant Species

Modoc National Forest Noxious Weed Treatment Project
Final Environmental Impact Statement

flowers of slender Orcutt Grass, Modoc National Forest

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Noxious Weed Treatment Project
MODOC NATIONAL FOREST

THREATENED AND ENDANGERED PLANTS BIOLOGICAL ASSESSMENT

January 23, 2006

Summary

The USDA Forest Service, Modoc National Forest, proposes noxious weed treatments designed to control or eliminate noxious weed species found on the Forest. The project would include physical, cultural, and/or herbicide treatments of 14 noxious weed species across the Forest. A Biological Evaluation has been prepared for Forest Sensitive Species, and a Biological Assessment (BA) would be prepared if Threatened or Endangered plant species were suspected in the treatment areas.

One Threatened plant species, Slender Orcutt grass, *Orcuttia tenuis*, occurs on the Forest. It is found near vernal pools or vernal pool like drainage edges. During review it was determined that this species and habitat for this species does occur near proposed noxious weed treatment areas. This Biological Assessment evaluates the effects to this species of the proposed actions documented in the Modoc National Forest Noxious Weed Treatment Project Final Environmental Impact Statement (FEIS).

Slender Orcutt grass was first found on the Forest in July 2003, and surveys were made in suitable habitat during July and August of that year. Nine populations were found within three districts on the Forest. It is possible that more populations may be found in the future.

Based on the analysis of the effects of the Project, it is my determination that:

- **Implementation of the Preferred Alternative and Design Standards as detailed in the action alternatives of the Final Environmental Impact Statement for the Noxious Weed Treatment Project would result in "No Effect" to individuals or populations of the Threatened plant species, slender Orcutt grass (*Orcuttia tenuis*).**
- **No Endangered plant species or habitat is known to exist on the Modoc National Forest, and therefore there will be "No Effect" to Endangered plant species.**
- **No Proposed plant species is known to exist on the Modoc National Forest, and therefore there will be "No Effect" to Proposed plant species.**
- **Critical habitat units (CHU) have not been designated within the Modoc National Forest for slender Orcutt grass, and therefore, there will be "No Effect" to CHU of slender Orcutt grass.**

Prepared by:

Cheryl Beyer, Forest Botanist

File Code: 2670

Date: September 22, 2005

Curt Mullis, Field Supervisor

United States Department of Interior

Fish and Wildlife Service

Klamath Falls Fish and Wildlife Service Office

6610 Washburn Way

Klamath Falls, OR 97603

Dear Mr. Mullis:

The U.S. Forest Service, Modoc National Forest is requesting your concurrence pursuant to Section 7 of the Endangered Species Act of 1973, as amended, on the Modoc National Forest Noxious Weed Strategy Implementation Project. Informal consultation has been ongoing for the past several months between Rick Hardy, Tony Hawkes and representatives of the Modoc National Forest staff. It is our understanding that this project falls within the streamlined consultation process.

We will transmit copies of the two Biological Assessments supporting the Modoc National Forest Noxious Weed Strategy Implementation Project for terrestrial wildlife species and plants within the week. Since this project occurs in various locations throughout the Modoc National Forest, the analysis included all of the species listed on your most recent correspondence dated 11 July 2005 (1-10-05-105-SP).

Informal consultation with the Modoc National Forest personnel and your staff has led to a determination of "NOT LIKELY TO ADVERSELY AFFECT" for bald eagle and *Orcuttia tenuis*. This determination was based on the potential for disturbance to nesting bald eagles and the concerns for the welfare of the slender Orcutt grass.

These Biological Assessments contain management requirements and constraints that should remove any adverse effects from the implementation of physical or chemical noxious weeds treatments when fully applied. We hereby request concurrence on the actions proposed for the FEIS including treatment buffers. The Forest Botanist and Terrestrial Biologist assigned to the project will continue to incorporate the comments from your office.

We appreciate your attention to this matter, and especially like to thank Rick Hardy and Tony Hawkes for their continued assistance. If we can provide additional information, please contact Cheryl Beyer for plant species at (530) 233-8827 or Mary Flores for terrestrial species at (530) 279-6116.

Sincerely,

/s/ Stanley G. Sylva

STANLEY G. SYLVA

Forest Supervisor

ccRick Hardy
USFWS
Tony Hawkes
USFWS

Introduction

This Biological Assessment (BA) serves as written request, under the provisions of Title 50 Code of Federal Regulations (CFR) Part 402.14, for U.S. Fish and Wildlife Service (USFWS), concurrence on a determination of "No Effect" as discussed in Chapter V of this document.

This BA has been prepared for the Modoc National Forest Noxious Weed Treatment Project. The project is located on the Modoc National Forest (NF) in Modoc, Siskiyou, and Lassen Counties, California. This BA describes the potential effects of the alternatives of the proposed project on federally listed or proposed species on MDF.

Resources on the Forest are described in the Land and Resource Management Plan (LRMP) for the Modoc National Forest (USDA Forest Service 1991). The LRMP was amended by the Record of Decision (ROD) for Amendments to Planning Documents Within the Range of the Northern Spotted Owl (USDA Forest Service and USDI Bureau of Land Management 1994), hereafter known as the Northwest Forest Plan (NWFP). The NWFP ROD was further amended in 2004. The LRMP was also amended by the ROD for the Sierra Nevada Forest Plan Amendment (USDA Forest Service 2001), and more recently, by the ROD for the Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement (USDA Forest Service 2004).

Consistency with Laws, Plans and Policies

All alternatives would be consistent with direction in the Modoc National Forest Plan as amended, with the Endangered Species Act, the Modoc National Forest Integrated Weed Management Strategy (2005), and other laws.

Purpose

The purpose of this biological assessment, hereafter referred to as the BA, is to describe and evaluate the effects of proposed federal land management activities for noxious weed treatment activities on US Fish and Wildlife Service (USFWS) federally Threatened (T), Endangered (E), and proposed (P) plant species and designated critical habitat that occur or may occur in the project vicinity.

These activities will be implemented under the alternative chosen by the decision maker, Forest Supervisor Stan Sylva, of the Modoc NF. Any alternative, or parts thereof, can be chosen for implementation. This assessment is to meet the legal requirements set forth under Section 7 of the Endangered Species Act of 1973, as amended (ESA) {19 U.S. C. 1536 (c)}.

Project Summary

Project Overview

The Modoc National Forest Noxious Weed Treatment Project sets forth six alternatives. Alternative 1 is the No Action Alternative. All other alternatives would authorize treatment of 14 species of noxious weeds. Treatment methods could include manual, cultural, or herbicide methods, or a combination. Alternatives 2, 4, and 6 include herbicides. Alternatives 3 and 5 exclude the use of herbicides. Number of sites and number of acres, as well as treatment methods, vary according to alternative. The project will not include aerial spraying of herbicides, treatment of aquatic species of noxious weeds, or, except in Alternative 6, applications of herbicides within 10 feet of water. Mitigations for the alternatives can be found in the alternative-specific Design Standards and in Mitigations that apply to all alternatives (see FEIS). Design Critera specific to listed plants can be found in Table 1 below.

To reduce effects from herbicides to slender Orcutt grass, discretionary Design Standards (please see the section on Design Standards further in this document) address separately Alternatives 2 and 4, and Alternative 6. These Standards are intended to be incorporated in the project to further reduce any adverse affects (LAA). The Design Standards for all alternatives, from the standpoint of reducing effects to slender Orcutt grass, are the ones written for Alternative 6.

Table 1: Design Standards for Threatened and Endangered Plants

Code	Design Standards in Alternatives 2-6	2	3	4	5	6
DS-31	TES Plants: Vehicle-based herbicide application will not take place within 50 feet of any TES plant location. Hand spraying or non-herbicide treatment may be conducted.	X	n/a	X	n/a	n/a
DS-33	Threatened and Endangered Plants: Herbicide treatments will not take place within 100 feet of Threatened or Endangered plant locations, however, non-herbicide treatments may be conducted.	n/a	n/a	n/a	n/a	X

The Design Standards for Alternative 6 do not permit herbicide treatments within 100 feet of Threatened, Endangered, and Proposed (TEP) plant species. This buffer would reduce the risk from drift, runoff or leaching of herbicide. Felsot (2001) found that in most cases, off-site effects of herbicide volatilization drift are usually limited to 100 feet. Manual treatments may be used within this 100-foot buffer.

Currently, 6,908 acres of noxious weeds are known on the Forest. Depending on alternative, an estimated 300 to 3,000 acres per year could be treated over a period of 5-10 years. A description of the alternatives can be found in Chapter 2 of the FEIS. The alternatives are explained in more detail in the Modoc National Forest Noxious Weed Treatment Project FEIS.

Lead Agencies

The Federal lead agency for this project is USDA Forest Service, Modoc National Forest.

Environmental Review

The environmental impacts of the proposed project have been addressed in a *Draft* Environmental Impact Statement that has been prepared to comply with the National Environmental Policy Act (NEPA). The Draft EIS (DEIS) was published and released for public comment in January, 2005 (USFS 2005). The FEIS for this project is projected to be published in spring of 2007. The FEIS and resulting Record of Decision (ROD) will address the public and agency comments received on the DEIS.

The DEIS identified and evaluated four alternatives for the project. Alternative 4 consisted of Early Detection – Rapid Response principles applied to annual weed management treatments that include physical/manual, cultural, and herbicide. Early Detection – Rapid Response Strategy allows minor project variations to meet site-specific conditions or landscape objectives.

The three alternatives besides Alternative 4 were identified as alternatives and were designated as Alternatives 1-3. Alternative 1 was “no action,” Alternative 2 was “ proposed action,” consisting of annual weed management treatments that included physical/manual and/or herbicide treatment, and Alternative 3 was manual treatment only.

Following public input, two additional alternatives were added, Alternative 5 that consists of manual and cultural treatments, and Alternative 6 that consists of manual, cultural, and herbicide treatments, with the addition of chlorsulfuron and two herbicide mixes.

Consultation

Formal consultation for listed plants is required when a project that may adversely affect listed plants or their habitat (1) occurs on Federal land or (2) is a private action with a Federal "nexus" (e.g., a Federal permit is required or Federal funding is involved) (CNPS 2005).

Federal agencies must also consider Proposed taxa in biological assessments (documents required by Section 7 of the Act for certain Federal projects or actions). Federal agencies must also "confer" with the Service regarding any action or project "likely to jeopardize the continued existence" of a proposed

species. During such a "conference," the Service typically reviews proposed project plans and determines the likely effects of a Federal action on a proposed species. Like the technical assistance provided by the Service for candidates, a conference is only an advisory process. Any recommendations to modify or abandon the project and/or undertake protective measures for proposed species are not mandatory on the Federal agency conferring with the Service. There are no known Proposed plant species on the Modoc National Forest (CNPS 2005).

Section 7(a)(2) consultation may be "informal" or "formal." Most agency consultations are resolved informally. Informal consultation is used to determine (1) whether formal consultation will be required or (2) if the project can be modified to reduce or remove adverse impacts to listed species. If a proposed activity that depends on a Federal action may adversely affect a listed species or designated critical habitat, formal consultation is required. Formal consultation concludes when the Service issues a "biological opinion" on the effects of the project on listed species. Modification, or rarely abandonment, of a proposed Federal action or project may be necessary if the Service determines that such activity is likely to jeopardize the species or adversely modify its critical habitat. Under such a scenario, the Service must provide a "reasonable and prudent alternative" to the consulting Federal agency (CNPS 2005).

Consultation to Date

Consultation to date includes a list prepared by the Klamath Falls office of USFWS of Threatened, Endangered, Proposed, and Candidate species that may be present on, or suspected in the area, of the Modoc NF. This letter was dated July 7, 2004. Informal consultation for slender Orcutt grass has taken place by phone, email and a meeting in Klamath Falls between February 18 and September 1, 2005. Personnel consulted were Rick Hardy, 541-885-2504 and Tony Hawkes 541-885-8481, both of the Klamath Falls USFWS office.

Project Design Standards

Project Design Standards (PDSs) are conservation measures incorporated into a project to minimize or avoid effects to endangered or threatened species and other resources. PDSs usually include seasonal restrictions (such as LOPs—Limited Operating Periods) and may also include such things as clumping of retention trees around nest trees, establishment of buffers, dropping the unit (s)/portions, or dropping the entire project.

In some cases, application of PDSs may reduce the impact of the projects to listed species and may change the effects determinations (from LAA to NLAA, or from LAA or NLAA to NE).

Project Design Standards specifically for TE plants are shown below. The full list of PDSs can be found in the FEIS, Chapter 2. Many of these will help minimize potential effects to slender Orcutt grass, such as some of the soil and water PDSs. All are consistent with the direction contained within the Modoc National Forest Land and Resources Plan, and they are incorporated by reference into the action alternatives.

Table 2: Project Design Standards in the Specified Alternatives

Code	Design Standards in Alternatives 2-6	2	3	4	5	6
DS-31	TES Plants: Vehicle-based herbicide application will not take place within 50 feet of any TES plant location. Hand spraying or non-herbicide treatment may be conducted.	X	n/a	X	n/a	n/a
DS-33	Threatened and Endangered Plants: Herbicide treatments will not take place within 100 feet of Threatened or Endangered plant locations, however, non-herbicide treatments may be conducted.	n/a	n/a	n/a	n/a	X

Some Mitigation Measures for hydrologic resources have also been incorporated into the FEIS. The difference between the PDSs and Mitigation Measures, are that the PDSs are alternative specific, and the Mitigation Measures apply to all the action alternatives.

Proposed Action

This chapter of the BA presents information about the alternatives. The first section identifies the purpose of the project. The second section describes the alternatives. More detailed descriptions of the alternatives can be found in the FEIS.

Purpose of Project

The purpose of the project is to aggressively and efficiently eradicate, or control and contain 14 specific noxious weed species on the Modoc NF utilizing manual, chemical, or manual and/or chemical treatments. Please see the FEIS, Chapter 1, for more information on the purpose.

This action will help preserve the native biodiversity of the Forest and promote the ecosystem health of forested and rangeland habitats by maintaining or improving native forbs and grass communities.

Description of the Alternatives

(Also, please see Appendix A – Comparison Table of Alternatives)

Alternative 1 – No Action

Under the No Action alternative, current management plans would continue to guide management of the project area. No aggressive treatment activities would be implemented to accomplish the purpose and need. The alternative provides a baseline for comparison of effects and analysis of effects.

Alternative 2

The Modoc NF proposes to treat 14 species of noxious weeds on 520 sites comprising approximately 5,995 acres to eradicate, control, or contain the occurrences; treating between 300 to 1,500 acres annually for the next five years; herbicides to be applied by directed spray treatments and backpack application utilizing the treatment methods of physical (hand-pulling), individual plant herbicide treatment, or physical and/or individual herbicide treatment.

Table 3. Targeted Noxious Weeds

Canada thistle	Mediterranean sage
Common crupina or bearded creeper	Musk thistle
Dalmatian toadflax	Plumeless thistle
Diffuse knapweed	Perennnial pepperweed or tall whitetop
Spotted knapweed	Scotch thistle
Squarose knapweed	Klamathweed or St. Johnswort
Dyers woad or Marlahan mustard	Yellow starthistle

Alternative 3

Alternative 3 was developed in response to scoping comments to provide an alternative that did not include herbicides. It does not completely meet the purpose and need because some weed species may be spread as a result of ground disturbance or incomplete removal. The Alternative consists of treating between 300 to 1,500 acres (494 sites) annually for the next five years utilizing physical (hand-pulling) methods.

Alternative 4

This alternative was developed to reflect scoping comments on the need to provide flexibility in treatment methods to eradicate, control, or contain the current occurrences and expanding or new infestations of the selected noxious weeds over a 10 year time period. In this alternative, the Modoc NF proposes to authorize annual treatments of weed infestations ranging from an estimated 300 to 3000 acres at 520 sites. Treatment includes physical (hand-pulling, digging, grubbing), individual plant herbicide treatment (directed spray treatment by backpack sprayer or wick applications of herbicides), physical and/or individual plant herbicide treatment, and Early Detection – Rapid Response. Herbicides proposed in Alternative 4 include clopyralid, dicamba, glyphosate, triclopyr and 2,4-D.

Adaptive management, defined as "…the process of continually adjusting management in response to new information, knowledge, or technologies," will provide the opportunity to treat sites of the identified

species that have developed or expanded using the same treatments as outlined in the EIS. This strategy recognizes that unknowns and uncertainty exist in the course of achieving any natural resource management goals. Early Detection – Rapid Response, as a part of adaptive management, is used in this project.

Early Detection – Rapid Response in Alternatives 4, 5, and 6 consists of treating the same or expanded sites, new sites, and the same and new species of weeds, using the same treatments as outlined in that alternative.

Alternative 5

Alternative 5 was developed in response to public comments. This alternative is a no-herbicide alternative utilizing a range of manual and cultural methods to eradicate, control, or contain approximately 532 acres of known sites by treating between 300 to 1,500 acres annually for the next 10 years.

Early Detection – Rapid Response would allow eradication of new infestations of the identified species along with adapting the methods outlined in this alternative, while utilizing the Design Standards, to remove infestations of new noxious weed species which have been proven to be eradicated, controlled, or contained by the methods evaluated. Early Detection – Rapid Response may be used on an additional 200 acres above the currently known locations annually.

Alternative 6

Alternative 6 was also developed in response to public comments. This alternative utilizes non-herbicide and herbicide treatment methods, adding a new herbicide and two mixes. It proposes to treat approximately 538 acres and treatments may include use of surfactants and dyes, as in all alternatives that use herbicides. Surfactants increase the absorption of herbicide by the weeds, and dyes assist the applicator in efficiently treating target weeds.

Early Detection – Rapid Response would allow treating new occurrences of the 14 identified weed species utilizing adaptive management within the identified Design Standards and the full range of treatment methods listed for this alternative in the FEIS.

Description of Treatments

Physical/manual treatment – This includes hand pulling, grubbing, and excavation of plants with a shovel at or just below the soil surface. All alternatives except the No Action Alternative include physical/manual treatments.

Herbicide treatment – Alternatives 2, 4, and 6 permit use of certain herbicides. Table 4 compares the herbicides proposed in each of Alternatives. Table 5 displays trade names and typical application rates of those herbicides.

Table 4. Herbicides Proposed In The Alternatives

	Herbicides	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	Herbicides	X		X		X
1	Clopyralid	X		X		X
2	Dicamba	X		X		X
3	Glyphosate	X		X		X
4	Triclopyr	X		X		X
5	2-4-D	X		X		X
6	Chlorsulfuron					X
7	Chlorsulfuron and 2,4-D (Mix 1)					X
8	Dicamba and 2,4-D (Mix 2)					X

Table 5. Herbicides and Typical Application Rates Proposed For Use in the Noxious Weed Treatment Project

	Chlorsulfuron	Clopyralid	Dicamba	Glyphosate	Triclopyr	2,4-D	Mix 1	Mix 2
Trade Name(s)	Telar	Transline	Banvel, Vanquish	Round-up Ultra RT, Round-up Original, Rodeo, Accord, others	Garlon 3A, Pathfinder II, Remedy RTU	20 formulations approved	Chlorsulfuron and 2,4-D	Dicamba and 2,4-D
Typical Application Rates	0.75-1.0 oz/ai/ac[1]	0.10 to 0.25 lbs/ae/ac	0.25 – 2 lbs/ae/ac	0.50 – 3.75 lbs/ae/ac	0.5 – 1.5 lbs/ae/ac	0.5 – 2 lbs/ae/ac	Chlorsulfuron 0.75 – 1.0 + 2,4-D 0.5 1.5 lbs/ae/ac	Dicamba 0.25 – 1.0 + 2,4-D 0.5 – 1.5 lbs/ae/ac

[1] ae = acid equivalent, ai = active ingredient

Existing Environment

This chapter presents an overview of the vegetation types that are found in the project area. This chapter also includes a discussion of the ecology, habitat requirements, and distribution of the listed plant species that occur or have the potential to occur in the project area. This chapter is divided into four sections:

Vegetation types in the Project Area

Permeable Soil types on the in the Project Area

Federally listed species in the Project Area

Critical habitat for federally listed plant species on the Modoc NF

Vegetation Types in the Project Area

According to the Modoc National Forest Land and Resource Management Plan (USDA 1991), there are 17 major vegetation types found on the Forest, based on the classification of California Vegetation, CALVEG and the Wildlife Habitat Relationship Program. The Forest is dominated by juniper and eastside pine. Western juniper covers approximately 28 percent of the Forest. Sagebrush is the third most dominant vegetation type. California Department of Fish and Game has delineated vernal pool communities within Modoc County, some of which are located on the Modoc NF

(http://maphost.dfg.ca.gov/wetlands/vp_asses_rept/modoc.htm).

Permeable Soil Types in the Project Area and the Possibility of Leaching

On soils with a high permeability, there is a potential to leach herbicide through the soil profile into the groundwater table, possibly impacting non-target plants. Design Standards are included in the FEIS to restrict herbicide applications in areas of these sensitive soils. See the Soils Specialist Report for a discussion of the permeable soils on the Forest.

Federally Listed Plant Species in the Project Area

An **Endangered** plant is one that is in danger of extinction throughout all or a significant portion of its range. A **Threatened** plant is one that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. A

Proposed plant is one that has been officially proposed by the USFWS for listing as Threatened or Endangered under the Endangered Species Act (ESA). A **Candidate** plant is one that the USFWS has on file sufficient information on biological vulnerability and threats to support proposals to list it as Endangered or Threatened.

Threatened and Endangered plants are determined and listed by the USDI Fish and Wildlife Service in 50 CFR Part 17 (USDI Fish and Wildlife Service 1994; 1996; 1997; 1999; 2002).

There is one **Threatened** plant species known to occur or have habitat on the Modoc NF. This species is slender Orcutt grass, *Orcuttia tenuis*, a vernal pool species found in specialized habitat that is inundated for a period during the spring and summer months.

No other listed plant species are suspected or known to occur on lands administered by the Modoc NF. This information is based on documentation obtained from the USFWS, and from documents related to rare plant surveys on file at the USFS Modoc NF Supervisors Office, Alturas, California.. On July 7, 2004, the USFWS sent a list of species that may occur in the area or be affected by projects on the Modoc NF (USFWS reference code: 1-10-04-FE-171).

Table 6. Federally Listed Plant Species Occurring InThe Project Area

Species[1]	Status
slender Orcutt grass (*Orcuttia tenuis*)	T Federal; E, 1B California

[1] Only Federally listed species are discussed in this BA; for a complete listing of USFS Sensitive species that occur or may occur in the project area, see the Biological Evaluation (BE) for this project.

Slender Orcutt grass was first located on the Modoc NF in 2003, occurring in vernal pool-like habitats, usually within juniper/pine woodlands or sagebrush flats. On the Modoc NF, it is limited to relatively deep pools with clay soil. Members of the Orcutt plant family (Orcuttieae) usually occur in patches within the pools that are essentially devoid of other plant species (Federal Register 2003). The main habitat requirement for slender Orcutt grass is standing water of sufficient depth and duration to drown out most competition from other plants and meet the physiological requirements for prolonged inundation, followed by a period of gradual (becoming total) desiccation.

During review, it was determined that habitat exists within the project area. Vernal pools are inhabited by an endemic flora that has adapted to the seasonal extremes of prolonged inundation in winter and spring and complete dryness by mid-summer. Because of this, most species that grow in vernal pools are not found in any other habitat and most non-adapted species, even aggressive, introduced weeds, do not have habitat in the vernal pools. Therefore, vernal pools have unusual vegetation in that is composed almost entirely of native plants (Corbin and Schoolcraft 1990).

Slender Orcutt grass seeds require special conditions to germinate; enough standing water to allow the growth of a soil fungus over the seed is required to break dormancy. This adaptation insures that slender Orcutt grass will germinate only when sufficient water is present in the pool to complete its life cycle. The seeds germinate in the spring while under water, as they are able to tolerate the anaerobic (oxygen deficient) conditions that occur in the winter and early spring when the pools are flooded and the seedlings are underwater. As temperatures rise in mid-spring, the plants send up long, floating leaves. As the pool dries, plants put out shorter terrestrial leaves, and then flowering stalks. Plants generally mature later than other native vernal pool annuals, so often they are the only vegetation still green by mid-summer on the vernal pool bed (Corbin and Schoolcraft 1990).

Species Description:

Description: Annual grass often covered with sticky, aromatic secretions with a tuft of short basal leaves. Stems mostly erect, one to several, 7-15 cm tall. Slender Orcutt grass flowers in the summer; flower heads are on short branchlets on the main stem; each head with several florets. Flowers with a five-toothed lemma. This species is wind pollinated, but pollen may not be carried long distances between occurrences. As an annual, slender Orcutt grass depends on seed set to replenish the seed bank for continued survival. The seeds can remain dormant for an undetermined amount of time, but at least for 3-4 years. Germination is under water after a prolonged period of immersion. Populations may express themselves cyclically, and thus, many years of observation are necessary to determine whether any occurrence is increasing, stable, or declining. (FR 2003 46692).

Status: Slender Orcutt grass is listed by the state of California as Endangered. Slender Orcutt grass was listed as Threatened by the USFWS on March 26, 1997 (62FR 14338) and critical habitat was designated on September 24, 2002 (67 FR 59884), along with other members of the Orcuttieae grass tribe and two vernal pool herbs.

Habitat: Vernal pools and similar habitat, occasionally on reservoir edges or stream floodplains, on clay soils with seasonal inundation in valley grassland to coniferous forest or sagebrush scrub. Median area of pools occupied by slender Orcutt grass on the Modoc Plateau in 1989 (these were pools located where Shasta, Lassen, and Modoc County come together, and are not on Modoc NF land) ranged from 5 to 100 acres and were typically at least 11.8 inches deep. This species is restricted to the deepest areas of these pools (FR 2003 46695). Plants sprout while pools are full, but grow and flower when soil of pool bed is dry.

Lassen NF pools containing this species may be found in transition (between eastside pine and westside foothill vegetation) conifer forests, eastside pine forest, sagebrush flats, or westside pine-dominated mixed conifer stands. Occurrences in the Central Valley are in vernal pools within blue oak woodlands or valley grasslands.

Elevation: 100 to 5,700 ft.
Flowering Period: June to July
Identification Period: June to October

Threats: Threats to these species identified in the listing notice include urbanization and agricultural land conversion as primary factors, and competition with non-native plants, highway projects, off-highway vehicle use, incompatible grazing practices, landfill projects, and other human impacts as secondary factors. The Regional Forester, Region 5 of the Forest Service, previously listed it as a Sensitive Species, but that status has been superseded by the USFWS listing.

In the Sierra Nevada FEIS rare plant assessment, slender Orcutt grass was ranked as a moderate vulnerability species, occurring in the vernally wet ecological guild. Nine threats were identified for slender Orcutt grass: noxious weeds, roads, grazing, stock trampling, fire-fighting/suppression activities, OHV, trails/hikers, development, and hydrologic alteration (FEIS 2001). The trend for this plant, according to the FEIS (2001) is stable on National Forest and BLM lands. Some private land occurrences have been extirpated.

Current conditions on Lassen NF: As of 1990, three of the five populations of slender Orcutt grass on the Lassen NF and Susanville BLM district had been fenced to protect them from impacts from grazing and off-highway vehicle use. Since 1990, six additional populations located on BLM administered land had been fenced to protect populations from grazing. Grazing has been discontinued in some instances FR 1997 14348).

Current condition on the Modoc NF: A review of the documentation for the nine Modoc NF occurrences found that 2/3 of the occurrences were in fair condition, and 1/3 were in good condition. The following disturbances were enumerated near or in habitat: recent waterfowl habitat construction with access roads, grazing and overgrazing, trampling by cows with hoof prints throughout habitat and up to 12" deep, road construction, vehicular use nearby, railroad operations, noxious weeds in the vicinity but not in habitat, and OHV use.

There is not a Species Management Guide for slender Orcutt grass in effect on the Modoc NF. However, the Guide developed for the Lassen NF and the Susanville BLM prescribes that all occurrences within the boundaries of those two agencies be protected from "excessive grazing." Threats to slender Orcutt grass enumerated in that Guide include hydrologic alteration, overgrazing, livestock trampling, OHV's, and other recreation.

The Modoc NF Land and Resource Management Plan (LRMP 1990), which was written before slender Orcutt was known on the Forest, encouraged the development of wetlands for waterfowl nesting habitat. The Plan states, "The goal of this Plan is to develop all suitable wetlands as waterfowl nesting habitat by the end of the 2nd decade……..… Livestock grazing continues in seasonal flooded wetlands, with nesting islands or areas protected by fencing." This development may have affected, positively or negatively, the vernal pools on the Forest.

The *Draft* Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon was published in October 2004 (U.S. Fish and Wildlife Service 2004). Grazing direction in the Draft Plan does not call for exclusion of grazing or fencing off of vernal pools from cows, as was presented in the Lassen NF Management Guide (Corbin and Schoolcraft 1990).

Species Distribution: Slender Orcutt grass, first collected by Alice Eastwood in 1912 in Shasta County, and described by Albert Hitchcock in 1934, is limited to northern California, and found mostly in the northern part of the Central Valley and the western edge of the Modoc Plateau. Seventy-nine occurrences were documented in 2001, of which 73 were presumed to be extant (Cypher 2000). The majority of these are in Tehama and Shasta Counties, and many are on private lands. Nine occurrences were first discovered on the Modoc NF in Modoc County in 2003. National Forest and BLM management can have a significant effect on the continued viablility of the species (Corbin and Schoolcraft 1990).

The nine recently discovered occurrences on the Modoc NF are located on the USGS quads Donica Mountain, Happy Camp Mountain, Knobcone Butte, and Spaulding Butte and within three of the four Ranger Districts: Doublehead, Devils Garden, and Big Valley. It is unknown if occurrences exist on private lands adjacent to the Forest. The GPS (geographical positioning system) polygons of these occurrences can be sprawling, and cover several to many individual small patches. Furthermore, the GPS polygons may broadly outline the occurrences within their boundaries, but not tightly adhere to the outlines of each patch within the population. Because of the broad inclusiveness of these GPS'd boundaries, it is possible that some weed occurrences may be falsely reported as closer to the actual plants of slender Orcutt grass than is fact. The occurrences of slender Orcutt grass, an annual grass no taller than 6", are estimated in 7 out of the 9 locations to be a half million plants or more.

Table 7. Slender Orcutt Grass On The Modoc National Forest

Occurrence	District and Assigned Name	USGS Quad	Estimated plants
MDF-ORTE-001	DG - Whitney Res.	Spaulding Butte	1,000,000
MDF-ORTE-002	DH - Upper Mud Lk.	Spaulding Butte	1,000,000
MDF-ORTE-003	BV - McKay Flat	Happy Camp Mtn.	500,000
MDF-ORTE-004	DG - Hackamore	KnobCone Butte	2,000,000
MDF-ORTE-005	DG - West of Hog Lk	KnobCone Butte	5,000
MDF-ORTE-006	DG - Spaulding Res.	Spaulding Butte	2,000,000
MDF-ORTE-007	BV - Whalen	Donica Mtn.	50,000
MDF-ORTE-008	DG - Quaking Aspen	KnobCone Butte	200
MDF-ORTE-009	BV - Upper Roberts Res.	Donica Mtn.	500,000

Current Management Direction

Threatened and Endangered (TE) species are federally designated because low population levels and loss of habitat may eventually render them extinct. The Forest Service must manage habitat to achieve recovery levels of TE species . Additionally, the National Forest Management Act states that National Forests will “provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives” (USDA 1991).

Slender Orcutt grass was first found on the Modoc NF during the 2003 field season. The only other National Forest with known slender Orcutt grass occurrences is the Lassen NF. Current management on the Lassen is as follows: All populations will be protected from direct disturbance by Forest Service management activities. Disturbance here includes excessive grazing, vehicle traffic within vernal pools, and hydrologic manipulation within pools. When necessary, fencing will be the primary method of protection. Vernal pool hydrology of all pools containing slender Orcutt grass will be maintained by designing all earth-moving projects within the drainage area to allow unchanged drainage into the vernal pools. From consultation on grazing allotments in 1999, no more than 5% trampling in occupied slender Orcutt grass habitat will be allowed before seed set, and no more than 15% trampling of occupied slender Orcutt grass habitat after seed set. Trampling is defined as soil displacement or compaction that would be capable of killing or dislodging the slender Orcutt grass plants, or compacting the seed so it would not be viable.

In the Overview Discussion in the *Draft* Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon the following points were brought out.

Use of herbicides, fertilizers, and other herbicides are common in urban and agricultural settings. Although there is a general lack of specific studies to assess effects of herbicides, fertilizers, and other herbicides on vernal pool species, such herbicides could have detrimental impacts on these species if such herbicides reach seasonal wetlands via storm or nuisance sheet flow.

Contamination of vernal pools from adjacent areas may injure or kill vernal pool crustaceans and plants either directly or indirectly via pathways including the alteration of herbicide properties of pool (e.g., pH) and inhibiting and/or disrupting biochemical processes creating less suitable conditions for reproduction or germination and growth.

Use of such herbicides in nearby areas may result in drift or runoff into vernal pools.

The specific effects of such contamination are difficult to ascertain unless an accurate assessment can be made regarding the assimilation rate, or rate of decay, of such herbicides in route to the vernal pool.

Considering the historic grazing of native ungulates and other herbivores in vernal pool ecosystems, properly managed livestock grazing can play a significant role as a process surrogate in the protection and enhancement of vernal pool ecosystems.

Inappropriate levels of grazing, from overgrazing, undergrazing, or inappropriately-timed grazing, can result in significant adverse effects to vernal pool ecosystems.

Physical trampling by livestock seriously can affect the viability of a species, especially if the species is restricted to a small area or if grazing occurs during sensitive parts of the growing season, such as during periods when the plants bloom or set seed.

Although experts maintain that the relationship between grazing livestock and vernal pool habitat condition is difficult to quantify, the prevailing belief is that livestock grazing can play an important role as a management tool in vernal pool habitat.

In areas where grazing has been a historic land use, the removal of grazing may actually prove to be a significant threat to the species.

Critical Habitat For Federally Listed Plant Species In The Project Area

Critical habitat is defined in section 3 (5) (A) of the ESA as: (i) The specific areas within the geographic area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. "Conservation" as defined in section 3(3) of the Act means the use of all methods and procedures needed to bring the species to the point at which listing under the Act is no longer necessary.

On August 6, 2003 the U.S. Fish and Wildlife Service issued its final rule on the Critical Habitat designation for 15 vernal pool species. The original proposal was for 1.7 million acres in 36 counties. The final rule covers only 740,000 acres and has completely eliminated the counties of Butte, Merced, Madera, Sacramento, and Solano for economic reasons. For Modoc County, the proposed acreage was 2,239 acres. The final acreage is 285. However, none of those acres of critical habitat within Modoc County have been designated on Modoc National Forest lands. This final rule was made before slender Orcutt grass was known to exist on the Forest.

Effects of the Action Alternatives on Listed Plant Species

This section describes the potential direct, indirect, and cumulative effects (past, present, and reasonably foreseeable future impacts) from project activities on Federally listed plant species that occur in the project area. This chapter begins by presenting a discussion of the potential project effects on the listed species, and the factors, such as Design Standards, considered in the determination.

The action alternatives in the Noxious Weed Treatment Project would treat 300 to 3000 acres per year for 14 noxious weed species currently known on approximately 6,908 acres of National Forest land. Treatments include manual, herbicide, a combination of manual/herbicide, and cultural. Potential effects to slender Orcutt grass near these treatments could include effects from drift, runoff, or lateral flow of herbicide, potentially killing some individuals; physical damage from manual weed treatment if the weed is immediately next to the listed plant; or aggressive, planted species out-competing the listed plant following cultural treatment (seeding) in areas where noxious weeds have been eliminated.

Because of the unique habitat that slender Orcutt grass occupies, which has standing water into the early summer, it is unlikely that noxious weeds will be able to grow in such harsh conditions, and therefore, it is unlikely that there would be manual treatments immediately next to slender Orcutt grass.

However, noxious weeds may be found in habitats nearby. Vernal pools, which exist because of clay soil layers, unfractured rock, or caliche, act as an impermeable barrier to water percolation, may act as sinks for herbicides that are applied in adjacent habitats. Those herbicides could come from drift, runoff, or lateral flow. Drift of herbicide has been calculated in Table 12. The Hazard Quotient (HI), or estimated exposure, calculated in the table shows that the effect to a surrogate, an annual species in this case, is low. A surrogate species is one that is tested in place of the species of interest. Potential runoff, leaching, and lateral flow are addressed in the section on permeable soils and in Table 9 under the column Mobility. Herbicides that could potentially affect the taxonomic group of which the species is a member, can be seen also in Table 9.

Factors Considered in the Effects Determination

Proximity of the action – how close to listed plant species is the weed treatment, including similarity of habitat of the listed species and the noxious weed species being treated

Distribution – what is the distribution of the listed plant and the distribution of the proposed action in relation to the listed plant species

Timing – the phonologic stage of the listed species when the weed treatment would take place

Nature of effect – what is the nature of the action and its effect

Duration – how long would the treatment last

Disturbance frequency – how often would the treatment be done

Disturbance intensity – how intense would the treatment be

Disturbance severity – what is the severity of the weed treatment

Proximity - There are three known occurrences of noxious weeds within a 100 foot buffer zone of the known occurrences of slender Orcutt grass. These weed occurrences do not overlap the listed species habitat, but encroach on the edge of the habitat. The two weed species found at these noxious weed sites are Scotch thistle (Onopordum acanthium) and Dyer's woad (Isatis tinctoria) (see Table 8 below), both of which occur on drier habitat than where slender Orcutt grass grows.

Table 8. Noxious Weed Sitings Within 100' of slender Orcutt grass

MDF ORTE#	Noxious Weed Species	Noxious Weed ID	Size of Infestation	Distance apart	TRS	ORTE Occurrence Location	Allotment
4	Dyers woad	DG001ISTI	1.0 acre/200 plants	1319 feet	T43N R7E S23	Hackamore Res.	Mowitz
4	Scotch thistle	DG059ONAC	1.43 acres	1480 feet	T43N R7E S23	Hackamore Res.	Mowitz
7	Scotch thistle	BV303ONAC	0.10acre/40 plants	unknown	T40N R7E S5	Whalen Spring	Crank Springs

Distribution - The distribution of noxious weeds are across the Forest, however, none are known to survive in vernal pool habitats. Slender Orcutt grass has only been found in vernal pool-like habitats on the Doublehead, Devils Garden, and Big Valley Ranger Districts of the Modoc NF. Although some noxious weeds may grow in the general area of slender Orcutt grass, habitat for noxious weeds addressed in the FEIS and habitat for slender Orcutt grass do not coincide.

Habitat for Scotch thistle is natural or disturbed areas, along roads, in fields, and especially on fertile soils. On the Modoc NF, it is not uncommon to see this noxious weed in moist areas near reservoirs, on earth dams, and on waterfowl nesting islands. However, it is not known to grow on sites that are inundated well into the early growing season, which is the main habitat requirement for slender Orcutt grass, whose habitat is standing water of sufficient quantity and duration to drown out most competition from other plants and meet the physiological requirements for prolonged inundation, followed by a period of gradual desiccation.

Dyer's woad is found mostly on disturbed sites, such as range, cropland, dry areas, burned areas, woodlands and pasture sites. It will invade native communities in these habitats. The habitat for Dyer's woad is a drier habitat than that of slender Orcutt grass, although this weed can be found nearby, on well-drained soils.

Timing - Flowering of slender Orcutt grass is May-July. Both Dyers woad and Scotch thistle may also be flowering at the same time. However, if the noxious weeds are treated in the rosette stage, most likely the vernal pools will still have water, and slender Orcutt grass would be submerged.

Nature of the Action:

Physical Weed Treatments – This treatment includes hand pulling, digging, and grubbing (selectively removing noxious plants from a native plant population), mulching and tarping, clipping and weedeating. In the unlikely case that a noxious weed is in such close proximity to the listed species, individuals of the listed species could be damaged or killed. However, the listed species has a very harsh habitat that drowns out most competition from other plants, and the chances are very low that a noxious weed would grow that close that its removal would inflict harm to the listed species. Physical treatments would be short in duration, depending on size of the infestation. Tarping or mulching is expected to occur on a very limited number of infestations of small size (see FEIS). Impact from this type of treatment is estimated to be "0."

Duration - Most likely, it would last no longer than one day, with subsequent visits (once or twice a year, and then on a yearly basis until the seed bank is exhausted) to treat new plants growing from the seed bank. Intensity and severity depend on how large and dense the infestations are.

Cultural Treatments – This treatment includes seeding or planting of native species following the removal of noxious weeds. It also includes goat grazing. This treatment would be done on a site-by-site basis, and, therefore, not every site would undergo cultural treatment. Duration - Because the listed species grows in such a specialized habitat, where few other plants are adapted to germinating and growing in an inundated situation, it is unlikely that cultural treatments of seeding would occur or have the potential of being successful in proximity to the listed species, and therefore, duration would be "0."

Herbicide Treatments – Herbicide selection considerations include, among other things, the proximity to sensitive areas, including Threatened plants, such as slender Orcutt grass. Additionally, the Design Standards include several buffers. For slender Orcutt grass, no herbicide weed treatment will occur within a 100-foot buffer. No broadcast spraying is proposed in this project. Only directed spray treatments and direct application, where the herbicide is applied directly to the weed via wicks, would be used. Risk from horizontal movement of herbicides from off-site are reduced by Design Standards, such as those for soils. Duration - Herbicide treatments would most likely be shorter in duration than manual treatments, however, two or three treatments a year may be necessary to control new plants germinating from the seedbank, as with manual treatments.

Disturbance Frequency, Intensity, and Severity Summarized – In summary of the above discussion, cultural treatments most likely would not occur in slender Orcutt habitat, as they would not be needed. Manual and herbicide treatments also would most likely not occur in the listed species' habitat. However, manual treatments in general are more likely to be more intense and severe than herbicide treatments, as manual treatments would be ground disturbing, whereas herbicide treatments would entail a person walking among the weeds with a backpack sprayer or wick applicator with no ground disturbance. Both manual treatments and herbicide applications might require one or two visits a year over a number of years.

Risk Assessment - Herbicides Proposed in the Alternatives

Three known occurrences of noxious weeds to be treated in this action are within 100 feet of slender Orcutt grass. The noxious weeds are located on railroad rights-of-way and near a "two-track" road.

Herbicides proposed for use in Alternatives 2, 4, and 6 are found in Table 4. These herbicides vary in selectivity to plant families and have different effects on native vegetation. A description of expected toxicity to slender Orcutt grass, and the mobility and translocation activity of the herbicide are found in Tables 9 and 10.

The choice of herbicide depends upon mode of action, the weed species involved and what life stage it is in (eg, rosette, seedling, juvenile, flowering, etc) and relative costs of the materials. No single herbicide is effective against all weed species, so tank-mixed combinations are commonly in use. Two tank mixes are proposed in Alternative 6. Toxicity information is unknown for these mixes, as mixing may be synergistic. Bakke discusses synergistic effects in the Specialist Report. His conclusion is that instances of herbicide combinations that cause synergistic effects are relatively rare at environmental exposure levels.

Post-emergence (i.e., after the plant comes up through the soil) herbicides kill existing weeds either by desiccation or by translocation to all growing points. Both types must be applied in sufficient volume to thoroughly wet the vegetation. Coverage and efficiency are enhanced by the use of surfactants, and severe weed infestations are more easily controlled if the weeds are mowed a couple of weeks prior to herbicide use. Most post-emergence herbicides have limitations on the time interval between application and rainfall.

The desiccants simply burn existing vegetation upon contact, which limits their use to annual weeds and seedling perennials. Established perennials have extensive underground storage organs which can quickly regrow new tops, so translocated herbicides are necessary to kill the entire plant. This difference in mode of action precludes the use of the two types of materials together.

Clopyralid (Stinger, Transline, Curtail) is a selective herbicide proposed for use on thistles, yellow starthistle, diffuse knapweed, spotted knapweed, dyer's woad, Mediterranean sage, squarrose knapweed, and common crupina. It affects members of four plant families: Asteraceae (sunflower), Fabaceae (bean), Solanaceae (nightshade), and Polygonaceae (buckwheat). Clopyralid does not affect plants in the Poaceae (grasses), such as slender Orcutt grass (http://tncweeds.ucdavis.edu/products/handbook/11.Clopyralid.pdf).

Dicamba (Clarity, Banvel, others) is a selective broadleaf herbicide, and is labeled for use in grains such as wheat, barley, oats, and in corn, all of which are monocots. It is not effective on grasses (http://www.co.larimer.co.us/publicworks/weeds/herbicide.htm#dic).

2,4-D is a short-residual herbicide that remains active for 10 to 14 days. It can kill or injure many broadleaf plants depending on site conditions, plant growth stage, and herbicide application rate. However, broadleaf plants germinating from seed, or initiating growth more than 10 days following

application should remain unaffected (USDA 2003c). It does not affect grasses (http://www.co.larimer.co.us/publicworks/weeds/herbicide.htm#dic).

Glyphosate, such as Roundup, is a broad spectrum herbicide, affecting both monocots and dicots. It can affect annual and perennial grasses (http://www.co.larimer.co.us/publicworks/weeds/herbicide.htm#dic).

Still the safest herbicides for use in residential and environmentally sensitive areas, glyphosate is a non-selective, foliar-applied herbicide, with Rodeo being licensed for use over water. Accord is the glyphosate formulation that is labeled for forestry applications. Glyphosate is not as effective as most of the other herbicides proposed, and many years of persistent treatment will be necessary to achieve eradication.

Triclopyr is a selective systemic herbicide used for control of woody and broadleaf plants along rights-of-way, in forests, on industrial lands, and on grasslands and parklands. Triclopyr does not injure grasses at recommended rates (http://www.fs.fed.us/r6/nr/fid/pubsweb/tri.pdf). Broad-leaf plants (dicots) have different biochemistry than monocots. Triclopyr affects the family of broad-leafed plants or dicots. Although triclopyr has high solubility, it is not toxic to monocots. (http://www.ecy.wa.gov/programs/wq/pesticides/final_pesticide_permits/noxious/triclopyr_faq.pdf site accessed 9/28/2005).

Chlorsulfuron is a selective herbicide that acts on primarily broadleaf weeds especially mustard spp., pigweed spp., and several thistles. Most perennial grasses are tolerant to chlorsulfuron making it a good herbicide choice for use in range and wildland settings dominated by perennial grasses. However, it may potentially have activity on some annual grass weeds (http://pmep.cce.cornell.edu/profiles/herb-growthreg/cacodylic-cymoxanil/chlorsulfuron/herb-prof-chlorsulfuron.html accessed 9/26/2005).

Mix 1 is a mix of chlorsulfuron and 2,4-D. Toxicity is unknown (due to possible synergist effects), however chlorsulfuron may potentially effect annual grasses, and therefore, this mix has the possibility of negatively affecting slender Orcutt grass if it should come in contact with it.

Mix 2 is a mix of dicamba and 2,4-D. Toxicity is unknown (due to possible synergist effects). Both dicamba and 2,4-D are used to treat broadleaf weeds. With that in mind, this mix most likely would not harm slender Orcutt grass if it should come in contact with it.

Grasses and other monocots are generally not susceptible to auxin-mimic herbicides Auxin is a plant hormone, and auxin-mimic herbicides have a mode of action similar to auxin. The reason that monocots display this selectivity is unclear because there are no apparent differences between the binding sites targeted by auxins in monocots and dicots. It may, however, be due to differences in vascular tissue structure or differences in ability to translocate or metabolize the herbicide (http://tncweeds.ucdavis.edu/products/handbook/08.HerbicideProperties.doc).

Glyphosate will cause harm to both monocots and dicots.

Situations can occur in which a plant may be injured by an herbicide to which it is normally tolerant. This often occurs because environmental stresses such as hot or cold temperatures, high relative humidity, or hail decrease a plant's natural ability to reduce herbicide uptake or deactivate a herbicide. An excessive application of herbicide, due to misapplication, can also injure a tolerant plant by overwhelming the plant's herbicide degradation and deactivation systems (http://www.estension.umn.edu/distribution/cropsystems/DC3832.html). Some herbicide applications may come from the mixing of two herbicides. Synergistic effects, those resulting from exposure to a combination of two or more herbicides that are greater than the sum of the effects of each herbicide alone (additive) are possible. However, Dave Bakke's Specialist Report in support of the FEIS states that instances of herbicide combinations that cause synergistic effects are relatively rare at environmental exposure levels (USDA 2005).

Table 9. Risk Assessment – Herbicides Proposed in the FEIS

HERBICIDE	ACTIVITY CATEGORY[1],	MODE OF ACTION (biochemical or physical mechanism by which it kills plants)	MOBILITY	TRANSLOCATION[3]	TOXICITY TO SLENDER ORCUTT GRASS	LIKELY EFFECT ON SLENDER ORCUTT GRASS USING DESIGN STANDARDS[2]
Clopyralid	Herbicides with foliar activity on broadleaved plants (dicots) only	Auxin mimic	Moderate in soil; very persistent	Systemic	Non-toxic, no effect	NLAA
Dicamba	Herbicides with foliar activity on broadleaved plants (dicots) only	Auxin mimic	Mobile in soil and water; easily degraded by microbes	Systemic	Non-toxic, no effect	NLAA
Glyphosate	Broad spectrum foliar active herbicides with systemic or contact activity and without pre-emergent or residual soil activity	Inhibits the shikimac acid pathway depleting aromatic amino acids	Strongly adsorbed to soil particles; low mobility; rapidly degraded by soil microbes	Systemic	Toxic	NLAA (although glyphosate is a broad spectrum herbicide, the 100' buffer and following the Design Standards should reduce any effects to NLAA)
Triclopyr	Herbicides with foliar activity on broadleaved plants (dicots) only	Auxin mimic	Potential to be mobile; not strongly adsorbed to soil particles; fairly rapidly degraded by soil micro-organisms	Systemic	Non-toxic, no effect	NLAA
2,4-D	Herbicides with foliar activity on broadleaved plants (dicots) only	Auxin mimic	High mobility in soils; weak binding to soil particles; rapid microbial degradation in 1-4 weeks (http://soils.usda.gov/sqi/files/05table.pdf accessed 9/26/2005)	Systemic	Non-toxic, no effect	NLAA
Chlorsulfuron	Chlorsulfuron is used to control many broadleaf weeds and some annual grass weeds. Some weeds may be resistant to chlorsulfuron	Chlorsulfuron is absorbed by the leaves and roots and moves rapidly through the plant; it prevents the plant from producing an	Fairly mobile in soil due to pH and pressure of Aluminum (Al) and Iron (Fe), more mobile at higher pHs and absence of Al and Fe, not expected	Translocation through xylem and phloem	May be toxic to some annual grasses	NLAA (although chlorsulfuron may be toxic to some annual grasses, the 100' buffer and

HERBICIDE	ACTIVITY CATEGORY[1],	MODE OF ACTION (biochemical or physical mechanism by which it kills plants)	MOBILITY	TRANSLOCATION[3]	TOXICITY TO SLENDER ORCUTT GRASS	LIKELY EFFECT ON SLENDER ORCUTT GRASS USING DESIGN STANDARDS[2]
		essential amino acid,(amino acid biosynthesis inhibitor) inhibiting cell division in the root tips and shoots of sensitive plants. It is broken down to inactive products in tolerant plants.	to reach ground water due to rapid degradation and low rates (http://soils.usda.gov/sqi/files/05table.pdf accessed 9/26/2005)			following the Design Standards should reduce any effects to NLAA)
Mix 1 – Chlorsulfuron + 2,4-D	Chlorsulfuron is used to control many broadleaf weeds and some annual grass weeds. Some weeds may be resistant to chlorsulfuron. 2,4-D herbicides control with foliar activity on broadleaved plants (dicots) only.		Mobile in soil.?		May be toxic as chlorsulfuron may be toxic to some annual grasses	NLAA
Mix 2 – Dicamba _ 2,4-D	Herbicides with foliar activity on broadleaved plants (dicots) only		Mobile in soil.?		Separately these two herbicides are non-toxic	NLAA

[1] California Department of Pesticide Registration : http://www.cdpr.ca.gov/docs/es/espdfs/25pe1299.pdf

[2] Design Standards are listed on page 9, 10 and 11 of this document.

[3] Herbicide translocation refers to the movement of a herbicide once inside the plant. Systemic herbicides are translocated throughout the plant, and are therefore more effective in controlling perennial weeds. Xylem-mobile herbicides move in the direction of water from roots to top of plant. Phloem-mobile herbicides are translocated throughout the plant.

Table 10. Comparison of offsite drift rates to observed toxicity values at the given application rate and appropriate buffers[1] to prevent damage to annual grass species; application by boom. Table from information provided by T. Hawkes, USFWS, 2005, and species toxicities from Ecotox 2005.

Herbicide	Application Rate[1] (lb / ac)	Annual Grass Surrogate[2] (NOAEL)[3]	Offsite Application Rate in lb/ac at 100 ft.	Hazard Quotient[3] for individual chemicals at 100 ft Buffer[5]	Hazard Quotient[4] mixes at 100 ft Buffer[5]
Chlorsulfuron	0.05 – 0.0625	0.000105	0.0003	0.178	N/A
Clopyralid	0.1 – 0.25	0.05	0.0011	0.006	N/A
Dicamba	0.25 – 2.0	0.57	0.0088	0.030	N/A
Glyphosate	0.5 –3.75	10	0.0166	0.006	N/A
Triclopyr	0.5 – 1.5	0.176	0.0066	0.051	N/A
2,4-D	0.5 – 2.0	4.2	0.0088	0.004	N/A
Mix 1 – Chlorsulfuron + 2,4-D	0.05-0.0625 (chlorsulfuron)	0.000105	0.0003	0.18	0.1824
	0.5 – 1.5 (2,4-D)	4.2	0.0066	0.0024	
Mix 2 – Dicamba + 2,4-D	0.25 – 1.0 (dicamba)	0.57	0.0044	0.0077	0.0087
	0.25 – 1.0 (2,4-D)	4.2	0.0044	0.0010	

[1] active ingredient application rate based on active ingredient concentration (or acid equivalent) reported on product labels.

[2] Most toxicity testing utilizes surrogate species. Surrogate species serve as a substitute for the species of interest, because all species of interest could not be tested. Surrogate species are typically organisms that are easily tested using standardized methods, are readily available, and inexpensive. Rare species are not tested.

[3] NOAEL = No Observed Adverse Effect Level, the highest level of continual exposure to a chemical which causes no significant adverse effect on morphology, biochemistry, functional capacity, growth, development or life span of individuals of the target species used in the toxicology study.

[4] HI = The ratio of the potential exposure to the substance and the level at which no adverse effects are expected. If the Hazard Quotient is calculated to be less than 1, then no adverse health effects are expected as a result of exposure. If the Hazard Quotient is greater than 1, then adverse health effects are possible. The Hazard Quotient cannot be translated to a probability that adverse health effects will occur, and is unlikely to be proportional to risk. It is especially important to note that a Hazard Quotient exceeding 1 does not necessarily mean that adverse effects will occur. http://www.epa.gov/ttn/atw/nata/gloss.html (accessed 9/20/2005)

[45] Buffers are based on drift as a result of application by a mechanical low boom sprayer, operated on the ground.

No drift estimates exceeded available effect thresholds. The aerial drift estimates are based on data from broadcast spray using boom applicators and therefore represent an overestimate of expected drift. The action in this project will utilize directed spray treatment using backpack sprayers and direct application to the weed using wipes. Therefore, drift values for this project are expected to be substantially less than predicted in the table.

Direct Effects

Direct effects from management activities to Threatened or Endangered plant species must be minimized or eliminated unless they are designed to maintain or improve plant populations (Forest Service Manual 2670, USDA 1995c).

No Action Alternative

Potential adverse effects to slender Orcutt grass from not controlling the spread of noxious weeds could include competition for resources from noxious weeds and change of fire regime if flammable noxious weeds move in. However, slender Orcutt grass occupies a specialized habitat that is inundated for part of the year, a situation that few other plants are adapted to. It is likely that the No Action Alterative would have no effect on slender Orcutt grass.

Action Alternatives that include physical/physical+ treatments

Some plants may be damaged by foot traffic-- trampling and crushing plants--, or, possibly but unlikely, by vehicular traffic, as workers access nearby noxious weed sites. Manually removing nearby noxious weeds by grubbing and digging could accidentally injure or kill some stems of slender Orcutt grass. If noxious weeds are in direct competition for resources with slender Orcutt grass, the removal of the noxious weeds would be a benefit to the threatened plant. However, noxious weeds within 100 feet of slender Orcutt grass, are known from only three sites. Therefore, direct effects are expected to be minimal.

Action Alternatives that include herbicide treatments

Two herbicides proposed in the Modoc National Forest Noxious Weed Treatment Project FEIS are lethal to annual grasses such as slender Orcutt grass: glyphosate and chlorsulfuron. The other herbicides target broadleaf herbs. If the herbicide is transported off-site, direct effects to non-target plants can originate from aerial drift, runoff, or lateral movement of groundwater.

Drift is the movement of the herbicide in the air from the target site to an area unintended for treatment. Formulation, droplet size, wind speed and direction, temperature, and height above ground at which the herbicide is applied are parameters in determining if drift sends herbicide onto untargeted plants. Amine formulations do not vaporize readily and should replace ester formulations in sensitive areas.

Table 10 supports the conclusion that a no herbicide buffer of even 25 feet may be sufficient to prevent drift of herbicide to non target plants when applied by boom (applications on the Forest will be directed spray or wick treatments, and therefore, effects would be even less than what the table shows.) Design Standards for soils and water quality minimizes runoff or lateral movement of groundwater.

Slender Orcutt grass occurs in vernal pool-like habitats that may be slightly depressed from the surrounding landscape. Minimizing any potential runoff or lateral flow is important from the viewpoint that its habitat is generally somewhat lower than the surrounding land surface. Glyphosate is tightly adsorbed to soil and rapidly degraded by microbes. Chlorsulfuron also undergoes microbial and herbicide degradation relatively rapidly. However, it can carry over if rates are exceeded, and trace amounts can be significant due to extreme bioactivity (http://pested.unl.edu/catmans/row/chapter8.pdf accessed 9/27/2005).

The Modoc NF tes_poly04 coverage for slender Orcutt grass was buffered by 100', then that was clipped to the Weedspoly_eis_gt5ac and weeds_woother_less5ac coverages. This Geographical Information Systems (GIS) search came up with three occurrences of noxious weeds within a 100-foot buffer of slender Orcutt grass occurrences. Treatment of these three weed occurrences is scheduled for manual treatment.

Mitigations to avoid affects of herbicide on slender Orcutt grass include Design Standards, Best Management Practices, and proper application methods. Additionally, the three weed occurrences currently known to be within 100 feet of slender Orcutt grass are scheduled for manual treatment.

Action Alternatives that include cultural treatments

Cultural treatments proposed in the FEIS include seeding with plant species on areas that have been denuded by noxious weed treatments. It also includes goat grazing, mulching and tarping. Cultural treatments would have no impact on slender Orcutt grass, as only three noxious weed sites are close, but not overlapping, to this threatened species; if seeding is implemented in nearby sites, only appropriate, species and methods as determined by resource specialists would be used; use of goats includes confining them within the noxious weed site and away from native plants by fences; tarping and mulching would only be used on weeds, not on slender Orcutt grass.

Early Detection – Rapid Response (EDRR) Strategy

Alternatives 4, 5, and 6 include adaptive management. EDRR allows minor project variations to meet site-specific conditions or landscape objectives.

Table 11. Early Detection – Rapid Response Strategy (EDRRS) by Alternative

Alternative 2 and 3 – no EDRRS	Alternatives 4, 5 and 6 - EDRRS
same species of noxious weeds, same sites, same treatments	same and new species of noxious weeds, same and expanding or new sites, same treatments

Because of the harsh environment that slender Orcutt grass grows in, it is unlikely that noxious weeds addressed in this FEIS will occupy that habitat, and effects to the listed species are expected to be minimal from the Early Detection –Rapid Response proposals for Alternatives 4, 5, and 6.

Surfactants, Inerts, Dyes and Synergistic Effects

Surfactants are used in herbicide formulations to increase the absorption of the herbicide by lowering the surface tension of the targeted plants. Since herbicides are used to kill plants, using a surfactant to make it more effective is a moot point. **Inerts** are used to improve the performance of a pesticide, and are 'confidential business information' of the chemical companies, and analysis of these herbicides is therefore impossible. **Dyes** will be used in herbicide treatments to show where the herbicide has been administered. Its effect on non-target terrestrial and aquatic species is unknown; however, its use has not resulted in any known problems. Using dyes can be an aid to making sure that only the target species is treated, and it is here recommended that dyes be used in the administering of herbicides. A **synergistic** effect is any effect of two herbicides acting together which is greater than the simple sum of their effects when acting alone: such herbicides are said to show synergism. The synergistic effect of the two mixes has been covered in Dave Bakke's Specialist Report in support of the FEIS.

Indirect Effects

Indirect effects to TEP plant species from herbicide use could include accidental spills, spray drift, surface runoff, subsurface runoff or a combination of these factors. Herbicide use could also indirectly affect TEP plant species by impacts to invertebrate pollinator species such as bees and butterflies. However, slender Orcutt grass is wind pollinated.

Pesticide spills could potentially impact TEP plant species. Should the spill occur near water, plant members of meadows and seeps, vernally wet, riparian woodland, riparian forest, bog and fen, and non-forested lakeshore and streamside habitats might be exposed to much higher concentrations of herbicides than would be expected from drift, runoff, or even direct deposition of herbicide at the label concentration.

Cumulative Effects

Cumulative impact is the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Cumulative effects would include past, present and ongoing impacts associated with forest management. Past and present activities, and ones that may continue into the reasonably foreseeable future that potentially affect slender Orcutt grass include other previously approved weed treatment programs, grazing activities on Forest allotments, timber management and fuel reduction, pile burning, railroad construction and concomitant weed eradication, road construction, recreation (such as OHV), any impacts from firewood gathering along the periphery of the vernal pool, dam construction and repair, goose nesting island construction, excavation of borrow material such as proposed for Lauer Reservoir, stock pond construction such as by deepening one place in vernal pool as was accomplished in T44N R14E NW ¼ Section 17 (near Lauer Reservoir) .

Herbicide treatments on noxious weeds or for brush control had been used on the Modoc NF, prior to 2002, at which time they were discontinued (Moreo 2005). Herbicides have the capacity to accumulate in the soil or in ground water. However, no such accumulation has been detected. Within the vernally wet habitat itself, there has been waterfowl nest construction, grazing and vehicular use. Hydrologic alterations have also occurred, such as dam creation and repair (Irvin 2004 Pers. comm.). Past management activities may have affected slender Orcutt grass or habitat, however, the treatments to noxious weeds should have no or miniscule effect to this plant.

Projects planned for the Modoc NF that may impact a portion of slender Orcutt grass occurrences and habitat include continued grazing. Cows also use slender Orcutt grass habitat in the early season as a water source, and later in the summer for trailing and resting. Cows have used this habitat for many years (Irvin 2004 Pers. Comm.).

Future recreational activities may impact some listed plant habitat and individuals, the most severe effects arising from unregulated OHV use. Off-highway vehicle damage has been reported to one population of slender Orcutt grass in Plumas County and threatens two additional populations in Shasta and one population in Madera County (CNDDB 1996). Vehicles driving on habitat or individuals may alter habitat and likely kill individuals by crushing.

Hydrologic alterations of habitat, including dam repair or removal, water development maintenance, borrowing material (such as clay to build up dams), and possibly excessive OHV or cattle damage, could impact habitat and entire populations by changing the water regime, lowering one part of the vernal pool so that the rest of the pool does not hold water, or removing water, or damming water and subsequently creating reservoirs too deep to dry out over the growing season. Slender Orcutt grass was first located on the Forest in 2003. Its previous extent on the Forest is unknown. A delineation of vernal pools on the Forest has been contracted. Once the information is gathered and put into a Forest GIS layer, management of vernal pools and slender Orcutt grass will be facilitated.

Natural events such as climate change could impact slender Orcutt grass by lack of sufficient water, or too much water. The change would have to be of such duration as to outlast seed viability of the listed species. At this time, there is no evidence that effects from noxious weed treatment would cause a downward trend for the listed plant species when coupled with the above cumulative effects.

Beneficial Effects

If listed plant species are in close proximity to treatment sites, the indirect effects of either physical or herbicide treatments could be that of decreasing weed competition and lessening the chance of possible future site conversion to the aggressive and competitive noxious weeds. When the weeds are removed from a site, essential resources (water, space, sunlight, and nutrients) will be more readily available to the native plants. The ‘sacrifice’ of a few individuals in a TEP plant population in order to eradicate or limit the spread of an advancing noxious weed is ultimately a beneficial action for the native species. However, since only three sites of noxious weeds are within 100 feet of slender Orcutt grass, there is no anticipated sacrifice of individuals that would lead to such a great loss as causing an adverse affect.

Based on the above discussions, the following determinations have been made as to effects of the Action Alternatives on the listed plant species:

Table 12. Determination of Affects of Project Weed Treatments on slender Orcutt grass

WEED TREATMENT	AFFECT ON LISTED PLANT SPECIES
Physical/Manual	NE[1]
Cultural	NE[1]
Herbicide:	(see specific herbicides below)
Clopyralid	NE[1]
Dicamba	NE[1]
Glyphosate	NE[1]
Triclopyr	NE[1]
2,4-D	NE[1]
Chlorsulfuron	NE[1]
Mix 1	NE[1]
Mix 2	NE[1]

[1] No Effect.

Rationale for Determination

Based on the analysis of the effects of the Project, and on the concerns for the welfare of the slender Orcutt grass:

There are no known noxious weeds that grow in the habitat occupied by slender Orcutt grass (inundated part of the year, dry part of the year).

Design Standards have been included to prevent any possible inadvertent impact to this species. It is determined that there would be No Effect to individuals or the 9 populations on the Forest which include more than 7 million plants total.

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Appendix A

Summary Comparison of Alternatives for the Noxious Weed Treatment Project

Alternatives / Alternative Features	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Treatment Timeframe	**Ongoing**	**5 years**	**5 years**	**10 years**	**10 years**	**10 years**
Treatment Sites and Acres	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**
Total Inventoried Weeds (2004)	541/6908	541 / 6908	541 / 6908	541 / 6908	541 / 6908	541 / 6908
Inventoried Weeds Fully Treated	**20-30** ac/yr[1]	520 / **5,995**	494 / **5,993**	520 / **5,995**	520 / **180**	538/ **241**
Inventoried Weed Sites Receiving Partial Treatment2	0/0	16/904[2]	0/0	16/904[2]	0/0	0/0
Inventoried Weeds Receiving Limited Treatment3	0/**0**	0/**0**	0/**0**	0/**0**	9/**100**[3]	3/**100**[3]
Inventoried Weeds Not Treated4	6,878[1]	5/9[4]	47/916[4]	5/9[4]	5/5515	0/6,567[4]
Proportion of Inventoried Weeds Treated	0.4%	na / 87%	na / 87%	99 % / 99 %	100 % / 4 %	100 % / 5 %
Noxious Weeds Treated Through Early Detection – Rapid Response (acres)5		0 acres	0 acres	Up to **200** acres (100 ac max/yr)	Up to **200** acres (100 ac max/yr)	Up to **200** acres (100 ac max/yr)
Total Acres of Weeds Treated	**20-30** ac/yr1	**6,899** acres	**5,993** acres	**7,099** acres	**480** acres	**541** acres
Treatment Methods for Inventoried Noxious Weeds (2004)	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**
Physical – hand pulling, hoeing, grubbing	0/0	161/31	494/5,993	161/31	0/0	0/0
Physical+ – Physical plus, clipping seed head or plant, weed eater, mulch/tarp	20-30 ac/yr1	0/0	0/0	0/0	527/139	116/19
Physical and/or Herbicide Treatments	0/**0**	333/**5,961**	0/**0**	333/**5,961**	0/**0**	371/**116**
Herbicide	0/**0**	42/**907**	0/**0**	42/9**07**	0/**0**	46/**65**
Limited Treatment3	0/0	0/0	0/0	0/0	9/100	3/100
Goat Grazing (potential) (physical/herbicide)	0/0	0/0	0/0	0/0	5/41 **(no herbicide)**	5/**41**
Total Acres Potentially Treated with Herbicides (includes ED-RR acres)6	0/**0**	355/**6,868**	0/**0**	355/**7,068**	0/**0**	425/**522**

[1]Under Current Management (Alt. 1), approximately 20 to 30 acres of noxious weeds are treated each year through other site specific NEPA decisions as part of other projects in accordance with the Modoc NF Integrated Weed Management Strategy (2005).

[2]These sites are rhizomotous species that occur within 10 feet of H2O. Those sites that are within 10 feet of H2O would not be treated. Sites with acreage ooutside of this 10 foot no treatment zone would receive partial treatment. The acreage within the 10 foot zone would not be treated, the acreage outside the 10 foot zone would be treated with herbicides.

[3]Includes treating along borders of infestations to prevent spread using the methods specific to each alternative. Treatment is estimated at 100 acres to be proportionally distributed based on the size of the individual infestations. These acres are included in the Inventoried Noxious Weeds Treated acreage.

[4]Excluded in Alt. 2 and Alt. 4: 5 sites of rhizamotous species that are within 10' of live water and partial acreage of 16 sites of rhizamotous species that are within 10' of live water. Rhizamotous species will not be treated by physical methods in these alternatives. Excluded in Alt. 3: 47 sites of rhizamotous species. Excluded in Alt. 5: 5,658 acre Dyer's woad, 850 acre Dalmatian toadflax, 159 acre crupina, and 6 sites of rhizamotous species. These sites will receive limited treatment around the perimeter estimated at 100 acres proportionally distributed based on the size of these sites. Excluded in Alt. 6: 5,658 acre Dyer's woad, 850 acre Dalmatian toadflax, 159 acre crupina. These sites will receive limited treatment around the perimeter estimated at 100 acres proportionally distributed based on the size of these sites.

[5]May use any of the methods approved for use in this NEPA decision.

[6]For Alt. 2 this includes the acres under the physical and/or herbicide method plus the herbicide treated acres. Alt. 4 adds the same categories as Alt. 2 plus adds in the potentially treated 200 acres through early detection rapid response. Alt. 6 includes the Physical and/or Herbicide acres, the herbicide acres, the acres under goat grazing, the acres under the limited treatment category, and the 200 acres under Early Detection-Rapid Response.

Appendix S2:

Botany Biological Evaluation

Appendix S2.1: Plants Biological Evaluation

Modoc National Forest Noxious Weed Control Project

MODOC NATIONAL FOREST
SENSITIVE PLANT BIOLOGICAL EVALUATION

December 16, 2002

Summary

The Modoc National Forest proposes to limit the spread of noxious weeds by treating known occurrences with mechanical and chemical control methods.
A Biological Assessment would be prepared if threatened or endangered plant species were suspected in the treatment areas. One Threatened species, *Orcuttia tenuis* is suspected to occur on the Modoc National Forest. This species is found near vernal pools or vernal pool like drainage edges usually in oak and/or pine woodlands. During review it was determined that no habitat for this species occurs within the proposed treatment areas, therefore these activities will have "No Effect". No Endangered plant species are suspected or known to occur on lands administered by the Modoc National Forest, therefore proposed activities would have "No Effect" on these species. No Biological Assessment will be prepared for this project.
This biological evaluation analyzes the potential effects of the proposed alternatives on sensitive plant species as listed by the Regional Forester. The purpose of this biological evaluation is to review the alternatives in sufficient detail to determine the effects of the proposed action on these species. Surveys for Threatened, Endangered and Sensitive (TES) plants have been conducted in many areas across the Modoc National Forest. Although surveys are not complete in all proposed treatment areas, sufficient analysis of the risks to TES plants can be accomplished with current information. Even though they may exist, there are no known instances where sensitive plants and noxious weeds occur in such close proximity that the proposed control measures would impact the sensitive plants.

Both the Proposed Action and the No Action alternatives may affect sensitive plants, but in different ways. The effect from the Proposed Action will be that some sensitive plants may be directly damaged or even killed by the weed control activities, but preventing further spread of the weeds will ultimately have a beneficial effect. Not implementing weed control activities may affect sensitive plants indirectly, resulting in high competition from the weeds and possible loss of individuals, occurrences or susceptible populations.

It is my determination that:

- **Implementation of the Proposed Action "may affect individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the populations or species" for all 19 Modoc National Forest sensitive plants.**

- **Implementation of the No Action alternative "may affect individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species" for all 19 Modoc National Forest sensitive plants.**

Prepared by: Bruce Davidson, Botanist

Reviewed by: Jim Irvin, Range Program Manager

INTRODUCTION

Botanical Review for Modoc National Forest Noxious Weed Control Project has been completed. All areas identified for manual and chemical treatments were considered.
This biological evaluation analyzes the potential effects of the proposed project activities on threatened, endangered and sensitive plant species as listed by the Regional Forester. The purpose of this biological evaluation is to review the proposed project alternatives in sufficient detail to determine the effects of the proposed activity on the species.

THE PROJECT

Location

The proposed noxious weed treatment areas are scattered over much of the Modoc National Forest.

Project description

Treatment will occur to noxious weeds spread geographically over <1% of the Forest, at known infestation sites, by a variety of treatment methods. Sites planned for treatment range in size from single plants to infestations covering up to 1,500 acres. Actual treatment would not exceed 1,500 acres per year. Physical treatment includes hand pulling, digging, and grubbing. These treatments will be applied to small, isolated populations of 100 plants or less and where deemed necessary for other resource concerns.
Herbicide application will occur directly to weed leaves and stems. Two types of foliar applications will be used: Spot applicators –herbicide is sprayed directly onto target plants only; other desirable plants are avoided. These applicators include motorized rigs with spray hoses, backpack sprayers, and hand-pumped spray or spray bottles that can target very small plants or parts of plants, and Wick (wipe-on) applicators –A sponge or wick on a handle wipes herbicide onto weed foliage and stems. The wick generally prevents drift or droplets from falling onto non-target plants and soil. All herbicides proposed for use are registered in the U.S. and California and have a label certifying that the Federal Environmental Protection Agency (EPA) and the California Department of Pesticide Regulation (DPR) have approved the chemical for use. All label directions will be followed.

BIOLOGICAL EVALUATION PROCESS

The activity proposed for this project requires a Biological Evaluation to be completed (FSM 2672.4). The intent of the Biological Evaluation process is to conduct and document activities necessary to ensure that the proposed management actions will not jeopardize the continued viability or cause adverse modification of habitat for: A) Species listed or proposed to be listed as threatened or endangered by the USDI-Fish and Wildlife Service. B) Species listed as sensitive by USDA-Forest Service Region 5.

The Biological Evaluation is a 4-step process. Evaluation of impacts on a given species may be complete at the end of Step #1 or may extend through Step #4. The review process for this project included a Prefield Review for Threatened, Endangered, and Sensitive (TES) plants.

This assessment examines the potential effects to TES plant resources that may result from implementation of proposed activities. Information was obtained from several sources including file records at the Modoc National Forest Supervisors Office, Interdisciplinary Team specialist reports, and numerous journal articles and reports addressing forest and weed management. The following table (Table 1) summarizes the species suspected to occur in the analysis area and the results of surveys performed in the area.

Table 1 Summary of Biological Evaluation Process

SENSITIVE PLANT SPECIES	Step #1 Prefield Review (Habitat Present?)	Step #2 Reconnaissance Assessment (Species Present?)	Step #3 Risk (Conflict?)	Step #4 Biological Investigation (Required?)
Astragalus anxius	YES	YES/limited surveys	YES	NO
Astragalus pulsiferae var. suksdorfii	YES	YES/limited surveys	YES	NO
Botrychium ascendens	YES	limited surveys	YES	NO
Botrychium crenulatum	YES	limited surveys	YES	NO
Botrychium lineare	YES	limited surveys	YES	NO
Botrychium montanum	YES	limited surveys	YES	NO
Calochortus longebarbatus var. longebarbatus	YES	YES/limited surveys	YES	NO
Cypripedium montanum	YES	YES/limited surveys	YES	NO
Eriogonum prociduum	YES	YES/limited surveys	YES	NO
Eriogonum umbellatum var. glaberrimum	YES	limited surveys	YES	NO
Galium glabrescens ssp. modocense	YES	limited surveys	YES	NO
Galium serpenticum ssp. warnerense	YES	limited surveys	YES	NO
Iliamna bakeri	YES	YES/limited surveys	YES	NO
Ivesia paniculata	YES	YES/limited surveys	YES	NO
Mimulus evanescens	YES	limited surveys	YES	NO
Phacelia inundata	YES	limited surveys	YES	NO
Pogogyne floribunda	YES	limited surveys	YES	NO
Polygonum polygaloides ssp. esotericum	YES	limited surveys	YES	NO
Rorippa columbiae	YES	YES/limited surveys	YES	NO

DISCUSSION

Threatened, Endangered Plants

One Threatened species, Orcuttia tenuis is suspected to occur on the Modoc National Forest. This species is found in vernal pools or vernal pool like drainage edges usually in oak and/or pine woodlands. During review it was determined that no habitat for this species occurs within the proposed treatment areas, therefore these activities will have “No Effect”. No Endangered plant species are suspected or known to occur on lands administered by the Modoc National Forest, therefore proposed activities would have “No Effect” on these species.

Sensitive Plants

There are 19 Region 5 Sensitive plant species suspected or documented on the Modoc National Forest. Many of them are restricted to specific habitat types and elevations. Prefield review suggested that habitat might be present in the proposed treatment areas for all 19 sensitive plants. Surveys have been conducted in many areas across the Forest for a variety of projects. If potential habitat areas are assumed occupied by the sensitive plants, an evaluation of effects can be done without additional surveys due to the overall beneficial effect of controlling noxious weeds.

CURRENT MANAGEMENT DIRECTION

Current management direction comes from several different Forest Service documents. The Modoc National Forest Land Management Plan outlines desired future conditions, management requirements and monitoring requirements. With the signing of the Sierra Nevada Framework the Forest Plan has

been amended to include additional management direction. Direction is also included in the Forest Service Manual and Handbook.
Current policy for sensitive plants as stated in the Forest Service Manual (FSM 2670.32) includes the following:

1. Avoid or minimize impacts to species whose viability has been identified as a concern.
2. If impacts cannot be avoided, analyze the significance of the potential adverse effects on the population or its habitat within the area of concern and on the species as a whole.
3. Establish management objectives for Federal Candidate species.

Viable occurrences are defined as "(A) population that has the estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species throughout its existing range within the planning area" (FSM 2670.5).

Current management direction for sensitive plants species by Forest:

Modoc National Forest – "All sensitive plant locations are managed according to the policy direction of the Forest Service Manual (FSM 2670) and the R-5 handbook on threatened and endangered species. Where known occurrences or sensitive plant habitats exist on the Forest, a botanical survey is conducted prior to any land disturbing or land exchange activity. Survey procedures and finding are documented in project environmental analysis records. Projects are modified to maintain the integrity of the habitat (p. 3-61, FEIS)

Species management guides have not yet been prepared for any species likely to be affected by the proposed action. Direction to manage and monitor sensitive plant occurrences according to interim and/or existing species management guides exists in the Forest-wide Standards and Guidelines, (p. 4-21, LRMP) and in the monitoring chapter (p. 5-11, LRMP)

Forest-wide Standards and Guidelines are as follows:

1. Manage and conserve sensitive plant species and their habitats to ensure that viable occurrences are maintained.
   a. Develop and implement a consistent, systematic, biologically sound program for sensitive plant species and their habitat so that federal listing as threatened or endangered is unnecessary.
   b. Prior to project implementation, conduct inventories if potential habitat or known population locations are identified. The reporting procedures for this process are outlined in the Forest Service Sensitive Plant Handbook.
   c. Complete interim management recommendations for all sensitive plant species.
   d. Allow no new disturbance of identified sensitive plant habitat without an environmental analysis.
   e. Allow scientific studies if no detrimental effects on sensitive species occur.
   f. Within the planning period, develop Species Management Guides for all species in the Forest sensitive plant list. These documents will provide information on background and present status of the species; new population locations; potential enhancement opportunities; key area necessary for long-term protection; and maximum impact levels. Use information from the California Natural Diversity Database, and State, federal and private organization.
2. Use partnerships and cooperative programs whenever possible to conserve and enhance sensitive plants and their habitats (p. 4-21, LRMP).

The Sierra Nevada FEIS adds four additional Standard and Guideline directives for threatened, endangered, proposed and sensitive species.

1. Conduct field surveys for threatened, endangered, proposed or sensitive species (TEPS) early enough that the project can be designed to conserve or enhance TEPS plants and their habitat. Conduct surveys according to procedures outlined in the Forest Service

Handbook (FSH 2609.25.11). If additional field surveys are to be conducted as part of project implementation, surveys results must be documented in the project file.

2. Minimize or eliminate direct or indirect impacts from management activities to TEPS plants unless project is designed to maintain or improve occurrences (FSM 2670).

3. All projects involving revegetation (planting or seeding) will adhere to the Regional Native Plant Policy.

4. Prohibit or mitigate ground-disturbing activities that negatively affect hydrological processes that maintain water flow, water quality, or temperature critical to sustaining bog and fen ecosystems and the plant species dependent on them. During project analysis, survey, map and protect bogs, and fens from activities such as trampling by livestock, pack stock, humans and from wheeled vehicles. Criteria for defining bogs and fens include but are not limited to: presence of sphagnum moss (Sphagnum spp.), presence of mosses in the genus Meesia, or presence of sundew (Drosera ssp.). Complete initial inventories of fens and bogs within active grazing allotments prior to re-issuing permits.

EXISTING ENVIRONMENT

Project Area Description
The proposed treatment areas include most habitat types on the Forest, from sagebrush steppe and juniper woodlands to dense conifer forests. Streamside occurrences of Canada thistle are present, as well as Scotch thistle at disturbed sites at a few reservoir edges.

Sensitive Species Information
Habitat Requirements/Range and Distribution
All nineteen sensitive species suspected for the Modoc National Forest were identified as having potential to occur in the treatment areas. Following is a summary of these species, the habitats in which they will most likely occur, physiology and phenology information.

Astragalus anxius – Ash Valley milkvetch

Description: Perennial, + matted; hairs sparse. Stems growing low to the ground, 3-20 cm. Leaflets 9-15, narrow at base and broadening toward tip. Flowers, 7-15, crowded, pea-like. Petals purple to white, with pale lilac veins. Fruit, egg shaped, weakly compressed side-to-side, thinly papery; base not stalk-like; with sparse, stiff, flattened hairs; chamber 1.

Habitat: Gravelly volcanic soil among easide pines barrens and juniper/sagebrush flats.
Elevation: 5,000 to 5,400 feet

Flowering Period: May to July Identification Period: May to August

Astragalus pulsiferae var. suksdorfii - Suksdorf's milkvetch

Description: Perennial, with fine, sub-appressed hairs on upper stem and flower stalk. Stems lying on the ground. Leaves, 1-5.5 cm; leaflets 7-13, crowded, small, moderately hairy. Flowers, 3-13, pea-shaped, petals whitish, lavender - veined. Fruit, 1-2 cm, 6-11 mm wide, + spheric, inflated, papery, translucent; base not stalk-like; hairs 0.5 mm, wavy; chamber 1.

Habitat: Found in open ponderosa pine forests and sagebrush plains or valley floors, in loose porous volcanic gravels and sands.

Elevation: 4,800 to 6,400 ft.

Flowering Period: May to August Identification Period: May to August

Botrychium ascendens, B. crenulatum, B. lineare & B. montanum –moonworts

Description: Perennial herbaceous plants, 2-20 cm tall, producing one above ground "leaf" each year, divided into a variously dissected portion with expanded green blades and a variously branched spore producing portion with clusters of round sporangia.

Habitat: Meadows, springs and seeps, usually at higher elevations.

Elevation: 5,000 to 10,000 ft.

Flowering Period: July to August Identification Period: July to September

Calochortus longebarbatus var. longebarbatus - long-haired star tulip

Description: Bulbiferous perennial 10-30 cm, with a small bulblet near the base of the stem above a narrow, inconspicuous leaf. 1-4 flowers, bell-shaped, 3 lavendar-pink petals with a deep purplish-red band and long hairs above the nectar gland. Petals 2-3 cm, broadly rounded near the tip and somewhat narrowed at the base. Sepals shorter than the petals, narrow, green and pointed. Fruit 20-25 mm, winged.

Habitat: Drying edges of seasonally wet meadow in yellow pine and scattered juniper, in full sun or partial shade, in heavy clay soil.

Elevation: 4,000 to 6,200 ft.

Flowering Period: June to August Identification Period: June to August

Cypripedium montanum - mountain lady's slipper

Description: Herbaceous perennial orchid, 25-70 cm, with 4-6 alternate leaves 5-15 cm, linear to round, often twisted or wavy, sessile. 1-4 flowers, with upper sepal and lateral petals purplish and twisted or wavy, and the lip a large white pouch. Staminode 8-12 mm, yellow, red to purple-spotted.

Habitat: Moist areas, dry slopes, mixed evergreen or coniferous forests..

Elevation: 650 to 7,200 ft.

Flowering Period: May to June Identification Period: May to July

Eriogonum prociduum - prostrate buckwheat

Description: Densely woody and branched, with flowers growing above. Leaves are widest at the top, growing basal, clustered on low stems. Both surfaces covered with dense wooly hairs. Flowers growing on stems in a dense head, bright yellow with reddish-brown midribs and teeth, bell-shaped, thinly hairy.

Habitat: Dry, rocky volcanic slopes and hills mostly in yellow pine or pinion woodlands, but also found in sagebrush scrub.
Elevation: 4,200 to 8,200 feet.

Flowering Period: May to August Identification Period: May to September

Eriogonum umbellatum var. glaberrimum - green buckwheat

Description: Densely woody and branched with flowers growing above leaves. Leaves without hairs, widest at the top, bright green, 1-2 cm long, clustered on low stems. Flowers growing on long hairless stems in an umbel, cream. Most flowering stems have a whorl of small leaves near the middle of the flower stem.

Habitat: Sandy or gravelly soil within sagebrush scrub or juniper woodlands.

Elevation: 5,200 to 7,600 feet.

Flowering Period: July to September Identification Period: May to September

Galium glabrescens ssp. modocense – Modoc bedstraw

Description: Plants frow 8-31 cm high from a woody base, grayish-green with microscopic hair. Leaves egg-shaped, coming to sharp tip, 12 mm long, in whorls of 4. Flowers very small and flat, pale yellow to reddish. Fruits nut-like, hairs long, straight, spreading.

Habitat: Gravelly slopes and under the edges of rocks.

Elevation: 5,200 to 9,200 feet.

Flowering Period: June to July Identification Period: May to September

Galium serpenticum ssp. modocense - Warner Mountains bedstraw

Description: Plants 7-33 cm with a woody base, may have soft short hairs. Leaves in whorls of 4, <15 mm long, lanceolate to elliptic, widest below the middle, the tip abruptly reflexed. Flowers very small, whitish, with 4 spreading corolla lobes. Fruit with 2 nutlike parts, yellowish, surrounded by long, straight hairs.

Habitat: Steep talus sloopes around the bases of rocks.

Elevation: 4,700 to 9,000 ft.

Flowering Period: June to July Identification Period: June to August

Iliamna bakeri - Baker's globe mallow

Description: Fairly large herbaceous plant with stiff stellate hairs along the stem and leaf. Leaves bright green, shallowly three lobed, stem 1-6 cm, blade 1.5-4.5 cm. Flowers large growing at base of leaf stems, calyx 9-12 mm, petals 1-3 cm, rose-purple. Very fragrant.

Habitat: Volcanic loam or lava beds especially after a burn in juniper woodlands and sagebrush scrub.

Elevation: 3,200 to 8,200 ft.

Flowering Period: July to September Identification Period: May to November

Ivesia paniculata - Ash Creek ivesia

Description: This plant is low matted, greyish-green, and densely hairy with branched woody stems. Leaves are mousetail-like, with flat lying straight hairs. Individual leaflets have greater than 5 lobes. The inflorescence is open with white to pale yellow flowers which grow in clusters on stalks. Individual flowers have 5 stamens and from 1-3 pistils. The fruit is 1-1.5 mm, smooth, brown.

Habitat: Open volcanic ridges, gravelly flats, and openings within yellow pine and juniper woodlands.

Elevation: 4,900 to 6,300 feet.

Flowering Period: June to July Identification Period: May to September

Mimulus evanescens – ephemeral monkeyflower

Description: Annual herb, more or less succulent, covered with short, gland-tipped hairs, moist and slimy to the touch. Stems slender, 10-25 cm tall, erect, branched. Leaves sharp-tipped, oval to sword shaped, 1-3.8 cm long, 0.7-2.9 cm wide; the lower leaves have a petiole while the upper leaves do not. Flowers growing at leaf bases, inconspicuous, yellow, with hairs on inside of petals. Fruit enclosed in calyx, 4.8-9.0 mm long.

Habitat: Occurs in sagebrush juniper dominated vegetation zones. Scattered among rock fragments and alongside small boulders, in moist, heavy gravel and clay that has been inundated earlier in the spring. Can also be found in rocky stream banks or drying watercourses.

Elevation: 3,900 to 5,600 feet.

Flowering Period: June to July Identification Period: June to July

Phacelia inundata - playa phacelia

Description: Annual 10-40 cm. Stem branched at the base, short-stiff-hairy, glandular. Leaves 1-3 cm, deeply lobed, segments rounded. Flower stalk 1-4 mm, calyx lobes 3-4 mm, 5.5-8 mm in fruit, short-hairy; corolla 3-5 mm, narrowly bell-shaped, yellow, remaining in fruit; stamens without hairs; style hairy. Fruit 4-7 mm, hairy. Seeds 5-30, 1-1.8 mm, with ridges and furrows throughout.

Habitat: Alkaline flats, dry lake margins.

Elevation: 4,900 to 6,650 ft.

Flowering Period: May to July Identification Period: May to August

Pogogyne floribunda - profuse-flowered pogogyne

Description: Annual less than 10 cm tall, with a pungent, mintlike aroma. Usually branched at the base with few to many upright stems, densely flowered throughout. Leaves linear to round, bristly. Flower and calyx hairy, corolla 4.5-6 mm, two-lipped, white with three purple spots at base of lower lobe.

Habitat: Seasonal wetlands such as vernal pools, and swales mainly within silver sage basins.

Elevation: 3,200 to 5,000 ft.

Flowering Period: June to August Identification Period: June to August

Polygonum polygaloides ssp. esotericum – Modoc County knotweed

Description: Annual herb with stems 5-12 cm. Leaves less than 4 cm long, sessile, linear to lanceolate. Inflorescence 2-7 cm long, 5-7 mm wide; bracts 3-6 mm long, lanceolate to elliptic, growing close to the stem, with a narrow white margin, if any. Flowers white with 5 or 8 anthers. Fruit 2-3 mm, brown, smooth, shiny and lanceolate.

Habitat: Vernal pools, swales and seasonally wet areas, in heavy clay.

Elevation: 4,900 to 5,200 ft.

Flowering Period: April to July Identification Period: June to August

Rorippa columbiae - Columbia yellow cress

Description: Low herbaceous perennial with spreading, branched stems 10-40 cm long. Rhizomatous and finely hairy with unbranched hairs. Leaves 3-10 cm long, lobed to divided, the lower ones stalked. Flowers in short racemes. Petals 4, light yellow, 2.5-4 mm; sepals 2-3.5 mm, hairy, persistent in fruit. Seed pods widely oblong, plump, 3-6 mm long, finely hairy, with a short but visible style tip.

Habitat: Drying lake beds and stream banks in various soil textures, but seasonal saturation is required.

Elevation: 4,000 to 5,900 ft.

Flowering Period: May to September Identification Period: May to October

ENVIRONMENTAL CONSEQUENCES

Proposed Action

Approximately 500 treatment areas are proposed for noxious weed control. 25 treatment sites are within 300 feet of known sensitive plant occurrences. A distance of 300 feet is used to account for varying levels of mapping accuracy for both the weed and sensitive plant locations. Effects specific to known locations are described below.

Astragalus anxius – Ash Valley milkvetch
One known site of Ash Valley milkvetch is in the vicinity of a Scotch thistle occurrence. Physical control is proposed for the Scotch thistle, and the weed site is about 250 feet from the milkvetch. No impacts are likely for this milkvetch occurrence.

Astragalus pulsiferae var. suksdorfii - Suksdorf's milkvetch

One known site of Suksdorf's milkvetch is in the vicinity of a Scotch thistle occurrence. Physical and/or chemical control is proposed for the Scotch thistle, and the weed site is about 200 feet from the milkvetch. No impacts are likely for this milkvetch occurrence.

Calochortus longebarbatus var. longebarbatus - long-haired star tulip

Two occurrences of Calochortus longebarbatus var. longebarbatus (CALOL) are within 300 feet of proposed weed treatment areas. Klamath weed is present within the mapped boundary of one occurrence and is also about 200 feet from the other. Physical control (grubbing) is proposed for all Klamath weed sites. In the summer of 2002, the Forest Botanist visited a CALOL site and reported the occurrence of Klamath weed within the mapped boundary. At that time Chrysolina beetles (introduced biological control agents) were observed on the weeds. Their impact to the weed patch was evident; the plants were wilting and discolored. On that same visit the CALOL plants were not found, but only a portion of the mapped CALOL site was searched. Grubbing the weed patch may impact a very few CALOL individuals. If CALOL plants are disturbed by grubbing, it is likely that direct competition from the weeds was already affecting them. Controlling the spread of the weed patch within the CALOL site will ultimately result in a benefit to the CALOL occurrence by decreasing competition from more aggressive species.
At the second CALOL occurrence, both Klamath weed and Mediterranean sage are growing together about 200 feet from the mapped CALOL site. Physical and/or chemical control is proposed for the Mediterranean sage. No direct effects to this CALOL occurrence are expected from the proposed treatments.

Cypripedium montanum - mountain lady's slipper

Two species of noxious thistles are near one known occurrence of Cypripedium montanum (CYMO2). The area is an undeveloped campsite with a spring. CYMO2 grows near the spring, and Scotch thistle grows in the disturbed area associated with the campsite, about 50 feet from the closest CYMO2 plants. Musk thistle occurs on the opposite side of a road, 50-100 feet from the closest CYMO2 plants. Physical and/or chemical treatments are proposed for both thistles here. The short distance between the thistles and CYMO2 plants is still enough separation that direct impacts to the CYMO2 plants are unlikely.

Eriogonum prociduum - prostrate buckwheat
Scotch thistle occurs adjacent to one known occurrence of Eriogonum prociduum (ERPR9), and is proposed for treatment by physical and/or chemical means. Even though Scotch thistle is not likely to invade the very harsh site that supports ERPR9, it is possible that the two plants co-exist where the mapped boundaries overlap. At this site, effects to ERPR9 from physical or chemical treatment of the Scotch thistle may include the loss of some individual plants. Grubbing or the application of herbicide could kill ERPR9 where the plants are interspersed with Scotch thistle, but most of the occurrence would be unaffected.

Iliamna bakeri - Baker's globe mallow

Known sites of Iliamna bakeri (ILBA) that are within 300 feet of proposed weed treatments occur in the Damon/Long Fire area. Burned in 1996, many thousands of ILBA plants have since sprouted and become established; the ILBA in the fire area is divided into eleven loosely defined occurrences. Known sites of dyer's woad (4), Scotch thistle (2) and spotted knapweed (4) are proposed for treatment here. Physical control is proposed for the two Scotch thistle sites and three of the dyer's woad sites. A combination of physical and chemical control is proposed for one larger dyer's woad site and the spotted knapweed sites. No sites where these noxious weeds and ILBA are actually growing together are known, but there is the possibility that some exist. Individuals of ILBA could be affected by the proposed treatments, but even where they might occur together, the likelihood of significant damage to any individual would be small. When grubbing, persons would not accidentally dig up ILBA; they are large plants and would require some effort to unearth. Likewise, when applying chemical to target weeds, it is unlikely that ILBA plants themselves would be sprayed. Still, there is the chance that some ILBA plants would be affected, maybe even killed during implementation of these weed control treatments. Overall benefits to ILBA from reducing the effects of noxious weed spread would outweigh the possible losses of a few individuals.

Ivesia paniculata - Ash Creek ivesia

The habitat of Ivesia paniculata (IVPA) is a very harsh environment for most plants. As with Eriogonum prociduum, even noxious weeds are not likely to invade these habitats. However, along the edges of these open gravelly barrens and especially in disturbed areas, weeds can compete directly with IVPA. Scotch thistle exists within 300 feet of four IVPA sites, and exists within the mapped boundary of one additional IVPA site. A combination of physical and chemical control methods is proposed for these Scotch thistle sites. Where the weeds and IVPA are growing together, there may be impacts to IVPA individuals. Grubbing and chemical applications could result in the injury or mortality of IVPA plants as the weeds are attacked. The overall benefit of eradicating or controlling the spread of the weeds will outweigh the possible loss of a few IVPA individuals.

Rorippa columbiae - Columbia yellow cress

Three sites of Canada thistle exist near or within the mapped boundary of a Rorippa columbiae (ROCO3) occurrence. The Canada thistle may not actually be near specific ROCO3 locations, as the mapped area is one and a half miles long and ROCO3 is only present in scattered locations along the stream. Still, there is a chance that the thistles may be close enough that ROCO3 could be affected by the proposed chemical treatment. If ROCO3 were in close proximity enough to be affected by the chemical application, the plants would already be suffering from competition from the weeds. Eradicating or controlling the spread of the Canada thistle would benefit the rest of the ROCO3 occurrences, protecting them from being overrun by the aggressive and competitive thistle.

DIRECT EFFECTS

Surveys are not complete throughout the proposed treatment areas; therefore it must be assumed that some undiscovered sensitive plant occurrences exist. Effects to undiscovered occurrences can be addressed without further surveys.
Sensitive plants may be damaged or killed by grubbing, digging and pulling noxious weeds, but only if the plants are interspersed with the weeds. In the same regard, chemical treatment may also damage or kill sensitive plants. There are no known situations on the Modoc National Forest where A, B or C rated noxious weeds are actually growing this close to sensitive plants, but it is possible. If the situation were known to exist, appropriate control measures, including possible chemical treatment, would still be recommended for the benefit of the sensitive species. Some plants may be damaged by foot traffic and vehicle traffic as workers access the sites. Overall, direct effects may initially have a negative impact on a small portion of sensitive plant occurrences.

INDIRECT EFFECTS

If sensitive plants are in close proximity to treatment sites, the indirect effects of both physical and chemical treatments will be that of decreasing competition and lessening the chance of possible future site conversion from the more aggressive and competitive noxious weeds. When the weeds are removed, essential resources (water, space, sunlight and nutrients) will be more readily available to the sensitive plants that remain. A weed-free site will be more likely to be re-colonized by the sensitive plants. Even the "sacrifice" of a few individuals in a sensitive plant population in order to eradicate or limit the spread of an advancing noxious weed is ultimately a beneficial action for the sensitive species.

CUMULATIVE EFFECTS

Other projects planned for the Modoc National Forest will be impacting a portion of sensitive plant populations and habitat. Some of the current project proposals and continuing actions are Blue Fire Restoration, Hackamore Thinning, herbicide application in Long/Damon area, Modoc Complex Fire Restoration, and prescribed fire programs. In addition, livestock grazing will go on throughout the range of most of the suspected sensitive plants, and effects from herbivory and trampling will continue. Recreational activities may impact some sensitive plants, the most severe effects arising from unregulated OHV use. The current proposal is to treat only A, B and C rated noxious weeds. Other noxious weeds, as well as other aggressive non-native plants, do exist throughout the Forest and have been documented in some sensitive plant occurrences. These other weeds (two examples are medusahead and cheatgrass) will continue to affect sensitive plants by competing for resources. Natural disturbances, such as wildfire, drought, flooding, and natural erosion processes will continue, with varying effects. Iliamna bakeri will be rejuvenated from wildfire; Calochortus longebarbatus var. longebarbatus populations will fluctuate with drought and wetter conditions; our annual sensitive plants, Mimulus evanescens, Phacelia inundata, Pogogyne floribunda, and Polygonum polygaloides ssp. esotericum, will experience population swings in response to varying climatic conditions. At this time, there is no evidence that these cumulative effects, coupled with effects from the current proposal, will cause a downward trend for any of the sensitive plants.

No Action

DIRECT/INDIRECT EFFECTS

Without active noxious weed control, the weeds will continue to spread unchecked. Prevention measures, such as equipment washing and restricting access to infested sites, will be implemented as projects occur, but there will be no control measures. The existing weed sites will expand and spread to new areas by wind, vehicle traffic, animal movement and other means. Because of their competitive advantage, when the weed sites are already near or within sensitive plant occurrences, the weeds can be expected to displace sensitive plants within the reasonably foreseeable future (10-20 years). Over a longer period of time (30+ years), entire sensitive plant occurrences could be lost, the plants not able to effectively compete for the limiting resources of water, space, sunlight and nutrients. As the noxious weeds spread to new areas, additional sensitive plant occurrences would be affected.
Are these effects severe enough to cause loss of viability to sensitive plant populations or to cause a trend toward federal listing? Certainly, some occurrences could be lost, and given enough time (50-100 years or more of no noxious weed control), it is reasonable to assume that some sensitive plant populations could lose viability and eventually be lost. Especially at risk are those species that occur only at one or very few sites, with a low number of plants, and exist in sites that are susceptible to weed invasion. Species with these criteria are Botrychium ascendens, Mimulus evanescens, and Rorippa columbiae. These species are not likely to lose population viability from noxious weed invasion in the next 10-20 years, but as time goes on and there is no attempt to actively control the weeds, there will

come a time when it will become likely that these populations will lose viability from the effects of weed competition. Loss of population viability in the long term is not likely for the remaining sensitive plants, which occur in larger numbers, at several locations, and/or in habitats that are less susceptible to weed invasion. My determination for this project is based on the relatively short time frame of the lifespan of a NEPA decision (<10 years).

CUMULATIVE EFFECTS

Effects from other management activities and natural processes are the same as described above for the Proposed Action. With the No Action Alternative, these effects will contribute to a somewhat faster rate of spread for the noxious weeds. For instance, weed seeds will be carried to new sites by continued livestock grazing, recreational OHV use and everyday vehicle traffic on roads.

DETERMINATION

Proposed Action

It is my determination that implementing physical and chemical noxious weed control measures for the currently known A, B and C rated weed sites "**may affect individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species**" for all 19 Modoc National Forest sensitive plants.

No Action

It is my determination that not implementing physical and chemical noxious weed control measures for the currently known A, B and C rated weed sites "**may affect individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species**" for all 19 Modoc National Forest sensitive plants.

Table 3. Summary of Effects

Species Suspected on the Modoc NF	Common Name	Proposed Action	No Action
Astragalus anxius	Ash Valley milkvetch	MAIH	MAIH
Astragalus pulsiferae var. suksdorfii	Suksdorf's milkvetch	MAIH	MAIH
Botrychium ascendens	upswept moonwort	MAIH	MAIH
Botrychium crenulatum	crenulate moonwort	**MAIH**	**MAIH**
Botrychium lineare	slender moonwort	**MAIH**	**MAIH**
Botrychium montanum	western goblin	**MAIH**	**MAIH**
Calochortus longebarbatus var. longebarbatus	long-haired star tulip	**MAIH**	**MAIH**
Cypripedium montanum	mountain lady's-slipper	**MAIH**	**MAIH**
Eriogonum prociduum	prostrate buckwheat	**MAIH**	**MAIH**
Eriogonum umbellatum var. glaberrimum	green buckwheat	**MAIH**	**MAIH**
Galium glabrescens ssp. modocense	Modoc bedstraw	**MAIH**	**MAIH**
Galium serpenticum ssp. warnerense	Warner Mountains	**MAIH**	**MAIH**
Iliamna bakeri	Baker's globe mallow	**MAIH**	**MAIH**
Ivesia paniculata	Ash Creek ivesia	MAIH	MAIH
Mimulus evanescens	ephemeral monkeyflower	MAIH	MAIH
Phacelia inundata	playa phacelia	**MAIH**	**MAIH**
Pogogyne floribunda	profuse-flowered	**MAIH**	MAIH

Species Suspected on the Modoc NF	Common Name	Proposed Action	No Action
Polygonum polygaloides ssp. esotericum	Modoc County knotweed	**MAIH**	**MAIH**
Rorippa columbiae	Columbia yellow cress	**MAIH**	**MAIH**

NE = No effects
MAIH = May affect individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species.
WAIFV* = Will affect individuals or habitat with a consequence that the action may contribute to a trend towards federal listing or loss of viability to the population or species.
* Trigger for a Significant Issue as defined in NEPA

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Appendix S2.2: Plants Biological Evaluation Addendum

Addendum to the Botany Biological Evaluation for Modoc National Forest Noxious Weed Treatment Project

Modoc National Forest, California
Sensitive Plant Species
1/29/2006

Summary

The USDA Forest Service, Modoc National Forest proposes to treat noxious weeds on the Forest.

A Biological Assessment (BA) has been prepared for threatened and endangered plant species suspected or occurring within the project area. *Orcuttia tenuis*, slender Orcutt grass, a Threatened species, occurs on the Forest. This species is found near vernal pools or vernal pool-like drainage edges. No Endangered or Proposed plant species are suspected or known to occur on lands administered by the Modoc National Forest.

A Biological Evaluation (BE) has been prepared for Forest Sensitive plant species. However, since 2003 when the BE was finalized, three species have been added to the Modoc National Forest Sensitive Plant Species List from the Northwest Forest Plan Survey and Manage Program, one species name has been updated, and one species has been removed. Additionally, two new alternatives have been added to the Final Environmental Impact Statement for the Modoc National Forest Noxious Weed Treatment Project. The purpose of this document is to update the BE as to the sensitive species list and to review effects of the alternatives on the twenty-one species on that list.

Information in this report is based on the Modoc National Forest Threatened, Endangered and Sensitive (TES) plant GIS layer, internal field documents, and in-house correspondence.

It is my determination that:

- **Implementation of the Preferred Alternative and Design Standards as detailed in the Final Environmental Impact Statement for the Noxious Weed Treatment Project - is "may effect individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the populations or species" of all sensitive plant species on the Modoc National Forest Sensitive Plant Species List.**

Prepared by: Cheryl Beyer, Forest Botanist

Introduction

Noxious weeds cover approximately 6,908 acres on the Modoc National Forest (NF). The Forest would like to eradicate or control a number of those noxious weeds through implementation of those portions of the Modoc National Forest Integrated Weed Management Strategy that are economically feasible. In addition to a No Action Alternative, several other alternatives have been set forth, including ones constructed from public input.

This Addendum to the Biological Evaluation (BE) for the Modoc National Forest Noxious Weed Treatment Project updates the original BE (2002) with the addition of two new alternatives, totaling six alternatives. These alternatives were developed in response to public comments and provide for a range of treatments.

This addendum includes the addition of species added to the Sensitive Species Plant List, Region 5, U.S. Forest Service, from the Northwest Forest Plan, in a letter dated April 26, 2004, with subsequent correction memo dated May 12, 2004, and direction letter dated August 4, 2004 (Blackwell 2004). This BE also includes a species name change; and the dropping of one species from the 2003 list.

Proposed Action

A description of the alternatives can be found below in the chapter: Alternatives and Their Effects on Sensitive Plant Species. The Proposed Alternative is Alternative 2.

Purpose of Project

The purpose of the project is to aggressively and efficiently eradicate, or control and contain, 14 specific noxious weed species on the Modoc NF utilizing manual, chemical, or manual and chemical treatments. Please see the FEIS for more information.

This action will help preserve the native biodiversity of the Forest and promote the ecosystem health of forested and rangeland habitats by maintaining or improving native forbs and grass communities.

Consistency with Laws, Plans, and Policies

All alternatives would be consistent with direction in the Modoc National Forest Plan as amended, the Modoc National Forest Integrated Weed Management Strategy (2005).

Sensitive Species List Updates

Species Name Change

It has recently (2002) been determined that the plants on the Modoc NF formerly identified as *Astragalus pulsiferae* var. *suksdorfii*, Suksdorf's milkvetch, are more correctly identified as *A. pulsiferae* var. *coronensis*, crown milkvetch (Welsh 2002). This variety is found only on the Modoc Plateau in Modoc and Lassen Counties and on volcanic inclusions in the Sierra

Nevada Range in Plumas County, California, and in Washoe County, Nevada. *A. pulsiferae* var. *coronensis* is a sensitive plant on the Modoc National Forest Sensitive Plant List.

Plant Species Added to the Sensitive List from the Northwest Forest Plan

The Northwest Forest Plan, Record of Decision, has placed three plant species on the Modoc National Forest Sensitive Plant list. These plants are described below.

Botrychium minganense **Mingan moonwort, and**
Botrychium pinnatum **Northwest moonwort**

Description: Perennial herbaceous plants, 2-20 cm tall, producing one above ground "leaf" each year, divided into a various dissected portion with expanded green blades and variously branched spore-producing portion with clusters of round sporangia.

Habitat: Meadows, springs and seeps, usually at higher elevations.

Elevation: 5,000 to 10,000 ft.

Flowering Period: July to August Identification Period: July to September

Threats: Timber harvest may pose indirect impacts in those portions of the range where *Botrychium* appears to be closely associated with old-growth, because of significant changes in light regime, hydrology, temperature, and microclimate that may occur. Direct impacts from timber harvest would occur if logs are yarded across *Botrychium*.

Habitat degradation of native plant communities resulting from exotic weed invasion is a well-documented concern and may pose a threat to the habitat of *Botrychium*.

Trampling by recreational users would probably be harmful to this species. *Botrychium* is a small herbaceous plant that is easily crushed.

Soil compaction would presumably have an adverse effect on the underground buds of this species.

Botrychium may respond poorly to fire; however, the reaction is unknown at the current time.

Livestock may have an adverse impact on *Botrychium* for several reasons. Native species in the Pacific Northwest have not co-evolved to be well adapted to large grazing herbivores, and generally do not respond well to this impact. While there is evidence that *Botrychium* species have been grazed by deer, the impacts from these animals are not equivalent to domestic stock because the latter weigh significantly more. Cattle and horse grazing may impact *Botrychium* due to increased trampling, soil compaction, hydrological alternation, and possible introduction of exotic weeds.

Burial by surface deposition (resulting from erosion, flooding, or other events) could directly impact *Botrychium* because of the small size of this species.

Buxbaumia viridis **Bug-on-a-stick Moss**

Description: Moss, with persistent protonema, yellow green to dark green, dense and felty, coating the substrate in a nearly solid mat. Leafy plant drastically reduced to a tiny cluster of bracts surrounding the gametangia. Seta 5-12 mm long, dark brown. Capsule ovoid, 4.5-6 X 2.5-3.5 mm, nearly erect, or pointing at about a 45° angle from the seta, sometimes horizontal. Mature capsule splits longitudinally along the top, and peels back toward the sides of the capsule, like a scroll of parchment. There is a lack of gloss on the capsule.

Habitat: Rotten logs, peaty soil and humus, in dense, shady and humid coniferous forest, low elevation to subalpine. The logs and stumps will be in an advanced stage of decay, the kind you can stick your foot into with little exertion.

Elevation: unknown

Flowering Period: late summer to fall Identification Period: potentially year-round

Threats: Bug-on-a-stick moss is dependent on shade and a supply of moist logs in an advanced state of decay. Activities that open up the canopy and deplete inputs of logs in various decay classes could diminish long-term viability of this species. It is considered an old growth forest associate. This moss may disappear if suitable substrate or microclimate is not available, or if sources of propagules no longer exist.

Plant Species Removed From the Sensitive List

Botrychium lineare, narrow-leaved moonwort, appeared on the Modoc NF sensitive list between 1998 and 2004. This plant was not on the Survey and Manage list, nor, at this time, is it known or suspected to occur on the Modoc National Forest. In California it was reported only from the Sierra National Forest, where attempts to relocate it have been unsuccessful.

Sensitive Species

Forest Service Manual (FSM) 2670.5 defines sensitive species as "those plants and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers, density, or habitat capability that reduce a species existing distribution."

In FSM 2670.22, management direction for sensitive species is, in part, to ensure that species do not become threatened or endangered because of Forest Service actions, and to maintain viable populations of all native species (U.S. Forest Service 1990a). In addition to Forest Service Region 5 sensitive species, the State of California keeps current listings for all state-sensitive species.

The sensitive species listed for the Modoc National Forest may have the potential to occur in

treatment areas. The table below summarizes these species and the habitats in which they will most likely occur.

Table 1: Sensitive Plant Species within the Modoc National Forest

Code	Species	Common Name	Habitat
ASAN18	Astragalus anxius	Ash Valley Milk-vetch	Dry, volcanic slopes and hills often in pine forests
ASPUC	Astragalus pulsiferae var. coronensis	Crown Milk-vetch	Loose, often rocky volcanic soils with pines and sagebrush.
BOAS	Botrychium ascendens	Upswept Moonwort	Fields, meadows, fens, creek sides
BOCR	Botrychium crenulatum	Scalloped Moonwort	Fields, meadows, fens, creek sides
BOLI7	Botrychium lunaria	Moonwort	Fields, meadows, fens, creek sides
BOMI	Botrychium minganense	Mingan Moonwort	Fields, meadows, fens, creek sides
BOMO	Botrychium montanum	Western Goblin	Fields, meadows, fens, creek sides
BOPI	Botrychium pinnatum	Northwestern Moonwort	Fields, meadows, fens, creek sides
BUVI	Buxbaumia viridis	Bug-on-a-stick	Rotting old-growth logs
CALOL	Calochortus longebarbatus var. longebarbatus	Long-haired Star Tulip	Seasonally wet meadow margins, often on the edges of pine forests.
CYMO2	Cypripedium montanum	Mountain Lady's-Slipper	Moist woods below 5,000 feet, mixed evergreen to pine forests
ERPR9	Eriogonum prociduum	Prostrate Buckwheat	Dry, rocky volcanic slopes and hills mostly in pine forests.
ERUMG	Eriogonum umbellatum var. glaberrimum	Green Buckwheat	Sand and gravel.
GAGLM	Galium glabrescens ssp. modocense	Modoc Bedstraw	Gravelly slopes and under the edges of rocks.
GASEW	Galium serpenticum ssp. warnerense	Warner Mountain Bedstraw	Steep serpentine talus slopes.
ILBA	Iliamna bakeri	Baker's Globe Mallow	Volcanic loam or lava beds, especially after a burn. Juniper woodlands, sagebrush, and pine forests.
IVPA	Ivesia paniculata	Ash Creek Ivesia	Open volcanic ridges, gravelly flats, and openings.
MIEV	Mimulus evanescens	Ephemeral monkeyflower	In gravelly and rocky areas around the edges of reservoirs.
PHIN3	Phacelia inundata	Playa Phacelia	Sub alkaline flats, inundated early in the season within sagebrush and pine habitats
POFL17	Pogogyne floribunda	Profuse-flowered Pogogyne	Vernal pools and similar habitats.
POPOE	Polygonum polygaloides	Modoc County	Vernal pools and swales.

Code	Species	Common Name	Habitat
	ssp. esotericum	Knotweed	
ROCO3	Rorippa columbiae	Columbia Yellow Cress	Moist areas generally along rivers, lakeshores and other wet sites.

Alternatives and Their Effects on Sensitive Plant Species

Below is a brief description of the Alternatives. Complete descriptions can be found in the Final Environmental Impact Statement for the Noxious Weed Treatment Project on the Modoc National Forest.

Alternative 1 – No Action

Under the No Action alternative, current management plans would continue to guide management of the project area. No aggressive noxious weed treatment activities would be implemented. The alternative provides a baseline for comparison and analysis of effects.

Direct and Indirect Effects:

- Identified noxious weed occurrences and new occurrences can continue to expand and compete with sensitive plants for space and resources.
- New noxious weed species may become established and compete with sensitive plants.
- Noxious weeds that produce allelopathic substances (toxic chemicals produced that have a negative impact on other organisms) can prevent other plants from growing in those locations.

Cumulative Effects

- Natural events (fire, flood, drought, disease, insects, landslides, climate change) have affected sensitive plants in the past, and continue to do so. Where, normally, native ruderale plants, including sensitive plants of that successional stage, would reinvade after a natural disturbance, and, gradually, later-stage seral natives would move in, now noxious weeds, highly adapted to infesting disturbed sites, are just as likely to invade and take over these places, and change the conditions on those sites so that they remain inhabited primarily by the weeds themselves, not giving natives and sensitive plants a chance to grow on the site.
- The effects from many past actions may have affected sensitive plants and habitats and may continue to impact them. Effects of reasonably foreseeable future actions include effects from projects that are on the schedule of proposed actions (SOPA).
- Road construction and use, railroad construction and use, and powerline construction and maintenance have created pathways and vectors that facilitate weed spread and infestation, while at the same time possibly injuring or killing sensitive plants. Not only have these activities created conditions allowing noxious weeds to invade, spread along these corridors, and compete with native vegetation, but these corridors may also have isolated some native communities from one another by creating barriers across which some sensitive plants cannot easily share pollen, possibly leading to long-range genetic problems in small populations of sensitive species. Habitat change is one such a barrier, and can occur, for example, when a long, wide,

open swathe is cut for a power line, creating hot, dry, open habitat where it had previously been cool, moist, and shaded.

- Some past road maintenance has spread noxious weeds that were in the cinders and gravel of the borrow material, creating, in some cases, monocultures of weeds in place of native communities that may have included sensitive plants. This is especially true of medusahead, a C-rated noxious weed in Modoc County, which will not be treated as part of this project at this time. However, any weed that competes with native flora can create a similar situation.
- Past fire suppression continues to allow non-fire-adapted species to thrive, while selecting against fire-adapted species such as Baker's globemallow, a sensitive plant. Past fire suppression may be one cause for the invasion of native grasslands and sagebrush steppe by western juniper, changing these areas to juniper woodlands with loss of understory plant biodiversity. Ash Valley milkvetch and crown milkvetch, both sensitive species, utilize this sagebrush steppe habitat.
- Canopy cover removal during past timber management and fuels reduction has changed understory soil moisture and light conditions possibly affecting some cool-forest communities and sensitive plants such as mountain lady's slipper (*Cypripedium montanum*). Those plant communities and the plant species within them that require low light and moist soil have subsequently been selected against in these places. In some cases, plantation-like conditions may have replaced more diversified native communities.
- Past road construction and trampling by cattle may have changed hydrologic function and connectivity of springs and seeps, drying habitats and causing enough change in plant communities dependent upon special aquatic features (such as peatlands) that, where once sensitive plants such as moonworts, two sensitive species of hump moss, and bug-on-a-stick moss had habitat, habitat no longer exists. Cattle trails have, in the past, cut across sensitive plant habitat, trampling individuals and degrading habitat, even if the plants themselves are not grazed; this has happened occasionally in Ash Creek ivesia occurrences. Dam building, goosenest island construction, dug-outs for watering holes and stock ponds have likely changed the hydrology in the Devil's Garden and Doublehead areas. Subsequently, some vernal pool plant communities have been inundated, and others dried up, while vernal pool habitat may have been inadvertently created by other actions. Vernal pool sensitive plant species include profuse-flowered pogogyne, playa phacelia, and Modoc County knotweed.
- Pile burning has the potential to sterilize the soil and kill the native seedbed, creating disturbed openings where weeds can invade intact native communities and begin to disperse their propagules. It follows that pile burning can also potentially eliminate the sensitive plant seedbank.
- The proposed sagebrush steppe ecosystem restoration project will most likely change the native plant communities over a large area of the Forest back to one that is less dominated by juniper.
- Grazing will continue on Forest allotments. Where critical aquatic features that support plant communities such as peatlands, fens, and seeps are found within allotments, there is the potential for trampling, which can change micro-topography and may subsequently alter the conditions upon which plant communities depend. Inadvertent trampling by cattle has the potential to expose organic soils to eroding

processes, creating gullies that facilitate the loss of these fine-textured soils, as has happened in some moonwort habitat. Sensitive plants of these habitats include sensitive moonworts and sensitive mosses. Cattle will continue to congregate in shady areas during hot summer months, including under trees or along creeks and at springs. This may lead to trampling and stressing of native vegetation and degrading of sensitive plant habitat in those areas. Sensitive species growing in shady areas include long-haired star-tulip and mountain lady's slipper.

- Recreation (OHV, horseriding, hiking, camping), firewood gathering, and many other activities have the potential to affect sensitive plants from trampling, the bringing in weed seeds, and picking or collection. Lady's slipper orchids are especially prone to collection by rare plant enthusiasts and casual pickers. In the long-term, this gradual degradation of native and sensitive plant communities and habitats could lead to loss of some of these species from the Forest. In the foreseeable future, however, it is unlikely that Alternative 1 would lead to a listing of any sensitive plant species on the Forest.
- Some of the weed infestations that form monocultures may have different fire regimes than the original native community. These changed fire regimes may select against native communities and sensitive plants that are not adapted to these new regimes, and noxious weed communities may in this way be perpetuated.

Alternative 2 Proposed Action

The Modoc NF proposes to treat 14 species of noxious weeds on 520 sites comprising approximately 5,995 acres to eradicate, control, or contain the occurrences, treating between 300 to 1,500 acres annually for the next five years; herbicides are to be applied by directed spray treatments and backpack application, utilizing the treatment methods of manual (hand-pulling), individual plant herbicide treatment, or manual and individual herbicide treatment. However, vehicle-based herbicide application will not take place within 50 feet of any TES plant location under the Proposed Alternative. Hand spraying or non-herbicide treatment may be conducted.

Direct and Indirect Effects:

- Herbicides are designed to kill plants; some damage to non-target plant species is possible despite cautious planning and implementation.
- Herbicide spray, drift, runoff, leaching, or groundwater movement may result in mortality to individuals, reduce their productivity, or lead to abnormal growth patterns. However, it is highly unlikely that such movement would take place.
- For ground applications of herbicides, the closer the non-target species is to the application site, the greater is the likelihood of damage.
- During herbicide application, the level and extent of damage to non-target plants depends, in part, on site-specific conditions, including wind speed and foliar interception. Design Standard DS-34 is for the control of drift or herbicide migration.
- Herbicides can move off-site in water, soil and wind. Site-specific soil and water characteristics, as well as herbicide formulation characteristics, affect this movement. Effects from herbicide movement are anticipated to be minimal to non-existent.

- The potential to harm non-target species is dependent on herbicide characteristics. Herbicides vary as to their potency, selectivity, and persistence. These factors all play a role in how much harm can occur.
- Measures taken to limit exposure, such as selective herbicide application methods may reduce herbicide movement off-site.
- To provide additional protections and help to avoid direct impacts, site-specific surveys would be conducted prior to implementation of project activities (DS-1).
- Identified noxious weeds may be contained, controlled, or eliminated over a 5-year period.
- No Early Detection Rapid Response Strategy would be included in this alternative, and therefore new sites, expanded sites, or new noxious weeds would not be treated, allowing for untreated expanding noxious weed infestation, and most likely, additional competition to sensitive plants.
- Some bare ground may be exposed during manual treatments as the weeds are removed, and noxious weeds may again invade these bare places. Herbicide treatment is less likely to be ground disturbing, exposing fresh soil for invasion.
- As noxious weeds are removed, natives have the chance to replace them, or natives may be reseeded at sites that are too large to reseed naturally in a timely fashion, before weeds again take over.
- Some native plants, including sensitive species, may be injured or killed by the treatment methods, both manual and herbicide, either directly or indirectly, as analyzed further in this document. However, this is highly unlikely due to Design Standards and other constraints placed on this project.
- The limited number of herbicides proposed in this alternative could pose some roadblocks to control if plants become adapted to those few chemicals, or if those chemicals are not efficiently effective.
- Alternatives 2 through 4 include the most acres to be treated. Based on this, these alternatives have the highest potential to harm non-target plants and native communities. However, this potential is significantly reduced through Design Standards.

Cumulative Effects

- There could be an additive cumulative effect to susceptible non-target species if herbicide use is repeated over time on the same site. This cumulative effect would be most likely where the treatment toolbox is most limited (as in Alternatives 2 and 4).
- Over a five-year period, noxious weed acreage should diminish and sensitive plant habitat would be less threatened by noxious weeds.
- After five years, if a new decision document to control noxious weeds is not implemented, noxious weeds may again start to encroach on sensitive plant habitat.
- Also, see Cumulative Effects under Alternative 1.

Alternative 3

Alternative 3 was developed in response to scoping comments to provide an alternative that did not include herbicides. It does not completely meet the purpose and need because some weed species may be spread as a result of rhizomes, tubers, or root buds that have not been

sufficiently removed to prevent regrowth. This Alternative consists of treating between 300 to 1,500 acres annually for the next five years utilizing manual (hand-pulling) methods.

Direct and Indirect Effects:

- Alternative 3 would result in the reduction of some noxious weeds, and consequently reduction in competition with sensitive plants. However, only non-rhizomatous weeds would be treated, and, therefore, rhizomatous species such as Canada thistle or dalmatian toadflax would continue to grow - possibly expanding in occurrence size - and produce propagules that could spread those weeds. Several occurrences of sensitive plants are within 50' of rhizomatous noxious weeds. These occurrences could be extirpated if weeds are not controlled.
- No Early Detection Rapid Response Strategy would be included in this alternative, and therefore new sites, expanded sites, or new noxious weeds would not be treated, allowing for untreated expanding noxious weed infestation, and most likely, additional competition to sensitive plants.
- Some bare ground may be exposed during manual treatments as the weeds are removed, and noxious weeds have the potential to invade these bare, disturbed places. Or, as noxious weeds are removed, natives also have the chance to replace them, or may be reseeded at some sites.
- To provide additional protections and help to avoid direct impacts, site-specific surveys would be conducted prior to implementation of project activities (DS-1).
- Some native plants, including sensitive species, may be injured or killed by the treatment methods either directly or indirectly, as by trampling or inadvertent mechanical injury.

Cumulative Effects

- Manual treatment of noxious weeds could create more disturbed ground that is prime habitat for aggressive noxious weeds. Unless this project is continued to outlast the seedbank, and desirable species seed in naturally or from cultural treatments, these areas could become dense weed patches upon termination of the project, effectively keeping out sensitive species.
- Rhizomatous noxious weeds would continue to grow and occurrences may increase in size. New sites and expanded sites may continue to grow unimpeded and new noxious weeds that invade would be allowed to grow and infest the Forest. Weed seedbanks will not be treated, and these may be a continuing source of noxious weeds. Noxious weeds would most likely continue to compete with sensitive plants.
- Also, please see Cumulative Effects under Alternative 1.

Alternative 4

This alternative was developed to reflect scoping comments on the need to provide flexibility in treatment methods to eradicate, control, or contain the current occurrences and expanding or new infestations of the selected noxious weeds over a 10 year time period.

In this alternative, the Modoc NF proposes to authorize annual treatments of weed infestations ranging from an estimated 300 to 3000 acres. Treatment includes manual (hand-

pulling, digging, grubbing), herbicide, and manual and herbicide treatment, and Early Detection Rapid Response – new or expanded infestations of the same plants with the same treatments. Herbicides proposed in Alternative 4 include clopyralid, dicamba, glyphosate, triclopyr and 2,4-D. (Please also see the effects section for Alternative 2.)

Direct and Indirect Effects:

- This alternative is the most beneficial to sensitive plants, as it proposes to treat all acreages of noxious weeds, including new weeds and new or expanded sites. This alternative also has a wide array of Design Standards that will help protect against unintentional injury.
- Identified noxious weeds may be contained, controlled, or eliminated over a 10-year period.
- Through Early Detection Rapid Response Strategy new noxious weeds or expanded infestations may also be contained, controlled, or eliminated in this time period.
- Some bare ground may be exposed during manual treatments as the weeds are removed, and noxious weeds may again invade these bare places.
- As noxious weeds are removed, natives have the chance to replace them, or natives may be reseeded at some sites.
- Some native plants, including sensitive species, may be injured or killed by the treatment methods, both manual and herbicide, either directly or indirectly, as analyzed further in this document.
- Alternative 2 through 4 include the most acres to be treated. Based on this, these alternatives have the highest potential to harm non-target plants and native communities.
- Currently, we do not know all the sites that might be treated in this alternative because of the Early Detection – Rapid Response Strategy. However, to provide additional protections and help to avoid direct impacts, site-specific surveys would be conducted prior to implementation of project activities (DS-1).

Cumulative Effects:

- Rhizomatous noxious weed infestations will most likely diminish across the Forest, which would improve the situation for sensitive plants that are competing with those species. Only the largest occurrences of rhizomatous species may still have plants at the end of 10 years, and thus noxious weeds may still be in proximity to and competitive with individuals of the sensitive plants Columbia yellow cress and scalloped moonwort. Due to the aggressive noxious weed treatment, overall noxious weed infestations will diminish across the Forest, as will overall competition with sensitive plants.
- Manual treatment of noxious weeds could create more disturbed ground -- prime habitat for aggressive noxious weeds. Unless this treatment is continued to outlast the seedbank, these areas could become dense weed patches upon termination of the project in 10 years, and provide a new flush of competition with sensitive plants several years later.
- Weed seedbanks will not be treated (this is the case in all alternatives), and these may be a continuing source of noxious weeds.
- Also, please see Cumulative Effects under Alternatives 2 and 1.

Alternative 5

Alternative 5 was developed in response to public comments. This alternative is a no-herbicide alternative utilizing a range of manual and cultural methods to eradicate, control, or contain approximately 280 acres of known sites over 10 years.

Early Detection Rapid Response Strategy would allow eradication of new infestations of the identified weed species, and infestations of new noxious weed species, utilizing the Design Standards. Early Detection Rapid Response Strategy may be used on an additional 200 acres with no more than 100 treated in any one year.

Direct and Indirect Effects:

- Some identified and new noxious weed species may be contained, controlled, or eliminated over a 10 year time period.
- The acreage to be treated is reduced, allowing some of the larger infestations (e.g. Dyers woad, Dalmatian toadflax, and common crupina) to remain unless additional NEPA is completed. Some sensitive plant habitat within these larger areas may become degraded with no treatment of weeds. However, it is unlikely that the occurrences of the sensitive species, Bakers globemallow, will be affected, as that species is mainly a fire-follower, and fire suppression will probably be the main factor for its germination and survival.
- Only small infestations of rhizomatous weeds would be treated, and, therefore, the larger occurrences of rhizomatous species would continue to grow - possibly expanding in occurrence size - and produce propagules that could spread those weeds. Expanding populations of these species could compete with the nearby species, Columbia yellow cress and scalloped moonwort, two sensitive species within 50’ of larger infestations of Canada thistle.
- Although the periphery of three Canada thistle sites would be treated, this member of the Asteraceae family produces seed that can travel with the wind, and expansion of the population can still occur even though the border undergoes treatment.
- Some bare ground may be exposed during manual treatments as the weeds are removed, and noxious weeds may again invade these bare places.
- As noxious weeds are removed, natives have the chance to replace them, or natives may be reseeded at some sites
- Some native plants, including sensitive species, may be injured or killed by the treatment methods, either directly or indirectly, as analyzed further in this document.
- New sites and expanded sites and new noxious weeds can be treated in this alternative through Adaptive Management. This will eliminate any increase in competition to sensitive plants from new information.
- No effect to sensitive plants is expected from treatment of noxious weeds by goat grazing. Use of goats will be limited and the goats will be controlled by fences and herders.

Cumulative Effects:

- Over 10 years noxious weed acreage may diminish and sensitive plant habitat may be improved.
- Manual treatment of noxious weeds could create more disturbed ground that is prime habitat for aggressive noxious weeds to reinfest, and compete with sensitive plants.
- However, the large untreated sites could become a source for many, new satellite sites if careful, annual inventory is not performed. These new sites may degrade sensitive plant habitat before they are discovered in inventories.
- Also, please see Cumulative Effects under Alternative 1.

Alternative 6

Alternative 6 was also developed in response to public comments. This alternative utilizes non-herbicide and herbicide treatment methods, adding a new herbicide (Telar) and two mixes. It proposes to treat approximately 341 inventoried acres over a 10-year time period, and treatments, as in Alternatives 2 and 4, may include use of surfactants and dyes.

Early Detection - Rapid Response Strategy would allow treating new and expanding occurrences of the 14 identified weed species and new species of weeds using the identified Design Standards and the full range of treatment methods listed for this alternative in the Final Modoc National Forest Noxious Weed Treatment Project Environmental Impact Statement (FEIS). (Please also see the effects section for Alternatives 2 and 4.)

Direct and Indirect Effects:

- Identified noxious weeds may be contained, controlled, or eliminated over a 10 year time period.
- Herbicides are designed to kill plants; some damage to non-target plant species is possible despite cautious planning and implementation.
- Herbicide spray, drift, runoff, leaching, or groundwater movement may result in mortality to individuals, reduce their productivity, or lead to abnormal growth patterns.
- The closer the non-target plant species is to the treatment site, the greater is the likelihood of damage.
- The potential to harm non-target plants is dependent on herbicide characteristics. Herbicides vary as to their potency, selectivity, and persistence (see tables 6, 7, and 8)
- Measures taken to limit exposure, such as selective application methods (wicking), may reduce herbicide movement off-site.
- By virtue of a greater variety of possible herbicides, this alternative would be less likely to result in repeated use of the same ones at the same sites over a long period of time.
- Through Early Detection Rapid Response Strategy, new noxious weeds may also be contained, controlled, or eliminated in this time period.
- However, the reduced acreage of noxious weeds to be treated may allow some of the larger infestations to remain unless additional NEPA is completed. It is possible, that sensitive plant habitat within these larger areas may become degraded.

- Some bare ground may be exposed during manual treatments as the weeds are removed, and noxious weeds may possibly invade these bare places.
- As noxious weeds are removed, natives also have the chance to replace them, or natives may be reseeded at some sites.
- An additional herbicide and two herbicide mixes proposed in this alternative may provide better control of some noxious weeds and allow for more opportunities for rotation of herbicides to prevent noxious species adapting to specific chemicals.
- Alternative 6 includes the most herbicides in the toolbox. If a sensitive plant of a particular family is located near a noxious weed site to be treated with herbicide, it may be possible in this alternative to chose an herbicide that would effectively treat the weed, yet not harm the sensitive plant (for example, using Telar, which is affects primarily species in the mustard family, near a sensitive plant in the pea family).

Cumulative Effects:

- Over 10 years noxious weed acreage may diminish and noxious weeds may become less of a threat to sensitive plant habitat.
- Please also see cumulative effects analysis under Alternative 1.

Early Detection Rapid Response Strategy

Early Detection Rapid Response Strategy is a first line of defense against invasions where efforts would increase the likelihood that invasions would be addressed successfully while populations are still localized and levels are not beyond that which can be contained and eradicated. This strategy has been included in alternatives 4, 5, and 6. Treatment of new sites may affect additional sensitive plant individuals (see Appendix C). However, it has been determined that implementation of the action alternatives will not lead to a listing of any of the sensitive plant species on the Forest, because all occur elsewhere besides the Modoc National Forest, and because such a low number of occurrences would be affected by this project (please see Appendix C, Sensitive Plant Risk Assessments for these seven species). Additionally, Design Standards have been included in the FEIS that protect sensitive plants, eg. DS-01, DS-31-34. Early Detection Rapid Response Strategy is the same for Alternatives 4, 5 and 6.

Direct, Indirect and Cumulative Effects of Early Detection Rapid Response Strategy:

- The main beneficial effect to sensitive plants from Early Detection Rapid Response Strategy found in Alternatives 4, 5 and 6 is the removal of the competition (non-native aggressive noxious weeds in this case) for sunlight, water, nutrients, and other plant requirements while noxious weed occurrences are still small and any competition has resulted in very little stress to sensitive plants. As competition increases for these requirements, sensitive plants may become stressed and weakened, and recovery may be impaired.
- There is the potential for treatments under Early Detection Rapid Response Strategy, both manual and chemical, to impact sensitive species. Although this is unlikely, especially with the Design Standards and the small number of occurrences known to be near noxious weed sites, some individuals, for example, might be stepped on. However, the potential impacts from competing invasive species is more likely to

alter sensitive plant communities in the long run, and degrade habitat, than are the potential but unlikely impacts from weed treatments.

Design Standards for Sensitive Plants

Project Design Standards (PDSs) are conservation measures incorporated into a project to minimize or avoid effects to endangered or threatened species and other resources. Project Design Standards (USDA 2005) for the action alternatives include several specifically for sensitive plants:

Table 3. Design Standards for Sensitive Plant Species

Code	Design Standard	2	3	4	5	6
DS-31	TES Plants: Vehicle-based herbicide application will not take place within 50 feet of any TES plant location. Hand spraying or non-herbicide treatment may be conducted.	X	n/a	X	n/a	n/a
DS-32	Sensitive Plants: No spraying of herbicides within 50 feet of sensitive plant species. Wicking and manual treatments may take place within 50 feet of sensitive plants.	n/a	n/a	n/a	n/a	X
DS-33	TES Plants: Herbicide treatments will not take place within 100 feet of Threatened or Endangered plant locations, however, non-herbicide treatments may be conducted.	n/a	n/a	n/a	n/a	X

Noxious Weeds Targeted

Noxious weeds are those plant species designated as noxious by the Secretary of Agriculture or by the responsible State official. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host of serious insects or disease (FSM 2080.5).

Fourteen identified noxious weeds are targeted for treatment on the Modoc National Forest. These species cover approximately 6,908 acres on the Forest.

Table 4: Noxious Weeds Targeted For Control in Alternatives 2-6

Canada thistle	Mediterranean sage
Common crupina or bearded creeper	Musk thistle
Dalmatian toadflax	Plumeless thistle
Diffuse knapweed	Perennnial pepperweed or tall whitetop
Spotted knapweed	Scotch thistle
Squarose knapweed	Klamathweed or St. Johnswort
Dyers woad or Marlahan mustard	Yellow starthistle

Discussion of the Environmental Consequences of the Action Alternatives

There are important *benefits* to sensitive plants from control and eradication of noxious weeds. Weeds compete aggressively with the native flora for light, water, nutrients,and space. For example, medusahead, *Taeniatherum caput-medusae*, an aggressive, invasive,

non-native annual grass identified as a "C" rated noxious weed in Modoc County but not included in this document because it is already so widespread, has overtaken native plant communities in many places on the Modoc National Forest, and is crowding out such rare California natives as volcanic daisy, *Erigeron elegantulus* (Beyer 2005).

Treatments proposed vary by Alternative (please see Table below), and includes manual/mechanical/cultural and chemical treatments. See Table 4 below for treatment methods in the action alternatives to control noxious weeds.

Treatment Methods	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Physical – hand pulling and use of hand tools -pulling grubbing, chopping, digging,	X	X	X	X	X
Physical + - clipping by hand PLANT OR SEED POD, Weed Eaters, mulching (tarping, mulching, covering very small areas)				X	X
Cultural – Limited Goat Grazing (>4 ACES AND < 25 Acres for thistle flowers).				X	X
Cultural – Seeding	X	X	X	X	X
Herbicides	X		X		X
Clopyralid	X		X		X
Dicamba	X		X		X
Glyphosate	X		X		X
Triclopyr	X		X		X
2-4-D	X		X		X
Telar					X
Mix 1					X
Mix 2					X

Manual, mechanical, cultural and herbicide treatments may have a negative effect on sensitive plants.

Herbicides are designed to kill plants. Therefore, the risk presented to sensitive plants is perhaps the greatest risk to a biological entity. But not all herbicides are lethal to all plants. Except for glyphosate, which is a broad-spectrum herbicide, the other chemicals proposed in the alternatives affect a more narrow set of plants. Most are specific to particular families within the dicots, such as chlorsulfuron (Telar) which mainly affects those plants in the Chenopodiaceae and Brassicaceae. That is why Telar is so effective on the noxious weed, Tall whitetop, a species that occurs on the Modoc National Forest. But it is also why the Hazard Quotient (HI), a measure of risk, would be high for Columbia yellow cress, *Rorippa columbiae*, a sensitive plant in the Brassicaceae.

Physical and mechanical treatments may also negatively affect sensitive plants. If the manual treatments create bare soil where noxious weed seeds in the soil bank or from nearby sources can germinate, then a denser occurrence of noxious weed could potentially arise. If manual treatments do not completely remove root or stem material of certain species, those plants can be stimulated rather than killed. Trampling can be more intense during manual rather than herbicide treatments as the workers generally may have to spend more time per plant during removal. Trampling can injure sensitive plants if they are nearby, and trampling can also compact soil, which could give a competitive edge to aggressive weed species. Table 4 shows how manual and mechanical treatments might negatively affect

sensitive plants. The positive effect is, of course, removal of plants that compete with sensitive plants for light, nutrients, water, and space.

Treatment of a monoculture of noxious weeds or a weed-infested site with few native species may not result in the proliferation of suppressed desirable species because the composition of desirable species could be too low to exert dominance. It is likely that viable seeds of both desirable native species and noxious weeds would remain in the soil following weed treatment. On sites dominated by noxious weeds, it is likely that the highest proportion of seeds in the soil would be those of noxious weed species. Therefore, it is likely that seed germination and growth would occur in proportions similar to the composition of the plant community before weed treatment. Sites dominated by noxious weeds prior to treatment, would likely become dominated by noxious weeds following treatment without seeding to establish desirable species. Following treatment of a monoculture or nearmonoculture of noxious weeds, desirable species may have to be seeded (**cultural treatment**) to establish a vigorous stand and prevent re-invasion by noxious weeds. As long as native plants or sterile non-native plants are used, there would be no negative impacts (USDA 2006a).

Manual Treatment Methods	Possible Effects
Physical – hand pulling and use of hand tools -pulling grubbing, chopping, digging	**Inadvertent removal or injury to a nearby plant, trampling of plant or compacting soil by trampling**
Physical - clipping by hand PLANT OR SEED POD	**Inadvertent clipping of sensitive plant or seed pod**
Mechanical – Weed Eaters	**Inadvertent cutting of nearby plants**
Cultural – Limited Goat Grazing (>4 ACES AND < 25 Acres for thistle flowers).	**Goats eating or trampling plants**
Cultural –mulching (tarping, mulching, covering very small areas)	**Mulch inadvertently covering plants and killing them**
Cultural – Seeding	**As long as locally adapted native plants or sterile non-native plants are used, there would be no negative impacts**

Alternatives That Treat Only Known Sites

Alternatives 2 and 3 treat only known sites. Design Standard DS-31 addresses TES Plants for those two alternatives: Vehicle-based herbicide application will not take place within 50 feet of any TES plant location. Hand spraying or non-herbicide treatment may be conducted.

A number of known sensitive plant occurrences are within 50 feet of some noxious weed treatment sites. This buffer of 50 feet does not prohibit herbicide treatments but restricts the application method of the herbicide. Directed spray and wick application can greatly reduce or eliminate drift to non-target plants. The method that has no drift is wick application. Aerial spray, **which is not proposed in this project**, has the greatest probability of drift. Wind direction, height above ground of application, and droplet size of the chemical also are important factors in whether or not drift happens and whether or not drift reaches sensitive plant populations, or drifts in a different direction. All label directions are to be followed when applying herbicides, including adherence to requirements for wind speed.

Bakers globemallow and Dyers woad occur within 50’ eleven times in the Long Damen area. These are places where the two species occur within 50’ of each other. These overlaps are for the same weed site, and also for the same sensitive plant occurrence. These overlaps are all within the large Dyers woad infestation that in Alternatives 4-6 would only be treated along the perimeter to prevent spread. It should be noted that Baker’s globemallow is being delisted from sensitive beginning October 1, 2006.

Seven additional sensitive plant species covering eleven total occurrences are within 50 feet of a noxious weed. Six of these occurrences are scheduled for possible herbicide treatment (see table below). The sensitive species include Ash Valley ivesia, prostrate buckwheat, mountain ladys slipper, long-haired star-tulip, crenulated moonwort, and Columbia yellowcress.

Even if manual or herbicide treatment injured or killed some plants, implementation of the action alternatives would not lead to a listing of any of these sensitive species because all occur elsewhere besides the Modoc National Forest, and because such a low number of occurrences would be affected by this project (please see Appendix C, Sensitive Plant Risk Assessments for these seven species). Additionally, annual review will be conducted by the Forest Botanist of sites to be treated that season. Necessary actions will be implemented if any treatments will be determined to so affect sensitive plant species as to lead to a listing of that species.

Table 7: Sensitive Plant Species At or Within 50' of Weed Treatment Sites

Sensitive species	Number of occurrences on Forest	Number of occurrences at or within 50 feet noxious weeds	Number of occurrences that are at or within 50 feet of noxious weeds that may be treated with herbicides
Ash Valley ivesia	41	2	1
Prostrate buckwheat	21	1	1
Mountain lady's slipper	34	3	2
Long-haired star-tulip	97	1	0
Crenulated moonwort	7	1	0
Columbia yellowcress	3	2	1
Bakers globemallow (delisted from sensitive 10/1/2006)	47	1	1

Alternatives That Include Adaptive Management That Would Treat New Sites

Because we do not know what new noxious weed species might invade the Forest, nor where those species might take root, the entire list of sensitive species on the Modoc NF was investigated for possible listing due to implementation effects of the alternatives that include Early Detection Rapid Response Strategy with treatment of new weeds and new sites.

A review of all sensitive species was done through individual risk assessments for those species (See Appendix A for all assessments). Risk criterion included endemism, number of occurrences on the Forest, percent of total occurrences that are located here, habitat vulnerability, threats, whether a noxious weed was currently located nearby (within 50'), habitat alteration and increased vectors expected from the project, and consideration of the sensitive plant Design Standards for those alternatives.

Although some sensitive plants had High ratings in some categories, because of some Low factors, such as location of that sensitive plant habitat, the overall rating was Low. Ratings for all the sensitive species came out Moderate to Low. Therefore, the

determination was made that even under alternatives that include adaptive management, a "may effect individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the populations or species" was made.

Effects to Sensitive Species From Treatments of Noxious Weeds

Benefits of Noxious Weed Removal:

Benefits can be realized to sensitive species from the removal of noxious weed species, as when the weeds are removed, essential resources, such as water, light, space and nutrients, will be more readily available to the sensitive species that remain.

Under the action alternatives any control of noxious weed species will benefit sensitive plant species within the reasonably foreseeable future (5-10 years). Allelopathic substances that are sometimes produced by noxious species, preventing native species from growing at those sites, would not be produced, and native plant populations would not be reduced or eliminated from growing at the site.

Invasive plants threaten ecological diversity at varying scales by potentially changing the structure and function of native plant communities. Monocultures are being created where a heterogeneous landscape once naturally existed (USDA 2005a).

The impacts of invasive plants on native plants occur at multiple levels, including effects on individuals, genetics, populations, communities and ecosystem processes (USDA 2005a). Invasive plants can often impede the germination, growth, and development of native plants. They can reduce the vigor of, or eliminate, individual native plants through competition. Invasive plants often use more than their share of nutrients, thereby limiting opportunities for natives to establish and thrive (USDA 2005a).

Some researchers have suggested that alteration of disturbance regime may be the most profound effect that an invasive species can have on an ecosystem. The best regional example of this may be the changes in fire frequency and intensity that result from the invasion of cheatgrass, which has been shown to alter historic fire intensity (USDA 2005a).

Herbicide Treatments:

Direct and Indirect Effects

Herbicides can kill or injure plants through direct contact (http://www.epa.gov/docs/OPPTS_Harmonized/850_Ecological_Effects_Test_Guidelines/Drafts/850-4000.pdf). However, different herbicides target different plant groups, and therefore, herbicide contact with a plant does not necessarily mean that that plant will be killed (please see Table 8). The potential to harm non-target species is dependent on herbicide characteristics. Herbicides vary in their potency, selectivity, and persistence. And, the closer the non-target plant is to the treatment site, the greater is the likelihood of damage.

Herbicides have the potential to shift species composition and reduce diversity of native plant communities, as less herbicide-tolerant species are replaced by more herbicide-tolerant species. Certain herbicides and the methods by which they are applied could also harm plant pollinators (USDA 2005a).

Unintended direct spray should be regarded as an extreme accidental form of exposure that is not likely to occur in Forest Service applications (SERA 2005). More likely impacts to sensitive species would occur indirectly from drift, surface runoff, leaching, accidental spills, or a combination of these factors. Potentially, herbicide use could also indirectly affect sensitive plant species by impacts to invertebrate pollinator species such as bees. Herbicide risk to bees, a surrogate for pollinators, can be found in the Risk Assessments for the individual herbicides in the appropriate appendices.

Drift

Drift is the movement of any herbicide through the air to areas not intended for treatment. Drift includes volatilization, where some herbicides may be rapidly lost as vapors after application (http://weeds.cas.psu.edu).

Drift depends on droplet size, wind speed and direction, height above ground of the application, herbicide formulations and adjuvants, and ambient temperature. Effects to sensitive plants from drift, such as injury or death, will be controlled and minimized by proper application of the herbicide using the label information and by adherence to the Design Standards in the FEIS. Herbicide effects to native species can be extrapolated from risk assessments and herbicide labels (such as what the target species are for any particular chemical).

The maximum drift values at 50 feet for dicamba and chlorsulfuron exceeded EPA (Environmental Protection Agency) effect thresholds for the monocot surrogate (a species that represents the sensitive species in question). No other drift estimates exceeded available effect thresholds. It is important to note that although thresholds were exceeded, this does not necessarily mean that adverse effects will occur.

Aerial drift estimates are based on available data, which is from broadcast spray using boom applicators -- and therefore represent an overestimate of expected drift. The action in the FEIS will utilize directed spray treatment, and, therefore, drift is expected to be substantially less than predicted in the table.

There is only one sensitive plant species on the Modoc National Forest that is a monocot – long-haired star lily, and for that species, only one noxious weed occurrence is within 50 feet, and that is Klamathweed, which is scheduled for manual treatment only. The data suggest that adverse impacts to sensitive species from drift will be minimal with a 50-foot buffer.

For application of herbicides closer than 50 feet, use of wicks will apply herbicide directly to weed surfaces, and there should be no drift. Directed spray within 50 feet may affect individual sensitive plants, however, for this limited number of sites, it would not cause a listing of any of the sensitive species.

Table 8. Maximum Application Rates and Offsite Application Rates for Proposed Herbicides in the FEIS, and Toxicity Values (NOEL[1]) for Surrogate[2] Monocots and Dicots Representing Sensitive Plant Species on the Modoc National Forest.

Herbicide	Maximum Application Rate ($^{lb}/_{ac}$)	NOEL		Offsite Application Rate in $^{lb}/_{ac}$ at a Representative Distance[3]
		Monocot Surrogate	Dicot Surrogate	50 feet
Chlorsulfuron	0.05 – 0.0625	0.000035	0.000013	0.0005
Clopyralid	0.1 – 0.25	0.05	0.006	0.0021
Dicamba	0.25 – 2.0	0.06	0.044	0.0166
Glyphosate	0.5 –3.75	0.85	0.14	0.0311
Triclopyr	0.5 – 1.5	0.166	0.182	0.0125
2,4-D	0.5 – 2.0	0.166	0.14	0.0166
Mix: Chlorsulfuron + 2,4-D	0.5 – 1.0 (chlorsulfuron)	0.000035	0.000013	0.0005
	0.5 – 1.5 (2,4-D)	0.166	0.14	0.0125
Mix: Dicamba + 2,4-D	0.25 – 1.0 (dicamba)	0.06	0.044	0.0083
	0.25 – 1.0 (2,4-D)	0.166	0.14	0.0083

Table based on T. Hawkes (2005) and Ecotox (2005).

[1] No Observed Effect Level (NOEL) is the highest level of continual exposure to a chemical which causes no significant adverse effect on morphology, biochemistry, functional capacity, growth, development or life span of individuals of the target species used in the toxicology study.

[2] Most toxicity testing utilizes surrogate species. Surrogate species serve as a substitute for the species of interest, because all species of interest could not be tested. Surrogate species are typically organisms that are easily tested using standardized methods, are readily available, and inexpensive. Rare species are not tested.

[3] Rates at Representative Distances are based on drift (AgDrift) as a result of application by a mechanical low boom sprayer.

Q: *What does this all mean?*

A: This table shows three important things: 1) the Application Rate, 2) the Offsite Application Rates, and 3) the NOEL's. Simply explained:

1) The "Application Rate" is the manufacturer-recommended amount of herbicide sprayed per unit area. This is the maximum rate at which the weeds will be sprayed. Some treatments will occur using lower concentrations of herbicide.

2) The "Offsite Application Rate" shows the concentration of herbicide that, through drift, lands on surfaces *x* feet away from the spray site.

3) The "NOEL" is the greatest concentration of herbicide at which the plant in question (monocot or dicot) is not affected. That is to say, a concentration of herbicide above the NOEL will have an effect upon the plant.

Q: *I'm still confused. How do I use this table? Can you give an example?*

A: Certainly. Let us say that you are concerned about the well-being of a particular plant, a dicot. It is 50 feet away from a noxious weed that will be sprayed with Glyphosate. So, you look on the table at "50 ft" and "Glyphosate," and you see that the concentration of glyphosate drift 50 feet away from the spray site will be 0.0311 $^{lb}/_{ac}$. Multiply this number by the maximum application rate for Glyphosate, 3.75 $^{lb}/_{ac}$, and divide the result by the dicot NOEL for Glyphosate, 0.14. The resulting number is called the Hazard Quotient (HI). If it is less than 1, lab tests show that there will be no adverse effects upon your plant.

Table 9 carries out the hazard quotient calculations for 50 feet, but using the data in the table above, you may do your own calculations for plants at other distances from spray sites.

Table 9. Calculated Hazard Quotients (HI) at 50´ for Surrogate[1] Monocots and Dicots based on data from Table 3.

Herbicide	Maximum Application Rate	Offsite Application Rate at 50 ft	Monocot Surrogate		Dicot Surrogate	
			NOEL[2]	HI[3]	NOEL[2]	HI[3]
Chlorsulfuron	0.0625	0.0005	0.000035	0.89	0.000013	2.4[4]
Clopyralid	0.25	0.0021	0.05	0.01	0.006	0.09
Dicamba	2	0.0166	0.06	0.6	0.044	0.75
Glyphosate	3.75	0.0311	0.85	0.14	0.14	0.83
Triclopyr	1.5	0.0125	0.166	0.11	0.182	0.10
2,4-D	2	0.0166	0.166	0.2	0.14	0.24
Mix chlorsulfuron/2,4-D[5]	0.0625/1.5	0.0005/0.0125	0.000035/0.166	0.89+.1=0.99	0.000013/0.044	2.4+.6=3[4]
Mix dicamba/2,4-D2	1.0/1.5	0.0083/0.0125	0.06/0.166	.1+.1=0.2	0.044/0.14	.2+.1=0.3

[1]Surrogate species are species that are used in place of the sensitive species of interest. Most surrogate plants are crop plants, because research on herbicide effects to non-target plants was done primarily for agricultural purposes.

[2] Toxicity values from Ecotox, 2005.

[3] HI = The ratio of the potential exposure to the substance and the level at which no adverse effects are expected. If the Hazard Quotient is calculated to be less than 1, then no adverse health effects are expected as a result of exposure. If the Hazard Quotient is greater than 1, then adverse health effects are possible. The Hazard Quotient cannot be translated to a probability that adverse health effects will occur, and is unlikely to be proportional to risk. It is especially important to note that a Hazard Quotient exceeding 1 does not necessarily mean that adverse effects will occur. http://www.epa.gov/ttn/atw/nata/gloss.html (accessed 9/20/2005)

[4]Only members of the mustard family, the Brassicaceae, were available as surrogates for chlorsulfuron in the Ecotox database for dicots. Chlorsulfuron is known to be especially toxic to plants in this family, and hence the higher HI. For dicots in other families, this herbicide is probably not as toxic.

[5]For a description of the mixes, see the FEIS, Table 2-9. For mixes, the effect s are additive (Dirkin 2005 pers. comm.)

Q: *What does this table mean?*

A: This table shows Hazard Quotients (HI) for both monocots and dicots for each herbicide at 50 feet from the spray site. It also includes all of the relevant data for

calculating the HI. The method for calculating the HI is discussed in a footnote for Table 8.

1) The "Site Application Rate" is the manufacturer-recommended amount of herbicide sprayed per unit area. Keep in mind: this is the maximum rate at which the weeds will be sprayed. Spraying may occur at lower rates.

2) The "Offsite Application Rate at 50 ft" is the concentration of herbicide that, through drift, lands on surfaces at various distances away from the spray site. In Table 9 this distance is 50 feet. The off-site drift rates are based on AgDrift (see Hawkes 2005).

4) The "HI" is the Hazard Quotient, a number obtained by multiplying the Application Rate by the Offsite Rate and dividing the result by the NOEL (species toxicity). If the HI is less than 1, there will be no adverse effects to the plant. In Table 9, if the HI is less than one, than there will be no adverse effects to the plant 50 feet away from the spray site. Only two HIs are greater than 1. Those are for a dicot receiving drift at 50 feet from chlorsulfuron, or the Mix 1 (chlorsulfuron and 2,4-D) at the maximum application rate. As discussed previously, for dicots, only mustard-family surrogates had been tested, and chlorsulfuron is especially toxic to plants in the mustard family. Only one sensitive plant is in the mustard family, Columbia yellow cress.

5) Not included in the table is the herbicide Triclopyr BEE. Hazard Quotients for both monocots and dicots using this ester form of Triclopyr are generally just above 1. Because boom sprayers are used, it can be argued that the Hazard Quotients in these cases, using the proposed wick and directed spray treatments, would actually be below 1.

Q: *Why was the H.I determined at 50 feet from application of the herbicide?*

A: In the Design Standards for sensitive plants, 50 feet is the distance within which, in Alternatives 2 and 4, no vehicle-based herbicide application will take place. In Alternative 6, 50 feet is the distance within which there will be no spraying.

Code	Design Standard	2	3	4	5	6
DS-31	TES Plants: Vehicle-based herbicide application will not take place within 50 feet of any TES plant location. Hand spraying or non-herbicide treatment may be conducted.	X	n/a	X	n/a	n/a
DS-32	Sensitive Plants: No spraying of herbicides within 50 feet of sensitive plant species. Wicking and manual treatments may take place within 50 feet of sensitive plants.	n/a	n/a	n/a	n/a	X
DS-33	TES Plants: Herbicide treatments will not take place within 100 feet of Threatened or Endangered plant locations, however, non-herbicide treatments may be conducted.	n/a	n/a	n/a	n/a	X

Q: *Can you clarify this for me? What is the point of this table?*

A: The point of this table is, as stated above, to show Hazard Quotients for representative surrogate monocots and dicots for each herbicide, at 50 feet from the spray site. Let us say that you are concerned about a plant, a monocot in this instance, that is located 50 feet from a weed that will be sprayed with Clopyralid. You look at the HI and see that it is 0.01, much less than 1. You understand what this means: since the HI is so much less than 1, there will be no adverse effect upon your monocot.

Q: *What is a 'surrogate?'*

A: A surrogate is something used in the place of another. Humans are usually not used in research trials, but laboratory animals are. For plants, crop plants were typically tested because of the emphasis on agricultural applications for herbicides. These crop plants are surrogates for the non-target plants. Because taxonomy is the important predictor of effects for plants, a monocot and a dicot were used in the analysis of possible effects on non-target plants.

Q: *Are the HI's calculated here set in stone? Can they be applied universally?*

A: These HI's are calculated from the best available data, but they are not universally applicable. For one, the application rates used for these calculations are the maximum that will be used; lower application rates will naturally result in lower off-site drift rates, and consequentially lower HI's. Also, the application method used in the experiments that provided us with these data was spraying by boom; we shall be using directed spray and wick treatments, which should significantly reduce drift. Wick treatments, in fact, should produce no drift at all. Finally, please note that our data was collected using surrogate species. The actual effects upon particular sensitive species may vary; however, this information allows us determine possible effects to our non-target species based upon the sensitive species' taxonomic relationship to the surrogate.

Q: *What if, in spite of efforts to the contrary, some sensitive plants are actually sprayed?*

A: Only in very few instances are noxious weeds in close proximity to known sensitive plant sites. Also, few of our sensitive species are endemic to this forest – the rest occur elsewhere as well as here. Even if some sensitive plants are injured or killed, there is no expectation that the species (nor even the various populations of those species) will suffer loss of viability as a result.

Herbicides are designed to kill plants, and therefore, some sensitive plants that are near noxious weeds to be treated in this FEIS, may be impacted. However, overall effects to these "nontarget" species (species are not intended to be controlled, injured, killed, or detrimentally-affected in any way by an herbicide) would not negatively impact the species, as only 10 populations other than those of Baker's globe-mallow are close enough to incur impacts from weed treatments, and in no instance would impacts to these few populations for these species cause a trend towards listing.

There are thirty-six occurrences of Baker's globe-mallow close enough to weed treatments to be affected. However, in reviewing the most recent literature showing a

large number of occurrences and large number of plants per occurrence of this species, the effects to this species, even with this number of possible impacts, is determined to be not of such magnitude that it would lead to a listing of this species. Additionally, this species is being removed 10/1/2006 from the sensitive species list on national forests and BLM districts in California.

Herbicide impacts to sensitive plants are to be additionally minimized by implementation of Design Standards, described in the FEIS, such as buffers to water bodies, limited operating periods (LOPS), and Design Standards for permeable soils.

Surface Runoff

Surface runoff is water moving over the surface of a field or treated area that can carry herbicide with it (http://weeds.cas.psu.edu). The greatest loss of herbicide occurs when the herbicide is applied to the soil surface and is washed off by the first rain after application. Applying herbicide to the soil surface is not one of the treatment methods in this Project. Effects to sensitive plants from runoff, such as uptake by roots, and translocation to plant organs that injure or kill the plant, will be controlled and minimized by using the application methods presented in the FEIS, and by adherence to the Design Standards. Design Standards for several of the action alternatives include the provision that on soils with rapid permeability and/or excessive drainage, do not use herbicides with high leaching potential to treat noxious weeds (please refer to the Hydrology Specialist Report). Additionally, some of the herbicides proposed in this project are broken down by microbes quickly.

Table 10. Risk Assessment – Herbicides Proposed in the FEIS[1]

HERBICIDE	ACTIVITY CATEGORY	MODE OF ACTION (biochemical or physical mechanism by which it kills plants)	MOBILITY	TRANSLOCATION
Clopyralid	Herbicides with foliar activity on broadleaved plants (dicots) only	Auxin mimic	Moderate in soil; very persistent	Systemic
Dicamba	Herbicides with foliar activity on broadleaved plants (dicots) only	Auxin mimic	Mobile in soil and water; easily degraded by microbes	Systemic
Glyphosate	Broad spectrum foliar active herbicides with systemic or contact activity and without pre-emergent or residual soil activity	Inhibits the shikimac acid pathway depleting aromatic amino acids	Strongly adsorbed to soil particles; low mobility; rapidly degraded by soil microbes	Systemic
Triclopyr	Herbicides with foliar activity on broadleaved plants (dicots) only	Auxin mimic	Potential to be mobile; not strongly adsorbed to soil particles; fairly rapidly degraded by soil micro-organisms	Systemic
2,4-D	Herbicides with foliar activity on broadleaved plants (dicots) only	Auxin mimic	High mobility in soils; weak binding to soil particles; rapid microbial degradation	Systemic

HERBICIDE	ACTIVITY CATEGORY	MODE OF ACTION (biochemical or physical mechanism by which it kills plants)	MOBILITY	TRANSLOCATION
			in 1-4 weeks	
Chlorsulfuron	Chlorsulfuron is used to control many broadleaf weeds, esp. those in the families Chenopodiaceae and Brassicaceae, and some annual grass weeds. Some weeds may be resistant to chlorsulfuron	Chlorsulfuron is absorbed by the leaves and roots and moves rapidly through the plant; it prevents the plant from producing an essential amino acid,(amino acid biosynthesis inhibitor) inhibiting cell division in the root tips and shoots of sensitive plants. It is broken down to inactive products in tolerant plants.	Fairly mobile in soil due to pH and pressure of Aluminum (Al) and Iron (Fe), more mobile at higher pHs and absence of Al and Fe, not expected to reach ground water due to rapid degradation and low rates	Translocation through xylem and phloem

[1] Information for this table obtained from the following site: (http://soils.usda.gov/sqi/files/05table.pdf accessed 9/26/2005)

Leaching

Leaching is when water carries herbicides into and ultimately out of the root zone. The portion lost to leaching depends on soil texture, herbicide solubility, and amount and intensity of rainfall (http://weeds.cas.psu.edu). Impacts from leaching to sensitive plants, such as uptake by roots and translocation to plant organs where it may injure or kill the plant, will be minimized by restricting application of water-soluble herbicides to soils that are not permeable. Permeable soils are discussed under the "Soils" topic in the FEIS. Additionally, to reduce impacts to sensitive plants from leaching, applications of herbicide will adhere to the relevant Design Standards, Table 2-4, FEIS.

Spills

Herbicide spills could potentially impact plants of all habitats. Herbicide spilled directly on the plant may injure or kill it. Herbicide spilled on the ground could be leached into the soil, or be moved by rain in runoff, and eventually reach plant roots where it is taken up and translocated to plant organs, eventually injuring or killing the plant. Should the spill occur near water, plants in those habitats (meadows, seeps, vernally wet, riparian, fen, lakeshore and streamside) might be exposed to high concentrations of herbicides. To lessen impact to non-target species, an herbicide spill contingency plan has been developed (see Appendix C: Spill and Safety Management of the FEIS). However, some potential effects cannot be fully mitigated, and spills could possibly injure plants, or kill non-target species, even though a spill plan is in place, and therefore the determination of a "may effect."

Cumulative Effects

Cumulative impact is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future

actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Herbicide use and other activities or influences, both natural and human-caused, on all land ownerships in Modoc, Lassen, and Siskyou Counties pose risks to non-target plants. Projects planned for the Modoc National Forest in addition to noxious weed treatments may impact a portion of sensitive plant populations and habitat, by removal or injury of plants, disturbing plants or soil, reducing canopy cover, or altering sensitive plant habitat in other ways.

Some of the past, present, and upcoming projects and continuing actions that will contribute to cumulative effects include roads, which will continue to be major conduits for invasive plants, previously approved weed treatment programs, sagebrush steppe ecosystem restoration and juniper removal, forest health projects, hazard tree removal, pile burning, fuel reduction, timber salvage, vegetation treatments, thinning, road construction, maintenance, and improvements, railroad and powerline construction, firewood gathering, decorative rock removal, guzzler installation and maintenance, dam construction, repair, or removal, creation of waterfowl habitat, weir building, livestock developments such as watering holes, and special uses such as hydroelectric, geothermal and wind energy developments.

In addition, livestock grazing will go on throughout the range of most of the sensitive plants and effects from herbivory and trampling will continue. Herbivory can alter successional patterns and rates when selective foraging favors survival, growth, and reproduction of plants with low palatability, although the impact can differ greatly among ecosystems (USDA 2005a). Hummocks created by cow hooves in wet to moist meadows and other special aquatic features has changed topography in sensitive plant habitat, and may continue to change this habitat.

Recreational users such as hikers, OHV (off-highway vehicle) operators, special camps and rides, and individual equestrians may impact some sensitive plants by trampling or running over them. Horses and pack stock may impact sensitive areas where they are picketed, left to graze, or brought to water. Medicinal and edible plant collectors may take parts or remove whole plants of some sensitive species.

The current project is to treat only certain A-, B-, and C-rated noxious weeds. Other noxious weeds, as well as other aggressive non-native plants, do exist throughout the Forest, and have been documented in some sensitive plant occurrences. These other weeds (such as medusahead and cheatgrass) will continue to affect sensitive plants by competing for resources.

Natural disturbances, such as wildfire, drought, flooding, and natural erosion processes will continue, with varying effects on sensitive plants. *Iliamna bakeri* will be rejuvenated by wildfire; *Calochortus longebarbatus* var. *longebarbatus, Mimulus evanescens*, *Phacelia inundata*, *Pogogyne floribunda*, and *Polygonum polygaloides* ssp. *esotericum* will experience population swings in response to varying climatic conditions.

Pollinators

Herbicides may affect pollinators to sensitive plants (see Special Report, Invertibrates). Very little information is available on the effect of herbicides on native pollinators. Most information is about the non-native honeybee (USDA 2005a). However, the accidental spraying of pollinators and any subsequent injuries to these pollinators, compared to the available number of pollinators, is expected to be a small percentage. No effect to the overall pollination of sensitive plants is expected from the action alternatives.

Manual Treatments

Manual/physical methods proposed in the action alternatives include:

Physical/Physical+ – hand pulling and use of hand tools, clipping by hand of the PLANT OR SEED POD, Weed Eaters, mulching (tarping, mulching, covering very small areas)
Cultural – Limited Goat Grazing (>4 ACES AND < 25 Acres for thistle flowers).

Direct and Indirect Effects

In the unlikely case that a noxious weed is in such close proximity to sensitive species, individuals of the sensitive species could be damaged or killed by trampling or mechanical means as the noxious weeds are treated. During tarping or mulching, some sensitive plants could be covered and consequently die. Mulching with plastic or organic materials can be used in relatively small areas (less than 0.25 ac), but will also stunt or stop growth of desireable native species (USDA 2005a). Goats could eat plants that weren't protected from them by fences or herding. Seeded species in cultural plantings could potentially outcompete the sensitive species, however, fertile non-natives are not being proposed in any seed mixtures, so this is unlikely. Additionally, manually treated areas may disturb soil that then becomes available to invading species, including the noxious weeds that already have seeds in the seed bank waiting for a germination opportunity.

Hay mulch was used in Idaho to reduce flowering of Canada thistle, but most rhizomatous perennial invasive plants cannot be controlled by this method or by shading because extensive root reserves allow regrowth through and around mulch or shad materials (USDA 2005a).

Cumulative Effects

Please see Table below and Cumulative Effects under the heading, Herbicide Treatments.

Table 11. Examples of Cumulative Effects for Action Alternatives

Type of Impacts	Source of Impact	Possible Results of Impact
Herbivory	Grazing by stock, cows, or sheep	Removal of plant parts, resulting in death of plant or loss of competitive ability
Breaking off plants parts	Trampling from recreation, stock or grazing animals, running over by vehicles	Loss of chlorophyllous tissue, and thereby weakening plant system

Type of Impacts	Source of Impact	Possible Results of Impact
	such as permittee's or recreational ohv or fire wood gathers vehicles	
Removal of plant	Medicinal plant collectors, inadvertent digging by manual noxious weed removal, siting of energy facilities	Loss of plant, weakening viability of that population
Change in canopy coverage and solar radiation	Timber and fuels projects	Too much solar radiation, changing habitat, and therefore the plant species that occupy that space
Killing seed bank	Hot fires, pile burning	Sensitive plant seeds in the soil bank will be killed, removing that plant from the site
Loss of saturation level, and/or organic soil	Hoof action in critical aquatic refuges from stock, cows and sheep	Loss of sensitive plant habitat
Competition from noxious weeds	No noxious weed treatments	Loss of sensitive plants to aggressive, competing noxious weeds
Habitat manipulation	Manipulation of water by guzzler, nest island, or dam construction	Sensitive plant not able to survive in that new habitat
Habitat fragmentation	Road building, habitat loss from management activities	Loss of viability of sensitive plant populations
Habitat loss	Decorative rock removal, heavy trampling by grazing livestock in critical aquatic features	New habitat not able to be occupied by previous species

Determination of Effects To Sensitive Plant Species

It is my determination that implementing the Preferred Alternative and Design Standards "may affect individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species" of all sensitive plant species on the Modoc National Forest Sensitive Plant List.

Table 12. Summary of Effects for Preferred Alternative

Code	Species	Common Name	Environmental Effect
ASAN18	Astragalus anxius	Ash Valley Milk-vetch	MAIH
ASPUC	Astragalus pulsiferae var. coronensis	crown Milk-vetch	MAIH
BOAS	Botrychium ascendens	Upswept Moonwort	MAIH
BOCR	Botrychium crenulatum	Scalloped Moonwort	MAIH
BOLI7	Botrychium lunaria	Moonwort	MAIH
BOMI	Botrychium minganense	Mingan Moonwort	MAIH
BOMO	Botrychium montanum	Western Goblin	MAIH
BOPI	Botrychium pinnatum	Northwestern Moonwort	MAIH
BUVI	Buxbaumia viridis	Bug-on-a-stick	MAIH
CALOL	Calochortus longebarbatus var. longebarbatus	Long-haired Star Tulip	MAIH
CYMO2	Cypripedium montanum	Mountain Lady's-Slipper	MAIH
ERPR9	Eriogonum prociduum	Prostrate Buckwheat	MAIH
ERUMG	Eriogonum umbellatum var. glaberrimum	Green Buckwheat	MAIH
GAGLM	Galium glabrescens ssp. modocense	Modoc Bedstraw	MAIH
GASEW	Galium serpenticum ssp. warnerense	Warner Mountain Bedstraw	MAIH
ILBA	Iliamna bakeri	Baker's Globe Mallow	MAIH
IVPA	Ivesia paniculata	Ash Creek Ivesia	MAIH
MIEV	Mimulus evanescens	Ephemeral monkeyflower	MAIH
PHIN3	Phacelia inundata	Playa Phacelia	MAIH
POFL17	Pogogyne floribunda	Profuse-flowered Pogogyne	MAIH
POPOE	Polygonum polygaloides ssp. esotericum	Modoc County Knotweed	MAIH
ROCO3	Rorippa columbiae	Columbia Yellow Cress	MAIH

NI = No impact.
MAIH = May affect individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species.
WAIFV* = Will affect individuals or habitat with a consequence that the action may contribute to a trend towards federal listing or loss of viability to the population or species.

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Appendix A

Exhibit A: Direction Letter for the Regional Forester's Sensitive Species List

File Code: 1900/2670 **Date:** August 4, 2004
Route To: (2400)

Subject: Additional Direction for the Regional Forester's Sensitive Species List

To: Forest Supervisors
Thru:

During the preparation of the *Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines*, a review was conducted to identify which species designated as Survey and Manage (S&M) met the criteria for addition to the Regional Forester's Sensitive Species List. The species that met sensitive species criteria were added to the sensitive species list in a letter dated April 26, 2004 and a subsequent correction memo dated May 12, 2004. Forests within the scope of the Northwest Forest Plan (NWFP) were directed to consider all these new species as sensitive immediately. Forests outside the NWFP area were requested to provide information on the distribution and status of species on forests, and any training needs to effectively evaluate potential project impacts on these species in Biological Evaluations.

Evaluating new sensitive fungi species on forests outside the Northwest Forest Plan area

Evaluation of responses from forests outside the Northwest Forest Plan area indicates that units lack distribution information for the new fungi species and that training is needed to effectively identify, analyze and manage them. Identifying and understanding fungi habitat requirements pose special challenges to forests that have not previously managed these species. As a result, I will not require forests outside the Northwest Forest Plan to manage the new fungi as sensitive until after the FY 05 sensitive species list revision process is completed. Training sessions will be held during the fall of 2004 to assist forests to manage these unique organisms more effectively. Fungi added to the sensitive species are known to fruit during the fall and training at this time makes the most biological sense. Upon completion of the training, forests should begin evaluating where they may have habitat for the new fungi species. This information will be used to develop a more complete distribution for the region. New habitat and occurrence information will be incorporated into the sensitive species list revision process. Upon completion of the revision, forests will include the new sensitive fungi species to their forest lists, as appropriate.

In this interim period, forests should manage any known occurrences of the sensitive fungi using the available information on fungal habitat requirements. Useful reference documents include the *Handbook to the Strategy 1 Fungal Species in the Northwest Forest Plan* and *Handbook to Additional Fungal Species of Special Concern in the Northwest Forest Plan*. Copies of these documents are being sent to forests that have reported sensitive fungi or habitat for these species. Additional information is available in the 1997 "*Management Recommendations for Survey and Manage Fungi,* version 2.0. This document is available online at the BLM-hosted Survey and Manage website http://www.or.blm.gov/surveyandmanage/mr.htm.

For all other species

The currently known distribution of the new sensitive species by forest is displayed in enclosure one. We have considerably broader experience in managing vascular plants, bryophytes, lichens, salamanders and mollusks across the Region, so where any Region 5 forests have identified known or potential habitat, these species should be treated as sensitive immediately. National Environmental Policy Act (NEPA) decisions signed after the date of this letter must include an evaluation of effects of proposed management actions on all species on the list that have habitat or may occur within the analysis area. For projects with NEPA decisions signed prior to the date of this letter there is no need to assess the effects to the new sensitive species. Although these species are sensitive, their status is not critical. The limited number of ongoing projects that could affect these species would result in negligible to minor effects. Conservation measures designed to minimize effects to these species from future projects are expected to ensure their persistence. Projects currently under contract, permit or other authorizing instrument, are not affected by the revised sensitive species list. However, projects may be modified to adopt all or part of this direction when line officers deem it appropriate. For projects under development, refer to the following NEPA decision process documented below for guidance on when to incorporate the new species in your analysis.

CE

Has proposed action been scoped?	Yes	Does the addition of these new sensitive species have a significant bearing on the proposed action or its effects per 40 CFR 1502.9?	Yes > Update analysis/BE as appropriate and rescope if necessary. No > Update analysis/BE as appropriate.
	No	Update BE/specialist reports as appropriate > Proceed to scope.	

EA

Has the 30-day Notice & Comment Period begun or been completed?	Yes	Does the addition of these new sensitive species result in substantial changes to the proposed action per 40 CFR 1502.9?	Yes > Revise proposed action and BE to reflect changes and re-start Notice & Comment. No > Update analysis/BE, document why new info has no bearing on the proposed action and proceed.
	No	Update analysis/BE/proposed action, as needed, and proceed with Notice & Comment.	

EIS

Has the DEIS Comment Period begun or been completed?	Yes	Does the addition of these new sensitive species have a significant bearing on the proposed action or its effects per 40 CFR 1502.9?	Yes > Supplement DEIS as appropriate and re-circulate DEIS for comment. No > Update analysis/BE, document why new info has no bearing and proceed to FEIS.
	No	Update analysis/BE/proposed action, as needed, and proceed with Notice & Comment.	

Has the FEIS Comment Period* begun or been completed? **note: Circulating a FEIS for comment is optional.*	Yes	Does the addition of these new sensitive species have a significant bearing on the proposed action or its effects per 40 CFR 1502.9?	Yes > Supplement FEIS as appropriate and re-circulate a Draft EIS for comment. No > Update analysis/BE, document why new info has no bearing and proceed to ROD.
	No	Update analysis/BE/proposed action, as needed, and circulate FEIS for comment.	

Comprehensive Revision of the Sensitive Species List

The forests and the regional office will work together to revise the regional sensitive species list during FY 05. All forests will be expected to implement the revised and approved sensitive species list at the completion of this process. Should a sensitive species, or suitable habitat within the range/distribution for that species, be located on a forest where it was not previously known to occur, the forest is responsible for informing the regional office TES or botany program managers so that the distribution account for the fungi species can be updated. When suitable habitat occurs for a species occurs on a forest, that species should be considered sensitive on the forest.

If you have questions, you may contact the following people for more information:

Diane Macfarlane, for salamanders or Regional TES program (707) 562 8931
Acting Regional Botany Program Manger at (707) 562-8938
Joseph Furnish, for aquatic and terrestrial mollusks (707) 562-8952
Lisa Hoover, Six Rivers NF, for recently added bryophytes, lichens or fungi (707) 441-3612
John McRae, Six Rivers NF, for recently added vascular plants (707) 441-3513

/s/ Barbara J. Rate (for)
JACK A. BLACKWELL
Regional Forester

cc: Dave R Gibbons, Diane Macfarlane, Stephen Bishop, Sarah Madsen, Kathy Anderson, George Lottritz

Appendix B

Summary Comparison of Alternatives for the Noxious Weed Treatment Project

Alternatives / Alternative Features	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Treatment Timeframe	**Ongoing**	**5 years**	**5 years**	**10 years**	**10 years**	**10 years**
Treatment Sites and Acres	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**
Total Inventoried Weeds (2004)	541/6908	541 / 6908	541 / 6908	541 / 6908	541 / 6908	541 / 6908
Inventoried Weeds Fully Treated	**20-30** ac/yr[1]	520 / **5,995**	494 / **5,993**	520 / **5,995**	532 / **180**	538/ **241**
Inventoried Weed Sites Receiving Partial Treatment2	0/0	16/904[2]	0/0	16/904[2]	0/0	0/0
Inventoried Weeds Receiving Limited Treatment3	0/**0**	0/**0**	0/**0**	0/**0**	9/**100**[3]	3/**100**[3]
Inventoried Weeds Not Treated4	6,878[1]	5/9[4]	47/916[4]	5/9[4]	5 / 5515	0/6,567[4]
Proportion of Inventoried Weeds Treated	0.4%	n.a. / 87 %	91% / 87%	99 % / 99 %	100 % / 4 %	100 % / 5 %
Noxious Weeds Treated Through Early Detection – Rapid Response (acres)5		0 acres	0 acres	Up to **200** acres (100 ac max/yr)	Up to **200** acres (100 ac max/yr)	Up to **200** acres (100 ac max/yr)
Total Acres of Weeds Treated	**20-30** ac/yr1	**6,899** acres	**5,993** acres	**7,099** acres	**480** acres	**541** acres
Treatment Methods for Inventoried Noxious Weeds (2004)	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**
Physical – hand pulling, hoeing, grubbing	0/0	161/31	494/5,993	161/31	0/0	0/0
Physical+ – Physical plus, clipping seed head or plant, weed eater, mulch/tarp	20-30 ac/yr1	0/0	0/0	0/0	527/139	116/19
Physical and/or Herbicide Treatments	0/**0**	333/**5,961**	0/**0**	333/**5,961**	0/**0**	371/**116**
Herbicide	0/**0**	42/**907**	0/**0**	32/9**07**	0/**0**	46/**65**
Limited Treatment3	0/0	0/0	0/0	0/0	9/100	3/100
Goat Grazing (potential) (physical/herbicide)	0/0	0/0	0/0	0/0	5/41 **(no herbicide)**	5/**41**
Total Acres Potentially Treated with Herbicides (includes ED-RR acres)6	0/**0**	355/**6,868**	0/**0**	355/**7,068**	0/**0**	425/**522**

[1]Under Current Management (Alt. 1), approximately 20 to 30 acres of noxious weeds are treated each year through other site specific NEPA decisions as part of other projects in accordance with the Modoc NF Integrated Weed Management Strategy (2005).

[2]These sites are rhizomotous species that occur within 10 feet of H2O. Those sites that are within 10 feet of H2O would not be treated. Sites with acreage ooutside of this 10 foot no treatment zone would receive partial treatment. The acreage within the 10 foot zone would not be treated, the acreage outside the 10 foot zone would be treated with herbicides.

[3]Includes treating along borders of infestations to prevent spread using the methods specific to each alternative. Treatment is estimated at 100 acres to be proportionally distributed based on the size of the individual infestations. These acres are included in the Inventoried Noxious Weeds Treated acreage.

[4]Excluded in Alt. 2 and Alt. 4: 5 sites of rhizamotous species that are within 10' of live water and partial acreage of 16 sites of rhizamotous species that are within 10' of live water. Rhizamotous species will not be treated by physical methods in these alternatives. Excluded in Alt. 3: 47 sites of rhizamotous species. Excluded in Alt. 5: 5,658 acre Dyer's woad, 850 acre Dalmatian toadflax, 159 acre crupina, and 6 sites of rhizamotous species. These sites will receive limited treatment around the perimeter estimated at 100 acres proportionally distributed based on the size of these sites. Excluded in Alt. 6: 5,658 acre Dyer's woad, 850 acre Dalmatian toadflax, 159 acre crupina. These sites will receive limited treatment around the perimeter estimated at 100 acres proportionally distributed based on the size of these sites.

[5]May use any of the methods approved for use in this NEPA decision.

[6]For Alt. 2 this includes the acres under the physical and/or herbicide method plus the herbicide treated acres. Alt. 4 adds the same categories as Alt. 2 plus adds in the potentially treated 200 acres through early detection rapid response. Alt. 6 includes the Physical and/or Herbicide acres, the herbicide acres, the acres under goat grazing, the acres under the limited treatment category, and the 200 acres under Early Detection-Rapid Response.

Appendix C
Direct, Indirect and Cumulative Effects by Sensitive Species

Prepared by F. Gauna
1/29/2006

Definitions

Direct, indirect, and cumulative effects are defined in NEPA (40 CFR 1508.7 and 1508.8).

- A cumulative effect is "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."
- A direct effect "is caused by the action and occur at the same time and place."
- Indirect effects "are caused by the action and are later in time or farther removed in distance, but are reasonably foreseeable. They may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems."

Direct, indirect, and cumulative effects for each alternative are discussed below for each of the 21 Sensitive species on the Forest.

Astragalus anxius (ASAN18)

Alternative 1 - No Action

Direct and Indirect Effects

Under the "No Action" alternative, no weed treatments would take place. Therefore, sensitive plants would not sustain any direct physical damage due to weed management activities.

Indirect effects to this sensitive plant might result from noxious weeds competing for sunlight, minerals, water, and other resources. This competition could weaken native plants, and noxious weeds could eventually out-compete sensitive plants and take over sensitive plant habitat.

Cumulative Effects

Possible future competition from noxious weeds. Without treatment of existing weed populations in the area around this species, the weeds would be able to colonise any disturbances to sensitive plant habitat. Scotch thistle, diffuse knapweed, lens-podded hoary-cress, Klamath weed, Mediterranean sage, and yellow star-thistle all inhabit the same ecological unit as *A. anxius*.

Alternative 2 - Proposed Action

Direct and Indirect Effects

Under the Proposed Action, weeds could be sprayed with herbicides, but there would be no vehicle-based herbicide spraying within 50 feet of sensitive plants (DS-31) and no spraying in unfavorable weather conditions (DS-34). Since DS-35 also calls for ensuring that no herbicide droplets travel outside the drip zone from the target weed, vehicle-based herbicides would cause no direct effect upon known population of *A. anxius*. However, hand-spraying or non-herbicide treatments are allowed within 50′ of TES plants; therefore, *A. anxius* may suffer from inadvertent herbicide spray and/or trampling.

Indirect effects upon *A. anxius* under Alternative 2 include possible damage to viability or reproductive ability of plants that are trampled upon or sprayed during weed treatment. Disturbance of ground near sensitive plants may provide an opening for invasion by competitive weeds. Beneficial effects to *A. anxius* include control of nearby noxious weeds that may reduce the risk that weed seeds or rhizomes might invade their habitat, and reduce the risk that future projects or people in the area could unwittingly transport weed seeds into *A. anxius* habitat. Since treatment of existing weed occurrences is far enough away from any known occurrences of *A. anxius* (the closest known weed to any population is a Scotch thistle site 70 meters away), it is unlikely that they will suffer from either overspray or trampling. Treatment of noxious weeds in the area might prevent them from invading habitat of *A. anxius*, and help prevent future projects in the area from moving weed seed into the same.

Cumulative Effects

By reducing noxious weeds, weed treatments will reduce propagules that could spread to nearby *A. anxius* habitat through grazing, workers for the Sagebrush Steppe project, OHV's, and recreationists. If a new decision document is not approved after 5 years, noxious weeds may regain ground and threaten sensitive plant habitat.

<u>Alternative 3</u>

Direct and Indirect Effects

Alternative 3 does not admit the use of pesticides. *A. anxius* would consequently not suffer from any herbicide overspray. Manual treatment of Scotch thistle might cause trampling, but the closest occurrence is 70 m away and would not likely cause any harm; additionally, Scotch thistle is not a high priority species for treatment.

Since Scotch thistle is the weed closest to all sites of *A. anxius*, and since it is not a high priority species, this weed has the potential to invade *A. anxius* territory because of lack of timely or sufficient treatment. However, since in this alternative the potential for Scotch thistle treatment is greater than in Alternative 1, there may be benefits to *A. anxius* if any treatment of Scotch thistle does take place.

Cumulative Effects

Given that Scotch thistle, as a non-high priority species, may not be treated sufficiently, it is possible that it can spread to *A. anxius* sites and out-compete it there. However, if the Scotch thistle were treated, the opposite would be true.

<u>Alternative 4</u>

Direct and Indirect Effects

Alternative 4 allows herbicide use. Again, Scotch thistle is not a high priority for treatment. Therefore, while the weed remains untreated, there will be no direct effects to *A. anxius*. When or if treatment does occur, some damage may result to the sensitive plant due to control methods, but overall treatment would be beneficial. DS-31 provides that there will be no vehicle-based praying within 50 feet of any TES plant location, and DS-34 provides that herbicides will not be applied on rainy and windy days, and that applicators will insure that no herbicide droplets travel farther than 10 feet from the plant. Thus, there will be no effect to *A. anxius* from vehicle-based herbicide application. As in Alternative 2, however, hand-spraying or non-herbicide treatments are allowed within 50′ of TES plants; therefore, *A. anxius* may suffer from inadvertent herbicide spray and/or trampling.

Again, because of its low priority for treatment, it is foreseeable that this weed may take over habitat of *A. anxius* and begin competing with the species in the future. Killing weeds would safeguard sensitive plant habitat.

Cumulative Effects

See the paragraph describing cumulative effects for Alternative 2.

<u>Alternative 5</u>

Direct and Indirect Effects

Like Alternative 3, this alternative does not allow the use of pesticides, but rather expands upon the possibility of using alternative methods for weed control. This alternative would allow goat grazing on Scotch thistle. Goats might eat our sensitive plants and cause damage or death. This alternative would also attempt clipping, weed-whacking, mulching, or tarping; if care is not exercised, the sensitive plant might get weed-whacked or buried under mulch or a tarp, or trampled upon by workers doing these activities to noxious weeds.

Indirect effects would include the possibility for invasion by weeds of *A. anxius* habitat due to weed control activities (soil disturbance, people moving seeds). Weed control could also safeguard the sensitive plant by inhibiting weed spread.

Cumulative Effects

Should the areas around ASAN18 be treated for weeds, *A. anxius* habitat would be less threatened by weed encroachment, and future projects or people in the area would be less likely to spread noxious weed seed from infested to uninfested sites.

<u>Alternative 6</u>

Direct, Indirect, and Effects

Scotch thistle, the most common weed in ASAN18 areas, is a priority species for treatment in Alternative 6. Manual treatment of this weed might cause minor physical stress to some plants of *A. anxius*, especially if the nearby Scotch thistle infestation spreads more closely to the sensitive plant site. Herbicides would not be sprayed within 50 feet of any

Sensitive species, so there would be no adverse effects upon *A. anxius* due to spraying (DS-32). Wicking with herbicides would be allowed to take place within this 50-foot buffer, but with care taken to insure that there are no sensitive plants directly beneath the weed, the plant should suffer minimal adverse effect.

Indirect effects, like always, include the possibility that *A. anxius* communities might suffer some decreased ability to survive or set seed due to trampling by weed controllers, but any treatment of weeds would safeguard habitat and improve chances for our Sensitive species.

Cumulative Effects

Cumulative effects upon *Astragalus anxius* from Alternative 6 include a reduced probability that weeds will be able to spread into its habitat or be tracked in by people visiting or working in the area or by grazing cattle.

***Astragalus pulsiferae* var. *coronensis* (ASPUC)**

Alternative 1 - No Action

Direct and Indirect Effects

Under the "No Action" alternative, no treatment would take place. Therefore, sensitive plants would not sustain any direct physical damage due to weed management activities.

Uncontrolled weeds would have the opportunity to invade and degrade sensitive plant habitat.

Cumulative Effects

Cumulative effects upon *A. pulsiferae* var. *coronensis* resulting from the "No Action" alternative would be possible future competition from noxious weeds. Without treatment of existing weed populations in the area around this species, the weeds would be able to colonise any disturbances to sensitive plant habitat. Scotch thistle, common crupina, Mediterranean sage, Klamath weed, yellow star-thistle, lens-podded hoary-cress, diffuse knapweed, dyer's woad, spotted knapweed and Canada thistle all inhabit the same ecological units as ASPUC. Grazing, OHV's, juniper removal, road maintenance, or other future forest projects could easily move weed seeds from untreated weeds in the area, making it more likely that weeds could invade sensitive plant habitat.

Alternative 2 - Proposed Action

Direct and Indirect Effects

Under the Proposed Action, weeds could be sprayed with herbicides, but there would be no vehicle-based herbicide spraying within 50 feet of sensitive plants (DS-31) and no spraying in unfavourable weather conditions (DS-34). Since DS-34 also calls for ensuring that no herbicide droplets travel more than 10 feet from the target weed, vehicle-based herbicides would cause no direct effect upon known populations of ASPUC. However, hand-spraying or non-herbicide treatments are allowed within 50′ of TES plants; therefore, *A. pulsiferae* var. *coronensis* may suffer from inadvertent herbicide spray and/or trampling.

Negative indirect effects upon *A. pulsiferae* var. *coronensis* under Alternative 2 include possible damage to viability or reproductive ability of plants that are trampled upon or sprayed during weed treatment. Disturbance of ground near sensitive plants may provide an opening for invasion by competitive weeds.

On the positive side, weed control near *A. pulsiferae* var. *coronensis* may reduce the risk that seeds or rhizomes from nearby plants might invade their habitat, and compete with sensitive plants for resources. Control would also reduce the risk that future projects or people in the region could unwittingly transport weed seeds into *A. pulsiferae* var. *coronensis* habitat.

Cumulative Effects

Since treatment of existing weed occurrences is far enough away from any known occurrences of *A. pulsiferae* var. *coronensis* (the closest known weed to any population is a Scotch thistle site 60 meters away), it is unlikely that they will suffer from either overspray or trampling. Treatment of noxious weeds in the area might prevent them from invading habitat of *A. pulsiferae* var. *coronensis*, and help prevent future projects such as grazing, OHV use, juniper removal, road maintenance, *etc*. in the area from moving weed seed into the same.

<u>Alternative 3</u>

Direct and Indirect Effects

Alternative 3 does not allow pesticide use. *A. pulsiferae* var. *coronensis* would consequently not suffer from any herbicide overspray. Manual treatment of Scotch thistle might cause trampling, but the closest occurrences are 60 m and 235 m away respectively and would not likely cause any harm; additionally, Scotch thistle is not a high priority species for treatment.

Since Scotch thistle is the weed closest to all sites of *A. pulsiferae* var. *coronensis*, and since it is not a high priority species, this weed has the potential to invade *A. pulsiferae* var. *coronensis* territory because of lack of timely or sufficient treatment. However, since in this alternative the potential for Scotch thistle treatment is greater than in Alternative 1, there may be benefits to *A. pulsiferae* var. *coronensis* if any treatment of Scotch thistle does take place.

Cumulative Effects

Given that Scotch thistle, as a non-high priority species, may not be treated sufficiently, it is possible that it can spread via future projects such as juniper removal, grazing, or use by recreationists, to *A. pulsiferae* var. *coronensis* sites and out-compete it there.

<u>Alternative 4</u>

Direct and Indirect Effects

Alternative 4 allows herbicide use. Again, Scotch thistle is not a high priority for treatment. Therefore, while the weed remains untreated, there will be no direct effects to *A. pulsiferae* var. *coronensis*. When or if treatment does occur, some damage may result to the sensitive plant due to control methods, but overall treatment could be beneficial over

time. DS-31 provides that there will be no vehicle-based praying within 50 feet of any TES plant location, and DS-34 provides that herbicides will not be applied on rainy and windy days, and that applicators will insure that no herbicide droplets travel farther than 10 feet from the plant. Thus, there will be no effect to *A. pulsiferae* var. *coronensis* from vehicle-based herbicide application. As in Alternative 2, however, hand-spraying or non-herbicide treatments are allowed within 50′ of TES plants; therefore, *A. pulsiferae* var. *coronensis* may suffer from inadvertent herbicide spray and/or trampling. Since the closest known weed occurrence is about 180 feet away from any known plant of ASPUC, this should not realistically be an issue.

Again, because of its low priority for treatment, it is foreseeable that this weed may take over habitat of *A. pulsiferae* var. *coronensis* and begin competing with the species in the future. Killing weeds would not likely improve *A. pulsiferae* var. *coronensis* habitat, but would at least safeguard it.

Cumulative Effects

See the paragraph describing cumulative effects for Alternative 2.

Alternative 5

Direct and Indirect Effects

Like Alternative 3, this alternative does not allow the use of pesticides, but rather expands upon the possibility of using alternative methods for weed control. This alternative would attempt goat grazing on Scotch thistle. If not properly fenced or herded, goats might eat our sensitive plants and cause damage or death. This alternative would also attempt clipping, weed-whacking, mulching, or tarping; if care is not exercised, the sensitive plant might get weed-whacked or buried under mulch or a tarp, or trampled upon by workers doing these activities to noxious weeds.

Indirect effects would include competition from noxious weeds. There is the possibility for invasion by weeds of *A. pulsiferae* var. *coronensis* habitat due to weed control activities (soil disturbance, people moving seeds). Weed control could also safeguard the sensitive plant by inhibiting weed spread.

Cumulative Effects

Should the areas around ASPUC be treated for weeds, *A. pulsiferae* var. *coronensis* habitat would be less threatened by weed encroachment. Future projects or people in the area would be less likely to spread noxious weed seed from infested to uninfested sites.

Alternative 6

Direct and Indirect Effects

Scotch thistle, the most common weed in ASPUC areas, is a priority species for treatment in Alternative 6. Manual treatment of this weed might cause physical stress to some plants of *A. pulsiferae* var. *coronensis*, especially if nearby Scotch thistle infestations spread more closely to the sensitive plant site. Herbicides would not be sprayed within 50 feet of any Sensitive species, so there would be no adverse effects upon *A. pulsiferae* var. *coronensis* due to spraying (DS-32). Wicking with herbicides would be allowed to take

place within this 50-foot buffer. With care taken to insure that there are no sensitive plants directly beneath the weed, ASPUC plants should suffer minimal adverse effect.

Indirect effects include the possibility that *A. pulsiferae* var. *coronensis* plants might suffer some decreased ability to survive or set seed due to trampling by weed controllers, but any treatment of weeds would safeguard habitat and improve chances for our Sensitive species.

Cumulative Effects

Cumulative effects upon *Astragalus pulsiferae* from Alternative 6 include a reduced probability that weeds will be able to spread into its habitat or be tracked in by people visiting or working in the area. (*Cumulative more)*

Sensitive *Botrychium* spp. (BOTRY)
excepting *Botrychium crenulatum* (see below)

Note: because of similarities in habitat, growth form, *etc.*, these species are treated jointly here.

Alternative 1 - No Action

Direct and Indirect Effects

Under the "No Action" alternative, no weed management would take place. Therefore, sensitive plants would not sustain any direct physical damage due to weed management activities.

Uncontrolled weeds would have the opportunity to invade and degrade sensitive plant habitat.

Cumulative Effects

Possible future competition from noxious weeds. Without treatment of existing weed populations in the area around this species, the weeds would be able to colonize disturbances to sensitive plant habitat. Dyer's woad, Canada thistle, Scotch thistle, globe-podded hoary-cress, tall whitetop, and Mediterranean sage all inhabit the same ecological units as sensitive *Botrychium* spp.

Alternative 2 - Proposed Action

Direct and Indirect Effects

Under the Proposed Action, weeds could be sprayed with herbicides, but there would be no vehicle-based herbicide spraying within 50 feet of sensitive plants (DS-31) and no spraying in unfavourable weather conditions (DS-34). Since DS-34 also calls for ensuring that no herbicide droplets travel more than 10 feet from the target weed, vehicle-based herbicides would cause no direct effect upon known sensitive *Botrychium* population. However, hand-spraying or non-herbicide treatments are allowed within 50′ of TES plants; therefore, *Botrychium* may suffer from inadvertent herbicide spray and/or trampling. Negative indirect effects upon *Botrychium* under Alternative 2 include possible damage to viability or reproductive ability of plants that are trampled upon or sprayed during

weed treatment. Disturbance of ground near sensitive plants may provide an opening for invasion by competitive weeds. Positively, weed control near *Botrychium* may reduce the risk that seeds or rhizomes from nearby plants might invade their habitat, and reduce the risk that future projects or people in the region could unwittingly transport weed seeds into *Botrychium* habitat.

Cumulative Effects

Continued cattle grazing in *Botrychium* habitat can potentially spread weed seeds due to moving cattle and their disturbance to the ground in areas with *Botrychium*. Weed treatment will help reduce the number of weeds whose seeds the cattle could carry into *Botrychium* habitat. This is true of other forest projects as well: OHV use, road maintenance, and other forest workers would also have a lesser chance of bringing in weed seed if current infestations are treated.

Alternative 3

Direct and Indirect Effects

Alternative 3 does allow pesticide use. *Botrychium* would consequently not suffer from any herbicide overspray. Although noxious rhizomatous weeds occur near some plants of *Botrychium*, DS-06 requires that manual treatments not be utilized on them; therefore, sensitive plants would not be damaged by manual treatments of rhizomatous plants. No other weeds occur close enough to *Botrychium* to cause damage due to manual treatments.

Treatment of non-rhizomatous plants near *Botrychium* species might cause harm to these delicate plants, but there are not any non-rhizomatous weeds within 50′ of any sensitive plants. Failure to treat aggressive rhizomatous plants can be detrimental to this species: these aggressive noxious weeds can spread from underground rhizomes and compete successfully with native plants.

Cumulative Effects

Non-treatment of rhizomatous species near *Botrychium* might cause irreversible damage to sensitive plant habitat: these species can expand their occupied area and change the habitat sufficiently to exclude *Botrychium* spp. Further use of these areas by other Forest projects may disturb the ground and allow noxious weeds to grow, especially those not allowed to be treated by DS-06 and by the prohibition against herbicide. In efforts to save *Botrychium* from weed-causing disturbances, it may be necessary to prohibit further use of those sensitive areas.

Alternative 4

Direct and Indirect Effects

Alternative 4 allows herbicide use. DS-31 provides that there will be no vehicle-based spraying within 50 feet of any TES plant location, and DS-34 provides that herbicides will not be applied on rainy and windy days, and that applicators will insure that no herbicide droplets travel farther than 10 feet from the plant. Thus, there will be no effect to *Botrychium* from vehicle-based herbicide application. As in Alternative 2, however,

hand-spraying or non-herbicide treatments are allowed within 50′ of TES plants; therefore, *Botrychium* may suffer from inadvertent herbicide spray and/or trampling.

Treatment of weeds of any variety would be beneficial in conserving the uncommon and small areas where *Botrychium* grows.

Cumulative Effects

See the paragraph describing indirect effects above. With treatment, future projects that disturb the ground will not bring in as many weeds as otherwise.

Alternative 5

Direct and Indirect Effects

Like Alternative 3, this alternative does not allow the use of pesticides, but rather expands upon the possibility of using alternative methods for weed control. This alternative would attempt goat grazing on Goats, if not properly or effectively controlled, might eat our sensitive plants and cause damage or death. This alternative would attempt clipping, weed-whacking, mulching, or tarping; if care is not exercised, the sensitive plant might get weed-whacked or buried under mulch or a tarp, or trampled upon by workers doing these activities to noxious weeds.

Indirect effects would include the possibility for invasion by weeds of *Botrychium* habitat due to weed control activities (soil disturbance, people moving seeds).

Weed control could also safeguard the sensitive plant by inhibiting weed spread from noxious weeds that may have been nearby.

Cumulative Effects

Reduction in noxious weed propagules in the local area would help prevent future projects in the area from spreading noxious weeds. See also the cumulative effects for Alternative 3.

Alternative 6

Direct, Indirect, and Effects

Herbicides would not be sprayed within 50 feet of any Sensitive species, so there would be no adverse effects upon *Botrychium* due to spraying (DS-32). Wicking with herbicides would be allowed to take place within this 50-foot buffer, but with care taken to insure that there are no sensitive plants directly beneath the weed, the plant should suffer no adverse effect.

Indirect effects, like always, include the possibility that *Botrychium* communities might suffer some decreased ability to survive or reproduce due to wicking or trampling by weed controllers, but any treatment of weeds would safeguard habitat and improve chances for our Sensitive species. Since it would be impossible to treat the *B. crenulatum* site with Canada thistle, we face the danger of losing that site to Canada thistle takeover.

Cumulative Effects

Cumulative effects from Alternative 6 include a reduced probability that weeds will be able to spread into *Botrychium* habitat or be tracked in by people visiting or working in the area.

***Botrychium crenulatum* (BOCR)**

Alternative 1 - No Action

Direct and Indirect Effects

Under the "No Action" alternative, no weed treatments would take place. Therefore, sensitive plants would not sustain any direct physical damage due to weed management activities.

Indirect effects to this sensitive plant might result from noxious weeds competing for sunlight, minerals, water, and other resources. This competition could weaken the native plants, and noxious weeds could eventually out-compete sensitive plants and take over sensitive plant habitat.

Cumulative Effects

Possible future competition from noxious weeds. Without treatment of existing weed populations in the area around this species, the weeds would be able to colonise any disturbances to sensitive plant habitat. Canada thistle, a rhizomatous noxious weed, occurs within 50´of a known *Botrychium crenulatum* occurrence.

Alternative 2 - Proposed Action

Direct and Indirect Effects

1 occurrence of Canada thistle (050953CIAR4012) occurs within a polygon of *Botrychium crenulatum*; In order to ensure that there are no negative effects to *Botrychium* plants due to herbicide use, Canada thistle should be treated either before the plants emerge or after they wither.

Indirect effects upon *B. crenulatum* under Alternative 2 include possible damage to viability or reproductive ability of plants that are trampled upon or sprayed during weed treatment. Disturbance of ground near sensitive plants may provide an opening for invasion by competitive weeds. Beneficial effects to *B. crenulatum* include control of nearby noxious weeds that may reduce the risk that weed seeds or rhizomes might invade their habitat, and reduce the risk that future projects or people in the area could unwittingly transport weed seeds into *B. crenulatum* habitat. Since treatment of existing weed occurrences is far enough away from any known occurrences of *B. crenulatum*, it is unlikely that they will suffer from either overspray or trampling. Treatment of noxious weeds in the area might prevent them from invading habitat of *B. crenulatum*, and help prevent future projects in the area from moving weed seed into the same.

Cumulative Effects

Treatment of noxious weeds in the area might prevent them from invading *Botrychium* habitat in the future, and help prevent projects in the area from moving weed seed into it. As this site is within an active allotment, cows may spread weed seeds from infested areas to uninfested locations. By reducing noxious weeds, weed treatments will reduce propagules that could spread to nearby *B. crenulatum* habitat through grazing, workers

for the Sagebrush Steppe project, OHV's, and recreationists. If a new decision document is not approved after 5 years, noxious weeds may regain ground and threaten sensitive plant habitat.

Alternative 3

Direct and Indirect Effects

Since there will be no herbicide use under Alternative 3, there will be no direct or indirect effects upon *B. crenulatum* due to herbicides. DS-06 prohibits manual treatment of rhizomatous weeds, so no *B. crenulatum* plants would be injured near the Canada thistle occurrence, since it would not be treated.

Cumulative Effects

Noxious weed treatment should reduce the number of noxious weeds in areas with *B. crenulatum*, but may cause disturbances that increase their populations. Future actions that disturb the ground may cause noxious weeds to gain new ground after treatment stops, and non-priority weed species left untreated may be further spread by any future use or projects in the area. By not treating the nearby Canada thistle occurrence, this weed could eventually invade the entirety of this *B. crenulatum* occurrence. If a decision document is not approved in five years, weeds may again encroach upon sensitive plant habitat.

Alternative 4

Direct and Indirect Effects

Alternative 4, like 2, allows the use of herbicides. Overspray, runoff, or leaching of herbicides may affect some individuals of *B. crenulatum*, but since all known weed sites are more than 50′ from sensitive plants, this is unlikely. Manual treatments of weeds located far from sensitive plants are also unlikely to cause any harm due to trampling. Weed treatment should reduce weeds and provide more and better habitat for sensitive plant species.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *B. crenulatum* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas. See also Cumulative Effects section for Alternative 2.

Alternative 5

Direct and Indirect Effects

Herbicides are not allowed in this alternative; therefore, there shall be no direct effects upon sensitive plants due to them. Goat grazing, allowed in this alternative, may damage plants that are near weed sites (Scotch and musk thistles) to be treated with goat grazing, especially if they are not well supervised or get loose. Clipping, weed whacking,

mulching, and tarping may be utilized on some weeds; *B. crenulatum* plants will suffer direct impacts if they are inadvertently clipped, weed whacked, mulched, or tarped.

Treatment of weeds will reduce the risk that they will invade sensitive plant habitat in the future. Sensitive plants that are trampled, grazed, clipped, whacked, mulched, or tarped may suffer an impaired ability to reproduce, especially if new weed sites come up closer than those now known. Larger weed sites, if left untreated, may potentially degrade sensitive plant habitat in the future. Treatment of Dalmatian toadflax and yellow star-thistle, high priority species for treatment, should make it more possible to defend sensitive plants from these nearby noxious weeds.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *B. crenulatum* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas. Untreated areas may serve as a seed (or rhizome) bank for future weed infestations, and mitigation measures for any projects in those areas will be necessary in order to help reduce weed spread.

Alternative 6

Direct, Indirect, and Effects

Herbicides would not be sprayed within 50 feet of any Sensitive species, so there would be no adverse effects upon *Botrychium* due to spraying (DS-32). Wicking with herbicides would be allowed to take place within this 50-foot buffer, but with care taken to insure that there are no sensitive plants directly beneath the weed, the plant should suffer no adverse effect, especially in the instance of Canada thistle occurring near *B. crenulatum*. Some individuals might be impacted, but overall the treatment of Canada thistle would be beneficial to the sensitive plant. Alternative 6 allows herbicide use and adds another herbicide and two mixes. Because of the expanded number of weed-combating tools, continued herbicide use throughout the years may both reduce the amount of weeds present and reduce the amount of herbicide needed in the future. Herbicide use will be prohibited within 50′ of sensitive plants (DS-32) and would thus cause minimal harm to them. Reduced herbicide use in the future would further reduce harm to sensitive plants. Goat grazing and weed whacking, etc., are addressed in Alternative 5 above. Herbicide use is reduced from Alternative 2 and 4, making it less likely that *B. crenulatum* plants will be harmed by their use.

Indirect effects include the possibility that *Botrychium* communities might suffer some decreased ability to survive or reproduce due to accidental herbicide impacts or trampling by weed controllers, but any treatment of weeds would safeguard habitat and improve chances for our Sensitive species. Since the *B. crenulatum* site with Canada thistle would not be treated, Canada thistle may further invade this site.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *B. crenulatum* such as

grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

***Buxbaumia viridis* (BUVI2) – come back to this species**

Alternative 1 - No Action

Direct and Indirect Effects

Under the "No Action" alternative, no weed management would take place. Therefore, sensitive plants would not sustain any direct physical damage due to weed management activities.

Uncontrolled weeds would have the opportunity to invade and degrade sensitive plant habitat.

Cumulative Effects

The only cumulative effect upon *Buxbaumia viridis* resulting from the "No Action" alternative would be possible future competition from noxious weeds. Without treatment of existing weed populations in the area around this species, the weeds would be able to colonise any disturbances to sensitive plant habitat.

Alternative 2 - Proposed Action

Direct and Indirect Effects

Under the Proposed Action, weeds could be sprayed with herbicides, but there would be no vehicle-based herbicide spraying within 50 feet of sensitive plants (DS-31) and no spraying in unfavourable weather conditions (DS-34). Since DS-34 also calls for ensuring that no herbicide droplets travel beyond the drip zone of the target weed, vehicle-based herbicides would cause no direct effect upon known sensitive *Buxbaumia viridis* population. However, hand-spraying or non-herbicide treatments are allowed within 50′ of TES plants; therefore, *Buxbaumia viridis* may suffer from inadvertent herbicide spray and/or trampling.

Negative indirect effects upon *Buxbaumia viridis* under Alternative 2 include possible damage to viability or reproductive ability of plants that are trampled upon or sprayed during weed treatment. Disturbance of ground near sensitive plants may provide an opening for invasion by competitive weeds. Positively, weed control near *Buxbaumia viridis* may reduce the risk that seeds or rhizomes from nearby plants might invade their habitat, and reduce the risk that future projects or people in the region could unwittingly transport weed seeds into *B. viridis* habitat.

Cumulative Effects

might prevent them from invading *Buxbaumia viridis* habitat, and help prevent future projects in the area from moving weed seed into it.

Alternative 3

Direct and Indirect Effects

Alternative 3 does not allow the use of pesticides. *Buxbaumia viridis* would consequently not suffer from any herbicide overspray.

Treatment of non-rhizomatous plants near *Buxbaumia viridis* species might cause harm to these delicate plants, but there are not any non-rhizomatous weeds within 50′ of any sensitive plants. Failure to treat aggressive rhizomatous plants will be detrimental to this species.

Cumulative Effects

Non-treatment of rhizomatous species near *Buxbaumia viridis* might cause irreversible damage to sensitive plant habitat. Further use of these areas will disturb the ground and allow noxious weeds to grow, especially those not allowed to be treated by DS-06 and by the prohibition against herbicide. In efforts to save *Buxbaumia viridis* from weed-causing disturbances, it may be necessary to prohibit further use of those sensitive areas.

Alternative 4

Direct and Indirect Effects

Alternative 4 allows herbicide use. DS-31 provides that there will be no vehicle-based spraying within 50 feet of any TES plant location, and DS-34 provides that herbicides will not be applied on rainy and windy days, and that applicators will insure that no herbicide droplets travel farther than 10 feet from the plant. Thus, there will be no effect to *Buxbaumia viridis* from vehicle-based herbicide application. As in Alternative 2, however, hand-spraying or non-herbicide treatments are allowed within 50′ of TES plants; therefore, *Buxbaumia viridis* may suffer from inadvertent herbicide spray and/or trampling.

Indirect effects from herbicide spraying near these plants are unknown – I do not know how *Buxbaumia viridis* reacts to herbicides intended for such distantly related plants as anthophytes. However, I feel fairly certain that herbicides would be detrimental to their reproductive ability. However, treatment of weeds of any variety would be beneficial in conserving the uncommon and small areas where *Buxbaumia viridis* likes to live.

Cumulative Effects

See the paragraph describing indirect effects above. With treatment, future projects that disturb the ground will not bring in as many weeds as otherwise.

Alternative 5

Direct and Indirect Effects

Like Alternative 3, this alternative does not allow the use of pesticides, but rather expands upon the possibility of using alternative methods for weed control. This alternative would attempt goat grazing as goats might eat our sensitive plants and cause damage or death. This alternative would also attempt clipping, weed-whacking, mulching, or tarping; if care is not exercised, the sensitive plant might get weed-whacked or buried under mulch or a tarp, or trampled upon by workers doing these activities to noxious weeds.

Indirect effects would include the possibility for invasion by weeds of *Buxbaumia viridis* habitat due to weed control activities (soil disturbance, people moving seeds). Weed control would also safeguard the sensitive plant by inhibiting weed spread.

Cumulative Effects
Future projects in the area would not spread weeds as much with treatment as without.

Alternative 6

Direct, Indirect, and Effects
Herbicides would not be sprayed within 50 feet of any Sensitive species, so there would be no adverse effects upon *Buxbaumia viridis* due to spraying (DS-32). Wicking with herbicides would be allowed to take place within this 50-foot buffer, but with care taken to insure that there are no sensitive plants directly beneath the weed, the plant should suffer minimal adverse effect.
Indirect effects, like always, include the possibility that *Buxbaumia viridis* communities might suffer some decreased ability to survive or reproduce due to wicking or trampling by weed controllers, but any treatment of weeds would safeguard habitat and improve chances for our Sensitive species.

Cumulative Effects
Cumulative effects from Alternative 6 include a reduced probability that weeds will be able to spread into *Buxbaumia viridis* habitat or be tracked in by people visiting or working in the area.

***Calochortus longebarbatus* var. *longebarbatus* (CALOL)**

Alternative 1 - No Action

Direct and Indirect Effects
Under the "No Action" alternative, no weed treatments would take place. Therefore, sensitive plants would not sustain any direct physical damage due to weed management activities.
Indirect effects to this sensitive plant might result from noxious weeds competing for sunlight, minerals, water, and other resources. This competition could weaken native plants, and noxious weeds could eventually out-compete sensitive plants and take over sensitive plant habitat.

Cumulative Effects
Possible future competition from noxious weeds. Without treatment of existing weed populations in the area around this species, the weeds would be able to colonise any disturbances to sensitive plant habitat. Scotch thistle, lens-podded hoary-cress, Mediterranean sage, musk thistle, squarrose knapweed, spotted knapweed, Klamath weed, and Canada thistle are all within 1 mile of *Calochortus longebarbatus* var. *longebarbatus*.

Alternative 2 - Proposed Action

Direct and Indirect Effects

Under the Proposed Action, weeds could be sprayed with herbicides, but there would be no vehicle-based herbicide spraying within 50 feet of sensitive plants (DS-31) and no spraying in unfavourable weather conditions (DS-34). Since DS-34 also calls for ensuring that no herbicide droplets travel more beyond the drip zone of the target weed, vehicle-based herbicides would cause no direct effect upon known population of *C. l.* var. *longebarbatus*. However, hand-spraying or manual treatments are allowed within 50′ of TES plants; therefore, *C. l.* var. *longebarbatus* may suffer from inadvertent herbicide spray and/or trampling. Since manual treatment of rhizomatous weeds is not allowed (DS-06), extra care should be taken when treating Canada thistle occurrences near CALOL.

Indirect effects upon *C. l.* var. *longebarbatus* under Alternative 2 include possible damage to viability or reproductive ability of plants that are trampled upon or sprayed during weed treatment. Disturbance of ground near sensitive plants may provide an opening for invasion by competitive weeds. Beneficial effects to *C. l.* var. *longebarbatus* include control of nearby noxious weeds that may reduce the risk that weed seeds or rhizomes might invade their habitat, and reduce the risk that future projects or people in the area could unwittingly transport weed seeds into *C. l.* var. *longebarbatus* habitat. Since treatment of existing weed occurrences is far enough away from any known occurrences of *C. l.* var. *longebarbatus*, it is unlikely that they will suffer from either overspray or trampling. Treatment of noxious weeds in the area might prevent them from invading *C. l.* var. *longebarbatus* habitat, and help prevent future projects in the area from moving weed seed into the same.

Cumulative Effects

By reducing noxious weeds, weed treatments will reduce propagules that could spread to nearby *C. l.* var. *longebarbatus* habitat through grazing, workers for the Sagebrush Steppe project, OHV's, and recreationists. If a new decision document is not approved after 5 years, noxious weeds may regain ground and threaten sensitive plant habitat. If a new decision document is not approved after 5 years, noxious weeds may regain ground and threaten sensitive plant habitat.

Alternative 3

Direct and Indirect Effects

Since there will be no herbicide use under Alternative 3, there will be no direct or indirect effects upon *C. longebarbatus* due to herbicides. Knapweeds occur within 1 mile of several occurrences of CALOL; since they are a high priority for treatment, manual removal may cause local disturbance to the soil and create opportunities for weed invasion, but will also reduce the danger that knapweeds will invade CALOL habitat. Other weeds close to CALOL, however, are not high priorities for treatment and, as a result of being left untreated, may invade CALOL habitat and out-compete the sensitive

plants. Of especial concern are rhizomatous weeds like Canada thistle, which are not allowed to be pulled (*q.v.* DS-06).

Cumulative Effects

Noxious weed treatment should reduce the number of noxious weeds in areas with CALOL, but may cause disturbances that increase their populations. Future actions that disturb the ground may cause noxious weeds to gain new ground after treatment stops, and non-priority weed species left untreated may be further spread by any future use or projects in the area. If a decision document is not approved in five years, weeds may again encroach upon sensitive plant habitat.

Alternative 4

Direct and Indirect Effects

Alternative 4, like 2, allows the use of herbicides. The only high-priority weeds near (within one mile of) CALOL to be treated are the knapweeds. Overspray, runoff, or leaching of herbicides may affect some individuals of CALOL, but as most weed sites are more than 50′ from sensitive plants, this is unlikely. Manual treatments of these weeds located far from sensitive plants are also unlikely to cause any harm due to trampling. Weed treatment should reduce weeds and provide more and better habitat for sensitive plant species.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with CALOL such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

Alternative 5

Direct and Indirect Effects

Herbicides are not allowed in this alternative; therefore, there shall be no direct effects upon sensitive plants due to them. Goat grazing may damage plants that are near weed sites (Scotch and musk thistles) to be treated with goat grazing, especially if they are not well-supervised or get loose. Clipping, weed whacking, mulching, and tarping may be utilized on some weeds; CALOL plants will suffer direct impacts if they are inadvertently clipped, weed whacked, mulched, or tarped.

Treatment of weeds will reduce the risk that they will invade sensitive plant habitat in the future. Sensitive plants that are trampled, grazed, clipped, whacked, mulched, or tarped may suffer an impaired ability to reproduce, especially if new weed sites come up closer than those now known. Larger weed sites, if left untreated, may potentially degrade sensitive plant habitat in the future.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *Calochortus*

longebarbatus var. *longebarbatus*, such as grazing, timber harvesting, etc. will be less likely to spread noxious weeds into those areas. Untreated areas may serve as a seed bank for future weed infestations, and mitigation measures for any projects in those areas will be necessary in order to help reduce weed spread.

Alternative 6

Direct, Indirect, and Effects

Alternative 6 allows herbicide use and adds another herbicide and two mixes. Because of the expanded number of weed-combating tools, continued herbicide use throughout the years may both reduce the amount of weeds present and reduce the amount of herbicide needed in the future. Herbicide use will be prohibited within 50´ of sensitive plants (DS-40) and would thus cause minimal harm to them. Reduced herbicide use in the future would further reduce harm to sensitive plants. Goat grazing and weed whacking, etc.are addressed in Alternative 5 above. Herbicide use is reduced from Alternative 2 and 4, making it less likely that CALOL plants will be harmed by it.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with CALOL such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

***Cypripedium montanum* (CYMO2)**

Alternative 1 - No Action

Direct and Indirect Effects

Under the "No Action" alternative, no weed treatments would take place. Therefore, sensitive plants would not sustain any direct physical damage due to weed management activities.

Indirect effects to this sensitive plant might result from noxious weeds competing for sunlight, minerals, water, and other resources. This competition could weaken native plants, and noxious weeds could eventually out-compete sensitive plants and take over sensitive plant habitat.

Cumulative Effects

Possible future competition from noxious weeds. Without treatment of existing weed populations in the area around this species, the weeds would be able to colonise any disturbances to sensitive plant habitat. Scotch thistle, lens-podded hoary-cress, musk thistle, Mediterranean sage, and dyer's woad are all within 1 mile of CYMO; Canada thistle, crupina, diffuse knapweed, Klamath weed, spotted knapweed, and yellow star-thistle also exist within the same ecological units as CYMO.

Alternative 2 - Proposed Action

Direct and Indirect Effects

Under the Proposed Action, weeds could be sprayed with herbicides, but there would be no vehicle-based herbicide spraying within 50 feet of sensitive plants (DS-31) and no spraying in unfavourable weather conditions (DS-34). Since DS-34 also calls for ensuring that no herbicide droplets travel more than 10 feet from the target weed, vehicle-based herbicides would cause no direct effect upon known population of *C. montanum*. However, hand-spraying or manual treatments are allowed within 50′ of TES plants; therefore, *C. montanum* may suffer from inadvertent herbicide spray and/or trampling.

Indirect effects upon *C. montanum* under Alternative 2 include possible damage to viability or reproductive ability of plants that are trampled upon or sprayed during weed treatment. Disturbance of ground near sensitive plants may provide an opening for invasion by competitive weeds. Beneficial effects to *C. montanum* include control of nearby noxious weeds that may reduce the risk that weed seeds or rhizomes might invade their habitat, and reduce the risk that future projects or people in the area could unwittingly transport weed seeds into *C. montanum* habitat. Since treatment of existing weed occurrences is far enough away from any known occurrences of *C. montanum*, it is unlikely that they will suffer from either overspray or trampling. Treatment of noxious weeds in the area might prevent them from invading habitat of *C. montanum*, and help prevent future projects in the area from moving weed seed into the same.

Cumulative Effects

By reducing noxious weeds, weed treatments will reduce propagules that could spread to nearby *C. montanum* habitat through grazing, workers for the Sagebrush Steppe project, OHV's, and recreationists. If a new decision document is not approved after 5 years, noxious weeds may regain ground and threaten sensitive plant habitat.

<u>Alternative 3</u>

Direct and Indirect Effects

Since there will be no herbicide use under Alternative 3, there will be no direct or indirect effects upon *C. montanum* due to herbicides. Knapweeds occur within 1 mile of several occurrences of *C. montanum*; since they are a high priority for treatment, manual removal may cause local disturbance to the soil and create opportunities for weed invasion, but will also reduce the danger that knapweeds will invade *C. montanum* habitat. Other weeds close to *C. montanum*, however, are not high priorities for treatment and, as a result of being left untreated, may invade *C. montanum* habitat and out-compete the sensitive plants.

Cumulative Effects

Noxious weed treatment should reduce the number of noxious weeds in areas with *C. montanum*, but may cause disturbances that increase their populations. Future actions that disturb the ground may cause noxious weeds to gain new ground after treatment stops, and non-priority weed species left untreated may be further spread by any future use or projects in the area. If a decision document is not approved in five years, weeds may again encroach upon sensitive plant habitat.

Alternative 4

Direct and Indirect Effects

Alternative 4, like 2, allows the use of herbicides. Again, the only high-priority weeds within one mile of *C. montanum* to be treated are the knapweeds. Overspray, runoff, or leaching of herbicides may affect some individuals of *C. montanum*, but as most weed sites are more than 50′ from sensitive plants, this is unlikely. Manual treatments of these weeds located far from sensitive plants are also unlikely to cause any harm due to trampling. Weed treatment should reduce weeds and provide more and better habitat for sensitive plant species.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *C. montanum* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

Alternative 5

Direct and Indirect Effects

Herbicides are not allowed in this alternative; therefore, there shall be no direct effects upon sensitive plants due to them. Goat grazing may damage plants that are near weed sites (Scotch and musk thistles) to be treated with goat grazing, especially if they are not well supervised or get loose. Clipping, weed whacking, mulching, and tarping may be utilized on some weeds; *C. montanum* plants will suffer direct impacts if they are inadvertently clipped, weed whacked, mulched, or tarped.

Treatment of weeds will reduce the risk that they will invade sensitive plant habitat in the future. Sensitive plants that are trampled, grazed, clipped, whacked, mulched, or tarped may suffer an impaired ability to reproduce, especially if new weed sites come up closer than those now known. Larger weed sites, if left untreated, may potentially degrade sensitive plant habitat in the future.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *C. montanum* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas. Untreated areas may serve as a seed bank for future weed infestations, and mitigation measures for any projects in those areas will be necessary in order to help reduce weed spread.

Alternative 6

Direct, Indirect, and Effects

Alternative 6 allows herbicide use and adds another herbicide and two mixes. Because of the expanded number of weed-combating tools, continued herbicide use throughout the years

may both reduce the amount of weeds present and reduce the amount of herbicide needed in the future. Herbicide use will be prohibited within 50′ of sensitive plants (DS-32) and would thus cause minimal harm to them. Reduced herbicide use in the future would further reduce harm to sensitive plants. Goat grazing and weed whacking, etc.are addressed in Alternative 5 above. Herbicide use is reduced from Alternative 2 and 4, making it less likely that *C. montanum* plants will be harmed by their use.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *C. montanum* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

***Eriogonum prociduum* (ERPR9)**

Alternative 1 - No Action

Direct and Indirect Effects

Under the "No Action" alternative, no weed treatments would take place. Therefore, sensitive plants would not sustain any direct physical damage due to weed management activities.

Indirect effects to this sensitive plant might result from noxious weeds competing for sunlight, minerals, water, and other resources. This competition could weaken native plants, and noxious weeds could eventually out-compete sensitive plants and take over sensitive plant habitat.

Cumulative Effects

Possible future competition from noxious weeds. Without treatment of existing weed populations in the area around this species, the weeds would be able to colonise any disturbances to sensitive plant habitat. Scotch thistle, globe-podded hoary-cress, and Canada thistle are all within 1 mile of ERPR; Dyer's woad, Med sage, lens-podded hoary-cress, diffuse knapweed, yellow star-thistle, Klamath weed, and tall whitetop exist within the same ecological units as ERPR.

Alternative 2 - Proposed Action

Direct and Indirect Effects

Under the Proposed Action, weeds could be sprayed with herbicides, but there would be no vehicle-based herbicide spraying within 50 feet of sensitive plants (DS-31) and no spraying in unfavourable weather conditions (DS-34). Since DS-34 also calls for ensuring that no herbicide droplets travel beyond the drip zone of the target weed, vehicle-based herbicides would cause no direct effect upon known population of *E. prociduum*. However, hand-spraying or manual treatments are allowed within 50′ of TES plants; therefore, *E. prociduum* may suffer from inadvertent herbicide spray and/or trampling.

Indirect effects upon *E. prociduum* under Alternative 2 include possible damage to viability or reproductive ability of plants that are trampled upon or sprayed during weed treatment. Disturbance of ground near sensitive plants may provide an opening for invasion by competitive weeds. Beneficial effects to *E. prociduum* include control of nearby noxious weeds that may reduce the risk that weed seeds or rhizomes might invade their habitat, and reduce the risk that future projects or people in the area could unwittingly transport weed seeds into *E. prociduum* habitat. Since treatment of existing weed occurrences is far enough away from any known occurrences of *E. prociduum*, it is unlikely that they will suffer from either overspray or trampling. Treatment of noxious weeds in the area might prevent them from invading habitat of *E. prociduum*, and help prevent future projects in the area from moving weed seed into the same.

Cumulative Effects

By reducing noxious weeds, weed treatments will reduce propagules that could spread to nearby *E. prociduum* habitat through grazing, workers for the Sagebrush Steppe project, OHV's, and recreationists. If a new decision document is not approved after 5 years, noxious weeds may regain ground and threaten sensitive plant habitat.

Alternative 3

Direct and Indirect Effects

Since there will be no herbicide use under Alternative 3, there will be no direct or indirect effects upon *E. prociduum* due to herbicides. No weeds within 1 mile of *E. prociduum* are considered high-priority; therefore, delayed treatment of these weeds may endanger sensitive plant habitat.

Cumulative Effects

Noxious weed treatment should reduce the number of noxious weeds in areas with *E. prociduum*, but may cause disturbances that increase their populations. Future actions that disturb the ground may cause noxious weeds to gain new ground after treatment stops, and non-priority weed species left untreated may be further spread by any future use or projects in the area. If a decision document is not approved in five years, weeds may again encroach upon sensitive plant habitat.

Alternative 4

Direct and Indirect Effects

Alternative 4, like 2, allows the use of herbicides. Overspray, runoff, or leaching of herbicides may affect some individuals of *E. prociduum*, but as most weed sites are more than 50′ from sensitive plants, this is unlikely. Manual treatments of these weeds located far from sensitive plants are also unlikely to cause any harm due to trampling. Weed treatment should reduce weeds and provide more and better habitat for sensitive plant species.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *E. prociduum* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

Alternative 5

Direct and Indirect Effects

Herbicides are not allowed in this alternative; therefore, there shall be no direct effects upon sensitive plants due to them. Goat grazing may damage plants that are near weed sites (Scotch and musk thistles) to be treated with goat grazing, especially if they are not well supervised or get loose. Clipping, weed whacking, mulching, and tarping may be utilized on some weeds; *E. prociduum* plants will suffer direct impacts if they are inadvertently clipped, weed whacked, mulched, or tarped.

Treatment of weeds will reduce the risk that they will invade sensitive plant habitat in the future. Sensitive plants that are trampled, grazed, clipped, whacked, mulched, or tarped may suffer an impaired ability to reproduce, especially if new weed sites come up closer than those now known. Larger weed sites, if left untreated, may potentially degrade sensitive plant habitat in the future.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *E. prociduum* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas. Untreated areas may serve as a seed bank for future weed infestations, and mitigation measures for any projects in those areas will be necessary in order to help reduce weed spread.

Alternative 6

Direct, Indirect, and Effects

Alternative 6 allows herbicide use and adds another herbicide and two mixes. Because of the expanded number of weed-combating tools, continued herbicide use throughout the years may both reduce the amount of weeds present and reduce the amount of herbicide needed in the future. Herbicide use will be prohibited within 50′ of sensitive plants (DS-32) and would thus cause minimal harm to them. Reduced herbicide use in the future would further reduce harm to sensitive plants. Goat grazing and weed whacking, etc.are addressed in Alternative 5 above. Herbicide use is reduced from Alternative 2 and 4, making it less likely that *E. prociduum* plants will be harmed by their use.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *E. prociduum* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

***Eriogonum umbellatum* var. *glaberrimum* (ERUMG)**

Alternative 1 - No Action

Direct and Indirect Effects

Under the "No Action" alternative, no weed treatments would take place. Therefore, sensitive plants would not sustain any direct physical damage due to weed management activities.

Indirect effects to this sensitive plant might result from noxious weeds competing for sunlight, minerals, water, and other resources. This competition could weaken native plants, and noxious weeds could eventually out-compete sensitive plants and take over sensitive plant habitat.

Cumulative Effects

Possible future competition from noxious weeds. Without treatment of existing weed populations in the area around this species, the weeds would be able to colonise any disturbances to sensitive plant habitat. Dyer's woad and Canada thistle each exist within 1 mile of *E. umbellatum* var. *glaberrimum*; Mediterranean sage and Scotch thistle also inhabit the same ecological units as *E. umbellatum* var. *glaberrimum*.

Alternative 2 - Proposed Action

Direct and Indirect Effects

Under the Proposed Action, weeds could be sprayed with herbicides, but there would be no vehicle-based herbicide spraying within 50 feet of sensitive plants (DS-31) and no spraying in unfavourable weather conditions (DS-34). Since DS-34 also calls for ensuring that no herbicide droplets travel more than 10 feet from the target weed, vehicle-based herbicides would cause no direct effect upon known population of ERUMG. However, hand-spraying or manual treatments are allowed within 50′ of TES plants; therefore, ERUMG may suffer from inadvertent herbicide spray and/or trampling. DG013CIAR4, a Canada thistle occurrence, is the closest weed that will be treated with herbicide, at about 365 m distant from the Sensitive plant.

Indirect effects upon ERUMG under Alternative 2 include possible damage to viability or reproductive ability of plants that are trampled upon or sprayed during weed treatment. Disturbance of ground near sensitive plants may provide an opening for invasion by competitive weeds. Beneficial effects to ERUMG include control of nearby noxious weeds that may reduce the risk that weed seeds or rhizomes might invade their habitat, and reduce the risk that future projects or people in the area could unwittingly transport weed seeds into ERUMG habitat. Since treatment of existing weed occurrences is far enough away from any known occurrences of ERUMG, it is unlikely that they will suffer from either overspray or trampling. Treatment of noxious weeds in the area might prevent them from invading habitat of ERUMG, and help prevent future projects in the area from moving weed seed into the same.

Cumulative Effects

By reducing noxious weeds, weed treatments will reduce propagules that could spread to nearby ERUMG habitat through grazing, workers for the Sagebrush Steppe project, OHV's, and recreationists. If a new decision document is not approved after 5 years, noxious weeds may regain ground and threaten sensitive plant habitat.

Alternative 3

Direct and Indirect Effects

Since there will be no herbicide use under Alternative 3, there will be no direct or indirect effects upon ERUMG due to herbicides. No weeds within 1 mile of ERUMG are considered high-priority; therefore, delayed treatment of these weeds may endanger sensitive plant habitat.

Cumulative Effects

Noxious weed treatment should reduce the number of noxious weeds in areas with ERUMG, but may cause disturbances that increase their populations. Future actions that disturb the ground may cause noxious weeds to gain new ground after treatment stops, and non-priority weed species left untreated may be further spread by any future use or projects in the area. If a decision document is not approved in five years, weeds may again encroach upon sensitive plant habitat.

Alternative 4

Direct and Indirect Effects

Alternative 4, like 2, allows the use of herbicides. Overspray, runoff, or leaching of herbicides may affect some individuals of ERUMG, but since all known weed sites are more than 50′ from sensitive plants, this is unlikely. Manual treatments of these weeds located far from sensitive plants are also unlikely to cause any harm due to trampling. Weed treatment should reduce weeds and provide more and better habitat for sensitive plant species.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with ERUMG such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

Alternative 5

Direct and Indirect Effects

Herbicides are not allowed in this alternative; therefore, there shall be no direct effects upon sensitive plants due to them. Goat grazing may damage plants that are near weed sites (Scotch and musk thistles) to be treated with goat grazing, especially if they are not well supervised or get loose. Clipping, weed whacking, mulching, and tarping may be utilized on some weeds); ERUMG plants will suffer direct impacts if they are inadvertently clipped, weed whacked, mulched, or tarped.

Treatment of weeds will reduce the risk that they will invade sensitive plant habitat in the future. Sensitive plants that are trampled, grazed, clipped, whacked, mulched, or tarped may suffer an impaired ability to reproduce, especially if new weed sites come up closer than those now known. Larger weed sites, if left untreated, may potentially degrade sensitive plant habitat in the future.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with ERUMG such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas. Untreated areas may serve as a seed bank for future weed infestations, and mitigation measures for any projects in those areas will be necessary in order to help reduce weed spread.

Alternative 6

Direct, Indirect, and Effects

Alternative 6 allows herbicide use and adds another herbicide and two mixes. Because of the expanded number of weed-combating tools, continued herbicide use throughout the years may both reduce the amount of weeds present and reduce the amount of herbicide needed in the future. Herbicide use will be prohibited within 50´ of sensitive plants (DS-32) and would thus cause minimal harm to them. Reduced herbicide use in the future would further reduce harm to sensitive plants. Goat grazing and weed whacking, etc.are addressed in Alternative 5 above. Herbicide use is reduced from Alternative 2 and 4, making it less likely that ERUMG plants will be harmed by their use.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with ERUMG such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

***Galium glabrescens* ssp. *modocense* (GAGLM)**

Alternative 1 - No Action

Direct and Indirect Effects

Under the "No Action" alternative, no weed treatments would take place. Therefore, sensitive plants would not sustain any direct physical damage due to weed management activities.

Indirect effects to this sensitive plant might result from noxious weeds competing for sunlight, minerals, water, and other resources. This competition could weaken native plants, and noxious weeds could eventually out-compete sensitive plants and take over sensitive plant habitat.

Cumulative Effects

Possible future competition from noxious weeds. Without treatment of existing weed populations in the area around this species, the weeds would be able to colonise any disturbances to sensitive plant habitat. Scotch thistle, Canada thistle, and yellow star-thistle each exist within 1 mile of *G. glabrescens* ssp. *modocense*.

Alternative 2 - Proposed Action

Direct and Indirect Effects

Under the Proposed Action, weeds could be sprayed with herbicides, but there would be no vehicle-based herbicide spraying within 50 feet of sensitive plants (DS-31) and no spraying in unfavourable weather conditions (DS-34). Since DS-34 also calls for ensuring that no herbicide droplets travel more than 10 feet from the target weed, vehicle-based herbicides would cause no direct effect upon known population of GAGLM. However, hand-spraying or manual treatments are allowed within 50′ of TES plants; therefore, GAGLM may suffer from inadvertent herbicide spray and/or trampling. Canada thistle, which will be treated chemically, is within 1 mile of at least 1 *G. g.* ssp. *modocense* occurrence.

Indirect effects upon GAGLM under Alternative 2 include possible damage to viability or reproductive ability of plants that are trampled upon or sprayed during weed treatment. Disturbance of ground near sensitive plants may provide an opening for invasion by competitive weeds. Beneficial effects to GAGLM include control of nearby noxious weeds that may reduce the risk that weed seeds or rhizomes might invade their habitat, and reduce the risk that future projects or people in the area could unwittingly transport weed seeds into GAGLM habitat. Since treatment of existing weed occurrences is far enough away from any known occurrences of GAGLM, it is unlikely that they will suffer from either overspray or trampling. Treatment of noxious weeds in the area might prevent them from invading habitat of GAGLM, and help prevent future projects in the area from moving weed seed into the same.

Cumulative Effects

By reducing noxious weeds, weed treatments will reduce propagules that could spread to nearby GAGLM habitat through grazing, workers for the Sagebrush Steppe project, OHV's, and recreationists. If a new decision document is not approved after 5 years, noxious weeds may regain ground and threaten sensitive plant habitat.

Alternative 3

Direct and Indirect Effects

Since there will be no herbicide use under Alternative 3, there will be no direct or indirect effects upon GAGLM due to herbicides. No weeds within 1 mile of GAGLM are considered high-priority; therefore, delayed treatment of these weeds may endanger sensitive plant habitat.

Cumulative Effects

Noxious weed treatment should reduce the number of noxious weeds in areas with GAGLM, but may cause disturbances that increase their populations. Future actions that disturb the

ground may cause noxious weeds to gain new ground after treatment stops, and non-priority weed species left untreated may be further spread by any future use or projects in the area. If a decision document is not approved in five years, weeds may again encroach upon sensitive plant habitat.

Alternative 4

Direct and Indirect Effects

Alternative 4, like 2, allows the use of herbicides. Overspray, runoff, or leaching of herbicides may affect some individuals of GAGLM, but since all known weed sites are more than 50′ from sensitive plants, this is unlikely. Manual treatments of these weeds located far from sensitive plants are also unlikely to cause any harm due to trampling. Weed treatment should reduce weeds and provide more and better habitat for sensitive plant species.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with GAGLM such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

Alternative 5

Direct and Indirect Effects

Herbicides are not allowed in this alternative; therefore, there shall be no direct effects upon sensitive plants due to them. Goat grazing may damage plants that are near weed sites (Scotch and musk thistles) to be treated with goat grazing, especially if they are not well supervised or get loose; however, neither Scotch nor mush thistles are known within 1 mile of *G. g.* ssp. *modocense*. Clipping, weed whacking, mulching, and tarping may be utilized on some weeds; GAGLM plants will suffer direct impacts if they are inadvertently clipped, weed whacked, mulched, or tarped.

Treatment of weeds will reduce the risk that they will invade sensitive plant habitat in the future. Sensitive plants that are trampled, grazed, clipped, whacked, mulched, or tarped may suffer an impaired ability to reproduce, especially if new weed sites come up closer than those now known. Larger weed sites, if left untreated, may potentially degrade sensitive plant habitat in the future.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with GAGLM such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas. Untreated areas may serve as a seed bank for future weed infestations, and mitigation measures for any projects in those areas will be necessary in order to help reduce weed spread.

Alternative 6

Direct, Indirect, and Effects

Alternative 6 allows herbicide use and adds another herbicide and two mixes. Because of the expanded number of weed-combating tools, continued herbicide use throughout the years may both reduce the amount of weeds present and reduce the amount of herbicide needed in the future. Herbicide use will be prohibited within 50′ of sensitive plants (DS-32) and would thus cause minimal harm to them. Reduced herbicide use in the future would further reduce harm to sensitive plants. Goat grazing and weed whacking, etc.are addressed in Alternative 5 above. Herbicide use is reduced from Alternative 2 and 4, making it less likely that GAGLM plants will be harmed by their use.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with GAGLM such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

***Galium serpenticum* ssp. *warnerense* (GASEW)**

Alternative 1 - No Action

Direct and Indirect Effects

Under the "No Action" alternative, no weed treatments would take place. Therefore, sensitive plants would not sustain any direct physical damage due to weed management activities.

Indirect effects to this sensitive plant might result from noxious weeds competing for sunlight, minerals, water, and other resources. This competition could weaken native plants, and noxious weeds could eventually out-compete sensitive plants and take over sensitive plant habitat.

Cumulative Effects

Possible future competition from noxious weeds. Without treatment of existing weed populations in the area around this species, the weeds would be able to colonise any disturbances to sensitive plant habitat. Dalmatian toadflax, dyer's woad, and Canada thistle each exist within 1 mile of *G. serpenticum* ssp. *warnerense*; spotted knapweed, Scotch thistle, and Mediterranean sage all inhabit the same ecological zones as Gasew.

Alternative 2 - Proposed Action

Direct and Indirect Effects

Under the Proposed Action, weeds could be sprayed with herbicides, but there would be no vehicle-based herbicide spraying within 50 feet of sensitive plants (DS-39) and no spraying in unfavourable weather conditions (DS-45). Since DS-45 also calls for ensuring that no herbicide droplets travel more than 10 feet from the target weed, vehicle-based herbicides would cause no direct effect upon any known population of GASEW. However, hand-spraying or manual treatments are allowed within 50′ of TES plants; therefore,

GASEW may suffer from inadvertent herbicide spray and/or trampling. Canada thistle, which will be treated chemically, is within 1 mile of at least 1 *G. s.* ssp. *warnerense* occurrence.

Indirect effects upon GASEW under Alternative 2 include possible damage to viability or reproductive ability of plants that are trampled upon or sprayed during weed treatment. Disturbance of ground near sensitive plants may provide an opening for invasion by competitive weeds. Beneficial effects to GASEW include control of nearby noxious weeds that may reduce the risk that weed seeds or rhizomes might invade their habitat, and reduce the risk that future projects or people in the area could unwittingly transport weed seeds into GASEW habitat. Since treatment of existing weed occurrences is far enough away from any known occurrences of GASEW, it is unlikely that they will suffer from either overspray or trampling. Treatment of noxious weeds in the area might prevent them from invading habitat of GASEW, and help prevent future projects in the area from moving weed seed into the same.

Cumulative Effects

By reducing noxious weeds, weed treatments will reduce propagules that could spread to nearby GASEW habitat through grazing, workers for the Sagebrush Steppe project, OHV's, and recreationists. If a new decision document is not approved after 5 years, noxious weeds may regain ground and threaten sensitive plant habitat.

Alternative 3

Direct and Indirect Effects

Since there will be no herbicide use under Alternative 3, there will be no direct or indirect effects upon GASEW due to herbicides. Dalmatian toadflax, a high-priority weed, is within one mile of *G. serpenticum*; treatment will be beneficial to GASEW, but will likely cause little damage due to manual treatment as the closest sensitive plant site to the weed is 400 meters away. Many noxious weeds that are close-by sensitive plants are not on the high-priority treatment list (see Tables 2-13 and 2-14, FEIS); therefore, delayed treatment of these weeds may endanger sensitive plant habitat.

Cumulative Effects

Noxious weed treatment should reduce the number of noxious weeds in areas with GASEW, but may cause disturbances that increase their populations. Future actions that disturb the ground may cause noxious weeds to gain new ground after treatment stops, and non-priority weed species left untreated may be further spread by any future use or projects in the area. If a decision document is not approved in five years, weeds may again encroach upon sensitive plant habitat.

Alternative 4

Direct and Indirect Effects

Alternative 4, like 2, allows the use of herbicides. Overspray, runoff, or leaching of herbicides may affect some individuals of GASEW, but since all known weed sites are more than 50′ from sensitive plants, this is unlikely. However, since some Dalmatian

toadflax sites are within 400 m of sensitive plant habitat, care should be exercised if herbicides are used. Manual treatments of these weeds located far from sensitive plants are also unlikely to cause any harm due to trampling. Weed treatment should reduce weeds and provide more and better habitat for sensitive plant species.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with GASEW such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

Alternative 5

Direct and Indirect Effects

Herbicides are not allowed in this alternative; therefore, there shall be no direct effects upon sensitive plants due to them. Goat grazing may damage plants that are near weed sites (Scotch and musk thistles) to be treated with goat grazing, especially if they are not well supervised or get loose; however, neither Scotch nor mush thistles are known within 1 mile of *G. s.* ssp. *warnerense*. Clipping, weed whacking, mulching, and tarping may be utilized on some weeds; GASEW plants will suffer direct impacts if they are inadvertently clipped, weed whacked, mulched, or tarped.

Treatment of weeds will reduce the risk that they will invade sensitive plant habitat in the future. Sensitive plants that are trampled, grazed, clipped, whacked, mulched, or tarped may suffer an impaired ability to reproduce, especially if new weed sites come up closer than those now known. Larger weed sites, if left untreated, may potentially degrade sensitive plant habitat in the future. Treatment of Dalmatian toadflax and yellow star-thistle, high priority species for treatment, should make it more possible to defend sensitive plants from these nearby noxious weeds.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with GASEW such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas. Untreated areas may serve as a seed bank for future weed infestations, and mitigation measures for any projects in those areas will be necessary in order to help reduce weed spread.

Alternative 6

Direct, Indirect, and Effects

Alternative 6 allows herbicide use and adds another herbicide and two mixes. Because of the expanded number of weed-combating tools, continued herbicide use throughout the years may both reduce the amount of weeds present and reduce the amount of herbicide needed in the future. Herbicide use will be prohibited within 50′ of sensitive plants (DS-32) and would thus cause minimal harm to them. Reduced herbicide use in the future would further reduce harm to sensitive plants. Goat grazing and weed whacking, etc.are

addressed in Alternative 5 above. Herbicide use is reduced from Alternative 2 and 4, making it less likely that GASEW plants will be harmed by their use. Care should still be exercised when treating the populations of Dalmatian toadflax that are close to sensitive plants.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with GASEW such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

***Iliamna bakeri* (ILBA)**

Alternative 1 - No Action

Direct and Indirect Effects

Under the "No Action" alternative, no weed treatments would take place. Therefore, sensitive plants would not sustain any direct physical damage due to weed management activities.

Indirect effects to this sensitive plant might result from noxious weeds competing for sunlight, minerals, water, and other resources. This competition could weaken the native plants, and noxious weeds could eventually out-compete sensitive plants and take over sensitive plant habitat.

Cumulative Effects

Possible future competition from noxious weeds. Without treatment of existing weed populations in the area around this species, the weeds would be able to colonise any disturbances to sensitive plant habitat. Dyer's woad, diffuse knapweed, spotted knapweed, Scotch thistle, wavyleaf thistle, globe-podded hoary-cress, Dalmatian toadflax, and Canada thistle each exist within 1 mile of *I. bakeri*; essentially all of the weeds on the Forest inhabit the same ecological zones as *Iliamna bakeri*.

Alternative 2 - Proposed Action

Direct and Indirect Effects

Under the Proposed Action, weeds could be sprayed with herbicides, but there would be no vehicle-based herbicide spraying within 50 feet of sensitive plants (DS-31) and no spraying in unfavourable weather conditions (DS-34). Since DS-34 also calls for ensuring that no herbicide droplets travel more than 10 feet from the target weed, vehicle-based herbicides would cause no direct effect upon any known population of *I. bakeri*. However, hand-spraying or manual treatments are allowed within 50′ of TES plants; therefore, *I. bakeri* may suffer from inadvertent herbicide spray and/or trampling. Canada thistle, which will be treated chemically, is within 1 mile of at least 1 *I. bakeri* occurrence.

Indirect effects upon *I. bakeri* under Alternative 2 include possible damage to viability or reproductive ability of plants that are trampled upon or sprayed during weed treatment.

Disturbance of ground near sensitive plants may provide an opening for invasion by competitive weeds. Beneficial effects to *I. bakeri* include control of nearby noxious weeds that may reduce the risk that weed seeds or rhizomes might invade their habitat, and reduce the risk that future projects or people in the area could unwittingly transport weed seeds into *I. bakeri* habitat. Since treatment of existing weed occurrences is far enough away from any known occurrences of *I. bakeri*, it is unlikely that they will suffer from either overspray or trampling. Treatment of noxious weeds in the area might prevent them from invading habitat of *I. bakeri*, and help prevent future projects in the area from moving weed seed into the same.

Cumulative Effects

By reducing noxious weeds, weed treatments will reduce propagules that could spread to nearby *I. bakeri* habitat through grazing, workers for the Sagebrush Steppe project, OHV's, and recreationists. If a new decision document is not approved after 5 years, noxious weeds may regain ground and threaten sensitive plant habitat.

Alternative 3

Direct and Indirect Effects

Since there will be no herbicide use under Alternative 3, there will be no direct or indirect effects upon *I. bakeri* due to herbicides. Dalmatian toadflax, a high-priority weed, is within one mile of *I. bakeri*; treatment will be beneficial to *I. bakeri*, but will likely cause little damage due to manual treatment as the closest sensitive plant site to the weed is 400 meters away. Many noxious weeds that are close-by sensitive plants are not on the high-priority treatment list (see Tables 2-13 and 2-14, FEIS); therefore, delayed treatment of these weeds may endanger sensitive plant habitat.

Cumulative Effects

Noxious weed treatment should reduce the number of noxious weeds in areas with *I. bakeri*, but may cause disturbances that increase their populations. Future actions that disturb the ground may cause noxious weeds to gain new ground after treatment stops, and non-priority weed species left untreated may be further spread by any future use or projects in the area. If a decision document is not approved in five years, weeds may again encroach upon sensitive plant habitat.

Alternative 4

Direct and Indirect Effects

Alternative 4, like 2, allows the use of herbicides. Overspray, runoff, or leaching of herbicides may affect some individuals of *I. bakeri*, but since all known weed sites are more than 50′ from sensitive plants, this is unlikely. However, since both Dalmatian toadflax and Canada thistle are within 1 mile of sensitive plant habitat, care should be exercised if herbicides are used. Manual treatments of these weeds located far from sensitive plants are also unlikely to cause any harm due to trampling. Weed treatment should reduce weeds and provide more and better habitat for sensitive plant species.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *I. bakeri* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

Alternative 5

Direct and Indirect Effects

Herbicides are not allowed in this alternative; therefore, there shall be no direct effects upon sensitive plants due to them. Goat grazing may damage plants that are near weed sites (Scotch and musk thistles) to be treated with goat grazing, especially if they are not well supervised or get loose. Clipping, weed whacking, mulching, and tarping may be utilized on some weeds; *I. bakeri* plants will suffer direct impacts if they are inadvertently clipped, weed whacked, mulched, or tarped.

Treatment of weeds will reduce the risk that they will invade sensitive plant habitat in the future. Sensitive plants that are trampled, grazed, clipped, whacked, mulched, or tarped may suffer an impaired ability to reproduce, especially if new weed sites come up closer than those now known. Larger weed sites, if left untreated, may potentially degrade sensitive plant habitat in the future. Treatment of Dalmatian toadflax and yellow star-thistle, high priority species for treatment, should make it more possible to defend sensitive plants from these nearby noxious weeds.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *I. bakeri* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas. Untreated areas may serve as a seed bank for future weed infestations, and mitigation measures for any projects in those areas will be necessary in order to help reduce weed spread.

Alternative 6

Direct, Indirect, and Effects

Alternative 6 allows herbicide use and adds another herbicide and two mixes. Because of the expanded number of weed-combating tools, continued herbicide use throughout the years may both reduce the amount of weeds present and reduce the amount of herbicide needed in the future. Herbicide use will be prohibited within 50′ of sensitive plants (DS-32) and would thus cause minimal harm to them. Reduced herbicide use in the future would further reduce harm to sensitive plants. Goat grazing and weed whacking, etc.are addressed in Alternative 5 above. Herbicide use is reduced from Alternative 2 and 4, making it less likely that *I. bakeri* plants will be harmed by their use. Care should still be exercised when treating the populations of Dalmatian toadflax or Canada thistle that are close to sensitive plants.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *I. bakeri* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

***Ivesia paniculata* (IVPA)**

Alternative 1 - No Action

Direct and Indirect Effects

Under the "No Action" alternative, no weed treatments would take place. Therefore, sensitive plants would not sustain any direct physical damage due to weed management activities.

Indirect effects to this sensitive plant might result from noxious weeds competing for sunlight, minerals, water, and other resources. This competition could weaken the native plants, and noxious weeds could eventually out-compete sensitive plants and take over sensitive plant habitat.

Cumulative Effects

Possible future competition from noxious weeds. Without treatment of existing weed populations in the area around this species, the weeds would be able to colonise any disturbances to sensitive plant habitat. Several infestations of Scotch thistle exist within 1 mile of *Ivesia paniculata*; Med sage, lens-podded hoary-cress, Klamath weed, yellow star-thistle, and Canada thistle all inhabit the same ecological zones as *I. paniculata*.

Alternative 2 - Proposed Action

Direct and Indirect Effects

Under the Proposed Action, weeds could be sprayed with herbicides, but there would be no vehicle-based herbicide spraying within 50 feet of sensitive plants (DS-31) and no spraying in unfavourable weather conditions (DS-34). Since DS-34 also calls for ensuring that no herbicide droplets travel more than 10 feet from the target weed, vehicle-based herbicides would cause no direct effect upon any known population of *I. paniculata*. However, hand-spraying or manual treatments are allowed within 50′ of TES plants; therefore, *I. paniculata* may suffer from inadvertent herbicide spray and/or trampling.

Indirect effects upon *I. paniculata* under Alternative 2 include possible damage to viability or reproductive ability of plants that are trampled upon or sprayed during weed treatment. Disturbance of ground near sensitive plants may provide an opening for invasion by competitive weeds. Beneficial effects to *I. paniculata* include control of nearby noxious weeds that may reduce the risk that weed seeds or rhizomes might invade their habitat, and reduce the risk that future projects or people in the area could unwittingly transport weed seeds into *I. paniculata* habitat. Since treatment of existing weed occurrences is far enough away from any known occurrences of *I. paniculata*, it is unlikely that they will suffer from either overspray or trampling. Treatment of noxious weeds in the area might

prevent them from invading habitat of *I. paniculata*, and help prevent future projects in the area from moving weed seed into the same.

Cumulative Effects

By reducing noxious weeds, weed treatments will reduce propagules that could spread to nearby *I. paniculata* habitat through grazing, workers for the Sagebrush Steppe project, OHV's, and recreationists. If a new decision document is not approved after 5 years, noxious weeds may regain ground and threaten sensitive plant habitat.

Alternative 3

Direct and Indirect Effects

Since there will be no herbicide use under Alternative 3, there will be no direct or indirect effects upon *I. paniculata* due to herbicides. Many noxious weeds that are close-by sensitive plants are not on the high-priority treatment list (see Tables 2-13 and 2-14, FEIS); therefore, delayed treatment of these weeds may endanger sensitive plant habitat.

Cumulative Effects

Noxious weed treatment should reduce the number of noxious weeds in areas with *I. paniculata*, but may cause disturbances that increase their populations. Future actions that disturb the ground may cause noxious weeds to gain new ground after treatment stops, and non-priority weed species left untreated may be further spread by any future use or projects in the area. If a decision document is not approved in five years, weeds may again encroach upon sensitive plant habitat.

Alternative 4

Direct and Indirect Effects

Alternative 4, like 2, allows the use of herbicides. Overspray, runoff, or leaching of herbicides may affect some individuals of *I. paniculata*, but since all known weed sites are more than 50′ from sensitive plants, this is unlikely. Manual treatments of weeds located far from sensitive plants are also unlikely to cause any harm due to trampling. Weed treatment should reduce weeds and provide more and better habitat for sensitive plant species.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *I. paniculata* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

Alternative 5

Direct and Indirect Effects

Herbicides are not allowed in this alternative; therefore, there shall be no direct effects upon sensitive plants due to them. Goat grazing may damage plants that are near weed sites

(Scotch and musk thistles) to be treated with goat grazing, especially if they are not well supervised or get loose. Clipping, weed whacking, mulching, and tarping may be utilized on some weeds; *I. paniculata* plants will suffer direct impacts if they are inadvertently clipped, weed whacked, mulched, or tarped.

Treatment of weeds will reduce the risk that they will invade sensitive plant habitat in the future. Sensitive plants that are trampled, grazed, clipped, whacked, mulched, or tarped may suffer an impaired ability to reproduce, especially if new weed sites come up closer than those now known. Larger weed sites, if left untreated, may potentially degrade sensitive plant habitat in the future. Treatment of Dalmatian toadflax and yellow star-thistle, high priority species for treatment, should make it more possible to defend sensitive plants from these nearby noxious weeds.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *I. paniculata* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas. Untreated areas may serve as a seed bank for future weed infestations, and mitigation measures for any projects in those areas will be necessary in order to help reduce weed spread.

Alternative 6

Direct, Indirect, and Effects

Alternative 6 allows herbicide use and adds another herbicide and two mixes. Because of the expanded number of weed-combating tools, continued herbicide use throughout the years may both reduce the amount of weeds present and reduce the amount of herbicide needed in the future. Herbicide use will be prohibited within 50´ of sensitive plants (DS-32) and would thus cause minimal harm to them. Reduced herbicide use in the future would further reduce harm to sensitive plants. Goat grazing and weed whacking, etc.are addressed in Alternative 5 above. Herbicide use is reduced from Alternative 2 and 4, making it less likely that *I. paniculata* plants will be harmed by their use.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *I. paniculata* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

***Mimulus evanescens* (MIEV)**

Alternative 1 - No Action

Direct and Indirect Effects

Under the "No Action" alternative, no weed treatments would take place. Therefore, sensitive plants would not sustain any direct physical damage due to weed management activities.

Indirect effects to this sensitive plant might result from noxious weeds competing for sunlight, minerals, water, and other resources. This competition could weaken the native plants, and noxious weeds could eventually out-compete sensitive plants and take over sensitive plant habitat.

Cumulative Effects

Possible future competition from noxious weeds. Without treatment of existing weed populations in the area around this species, the weeds would be able to colonise any disturbances to sensitive plant habitat. Several infestations of Scotch thistle, dyer's woad, spotted knapweed, and Klamath weed, exist within 1 mile of *Mimulus evanescens*; Dalmatian toadflax, yellow star-thistle, squarrose knapweed, musk thistle, and diffuse knapweed all inhabit the same ecological zones as *M. evanescens*.

Alternative 2 - Proposed Action

Direct and Indirect Effects

Under the Proposed Action, weeds could be sprayed with herbicides, but there would be no vehicle-based herbicide spraying within 50 feet of sensitive plants (DS-31) and no spraying in unfavourable weather conditions (DS-34). Since DS-34 also calls for ensuring that no herbicide droplets travel more than 10 feet from the target weed, vehicle-based herbicides would cause no direct effect upon any known population of *M. evanescens*. However, hand-spraying or manual treatments are allowed within 50′ of TES plants; therefore, *M. evanescens* may suffer from inadvertent herbicide spray and/or trampling.

Indirect effects upon *M. evanescens* under Alternative 2 include possible damage to viability or reproductive ability of plants that are trampled upon or sprayed during weed treatment. Disturbance of ground near sensitive plants may provide an opening for invasion by competitive weeds. Beneficial effects to *M. evanescens* include control of nearby noxious weeds that may reduce the risk that weed seeds or rhizomes might invade their habitat, and reduce the risk that future projects or people in the area could unwittingly transport weed seeds into *M. evanescens* habitat. Since treatment of existing weed occurrences is far enough away from any known occurrences of *M. evanescens*, it is unlikely that they will suffer from either overspray or trampling. Treatment of noxious weeds in the area might prevent them from invading habitat of *M. evanescens*, and help prevent future projects in the area from moving weed seed into the same.

Cumulative Effects

By reducing noxious weeds, weed treatments will reduce propagules that could spread to nearby *M. evanescens* habitat through grazing, workers for the Sagebrush Steppe project, OHV's, and recreationists. If a new decision document is not approved after 5 years, noxious weeds may regain ground and threaten sensitive plant habitat.

Alternative 3

Direct and Indirect Effects

Since there will be no herbicide use under Alternative 3, there will be no direct or indirect effects upon *M. evanescens* due to herbicides. Many noxious weeds that are close-by sensitive plants are not on the high-priority treatment list (see Tables 2-13 and 2-14, FEIS); therefore, delayed treatment of these weeds may endanger sensitive plant habitat.

Cumulative Effects

Noxious weed treatment should reduce the number of noxious weeds in areas with *M. evanescens*, but may cause disturbances that increase their populations. Future actions that disturb the ground may cause noxious weeds to gain new ground after treatment stops, and non-priority weed species left untreated may be further spread by any future use or projects in the area. If a decision document is not approved in five years, weeds may again encroach upon sensitive plant habitat.

Alternative 4

Direct and Indirect Effects

Alternative 4, like 2, allows the use of herbicides. Overspray, runoff, or leaching of herbicides may affect some individuals of *M. evanescens*, but since all known weed sites are more than 50′ from sensitive plants, this is unlikely. Manual treatments of weeds located far from sensitive plants are also unlikely to cause any harm due to trampling. Weed treatment should reduce weeds and provide more and better habitat for sensitive plant species.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *M. evanescens* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

Alternative 5

Direct and Indirect Effects

Herbicides are not allowed in this alternative; therefore, there shall be no direct effects upon sensitive plants due to them. Goat grazing may damage plants that are near weed sites (Scotch and musk thistles) to be treated with goat grazing, especially if they are not well supervised or get loose. Clipping, weed whacking, mulching, and tarping may be utilized on some weeds; *M. evanescens* plants will suffer direct impacts if they are inadvertently clipped, weed whacked, mulched, or tarped.

Treatment of weeds will reduce the risk that they will invade sensitive plant habitat in the future. Sensitive plants that are trampled, grazed, clipped, whacked, mulched, or tarped may suffer an impaired ability to reproduce, especially if new weed sites come up closer than those now known. Larger weed sites, if left untreated, may potentially degrade sensitive plant habitat in the future. Treatment of Dalmatian toadflax and yellow star-thistle, high priority species for treatment, should make it more possible to defend sensitive plants from these nearby noxious weeds.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *M. evanescens* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas. Untreated areas may serve as a seed bank for future weed infestations, and mitigation measures for any projects in those areas will be necessary in order to help reduce weed spread.

Alternative 6

Direct, Indirect, and Effects

Alternative 6 allows herbicide use and adds another herbicide and two mixes. Because of the expanded number of weed-combating tools, continued herbicide use throughout the years may both reduce the amount of weeds present and reduce the amount of herbicide needed in the future. Herbicide use will be prohibited within 50´ of sensitive plants (DS-32) and would thus cause minimal harm to them. Reduced herbicide use in the future would further reduce harm to sensitive plants. Goat grazing and weed whacking, etc.are addressed in Alternative 5 above. Herbicide use is reduced from Alternative 2 and 4, making it less likely that *M. evanescens* plants will be harmed by their use.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *M. evanescens* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

***Phacelia inundata* (PHIN)**

Alternative 1 - No Action

Direct and Indirect Effects

Under the "No Action" alternative, no weed treatments would take place. Therefore, sensitive plants would not sustain any direct physical damage due to weed management activities.

Indirect effects to this sensitive plant might result from noxious weeds competing for sunlight, minerals, water, and other resources. This competition could weaken the native plants, and noxious weeds could eventually out-compete sensitive plants and take over sensitive plant habitat.

Cumulative Effects

Possible future competition from noxious weeds. Without treatment of existing weed populations in the area around this species, the weeds would be able to colonise any disturbances to sensitive plant habitat. Known infestations of Scotch thistle, musk thistle, Canada thistle, and squarrose knapweed exist within 1 mile of *Phacelia inundata*; Dyer's

woad, Dalmatian toadflax, Klamath weed, yellow star-thistle, Russian knapweed, plumeless thistle, Mediterranean sage, and heart-podded hoary-cress all inhabit the same ecological zones as *Ph. inundata*.

Alternative 2 - Proposed Action

Direct and Indirect Effects

Under the Proposed Action, weeds could be sprayed with herbicides, but there would be no vehicle-based herbicide spraying within 50 feet of sensitive plants (DS-31) and no spraying in unfavourable weather conditions (DS-34). Since DS-34 also calls for ensuring that no herbicide droplets travel more than 10 feet from the target weed, vehicle-based herbicides would cause no direct effect upon any known population of *Ph. inundata*. However, hand-spraying or manual treatments are allowed within 50′ of TES plants; therefore, *Ph. inundata* may suffer from inadvertent herbicide spray and/or trampling.

Indirect effects upon *Ph. inundata* under Alternative 2 include possible damage to viability or reproductive ability of plants that are trampled upon or sprayed during weed treatment. Disturbance of ground near sensitive plants may provide an opening for invasion by competitive weeds. Beneficial effects to *Ph. inundata* include control of nearby noxious weeds that may reduce the risk that weed seeds or rhizomes might invade their habitat, and reduce the risk that future projects or people in the area could unwittingly transport weed seeds into *Ph. inundata* habitat. Since treatment of existing weed occurrences is far enough away from any known occurrences of *Ph. inundata*, it is unlikely that they will suffer from either overspray or trampling. Treatment of noxious weeds in the area might prevent them from invading habitat of *Ph. inundata*, and help prevent future projects in the area from moving weed seed into the same.

Cumulative Effects

By reducing noxious weeds, weed treatments will reduce propagules that could spread to nearby *Ph. inundata* habitat through grazing, workers for the Sagebrush Steppe project, OHV's, and recreationists. If a new decision document is not approved after 5 years, noxious weeds may regain ground and threaten sensitive plant habitat.

Alternative 3

Direct and Indirect Effects

Since there will be no herbicide use under Alternative 3, there will be no direct or indirect effects upon *Ph. inundata* due to herbicides. Many noxious weeds that are close-by sensitive plants are not on the high-priority treatment list (see Tables 2-13 and 2-14, FEIS); therefore, delayed treatment of these weeds may endanger sensitive plant habitat.

Cumulative Effects

Noxious weed treatment should reduce the number of noxious weeds in areas with *Ph. inundata*, but may cause disturbances that increase their populations. Future actions that disturb the ground may cause noxious weeds to gain new ground after treatment stops, and non-priority weed species left untreated may be further spread by any future use or

projects in the area. If a decision document is not approved in five years, weeds may again encroach upon sensitive plant habitat.

Alternative 4

Direct and Indirect Effects

Alternative 4, like 2, allows the use of herbicides. Overspray, runoff, or leaching of herbicides may affect some individuals of *Ph. inundata*, but since all known weed sites are more than 50′ from sensitive plants, this is unlikely. Manual treatments of weeds located far from sensitive plants are also unlikely to cause any harm due to trampling. Weed treatment should reduce weeds and provide more and better habitat for sensitive plant species.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *Ph. inundata* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

Alternative 5

Direct and Indirect Effects

Herbicides are not allowed in this alternative; therefore, there shall be no direct effects upon sensitive plants due to them. Goat grazing may damage plants that are near weed sites (Scotch and musk thistles) to be treated with goat grazing, especially if they are not well supervised or get loose. Clipping, weed whacking, mulching, and tarping may be utilized on some weeds; *Ph. inundata* plants will suffer direct impacts if they are inadvertently clipped, weed whacked, mulched, or tarped.

Treatment of weeds will reduce the risk that they will invade sensitive plant habitat in the future. Sensitive plants that are trampled, grazed, clipped, whacked, mulched, or tarped may suffer an impaired ability to reproduce, especially if new weed sites come up closer than those now known. Larger weed sites, if left untreated, may potentially degrade sensitive plant habitat in the future. Treatment of Dalmatian toadflax and yellow star-thistle, high priority species for treatment, should make it more possible to defend sensitive plants from these nearby noxious weeds.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *Ph. inundata* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas. Untreated areas may serve as a seed bank for future weed infestations, and mitigation measures for any projects in those areas will be necessary in order to help reduce weed spread.

Alternative 6

Direct, Indirect, and Effects

Alternative 6 allows herbicide use and adds another herbicide and two mixes. Because of the expanded number of weed-combating tools, continued herbicide use throughout the years may both reduce the amount of weeds present and reduce the amount of herbicide needed in the future. Herbicide use will be prohibited within 50′ of sensitive plants (DS-32) and would thus cause minimal harm to them. Reduced herbicide use in the future would further reduce harm to sensitive plants. Goat grazing and weed whacking, etc.are addressed in Alternative 5 above. Herbicide use is reduced from Alternative 2 and 4, making it less likely that *Ph. inundata* plants will be harmed by their use.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *Ph. inundata* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

***Pogogyne floribunda* (POFL)**

Alternative 1 - No Action

Direct and Indirect Effects

Under the "No Action" alternative, no weed treatments would take place. Therefore, sensitive plants would not sustain any direct physical damage due to weed management activities.

Indirect effects to this sensitive plant might result from noxious weeds competing for sunlight, minerals, water, and other resources. This competition could weaken the native plants, and noxious weeds could eventually out-compete sensitive plants and take over sensitive plant habitat.

Cumulative Effects

Possible future competition from noxious weeds. Without treatment of existing weed populations in the area around this species, the weeds would be able to colonise any disturbances to sensitive plant habitat. Known infestations of Scotch thistle, musk thistle, Canada thistle, and squarrose knapweed exist within 1 mile of *Phacelia inundata*; Dyer's woad, Dalmatian toadflax, Klamath weed, yellow star-thistle, Russian knapweed, plumeless thistle, Mediterranean sage, and heart-podded hoary-cress all inhabit the same ecological zones as *P. floribunda*.

Alternative 2 - Proposed Action

Direct and Indirect Effects

Under the Proposed Action, weeds could be sprayed with herbicides, but there would be no vehicle-based herbicide spraying within 50 feet of sensitive plants (DS-39) and no spraying in unfavourable weather conditions (DS-45). Since DS-45 also calls for ensuring that no herbicide droplets travel more than 10 feet from the target weed, vehicle-based herb-

icides would cause no direct effect upon any known population of *P. floribunda*. However, hand-spraying or manual treatments are allowed within 50′ of TES plants; therefore, *P. floribunda* may suffer from inadvertent herbicide spray and/or trampling. Canada thistle, musk thistle, squarrose knapweed, and Scotch thistle, which exist within 1 mile of *P. floribunda*, may be treated with herbicides: care must be exercised to insure that no sensitive plants are inadvertently sprayed or otherwise damaged.

Indirect effects upon *P. floribunda* under Alternative 2 include possible damage to viability or reproductive ability of plants that are trampled upon or sprayed during weed treatment. Disturbance of ground near sensitive plants may provide an opening for invasion by competitive weeds. Beneficial effects to *P. floribunda* include control of nearby noxious weeds that may reduce the risk that weed seeds or rhizomes might invade their habitat, and reduce the risk that future projects or people in the area could unwittingly transport weed seeds into *P. floribunda* habitat. Since treatment of existing weed occurrences is far enough away from any known occurrences of *P. floribunda*, it is unlikely that they will suffer from either overspray or trampling. Treatment of noxious weeds in the area might prevent them from invading habitat of *P. floribunda*, and help prevent future projects in the area from moving weed seed into the same.

Cumulative Effects

By reducing noxious weeds, weed treatments will reduce propagules that could spread to nearby *P. floribunda* habitat through grazing, workers for the Sagebrush Steppe project, OHV's, and recreationists. If a new decision document is not approved after 5 years, noxious weeds may regain ground and threaten sensitive plant habitat.

<u>Alternative 3</u>

Direct and Indirect Effects

Since there will be no herbicide use under Alternative 3, there will be no direct or indirect effects upon *P. floribunda* due to herbicides. Squarrose knapweed, a high-priority species for treatment, lives within 1 mile of a POFL occurrence: treatment of this weed site may cause mechanical injury to sensitive plants if care is not exercised. Many nearby weeds are not high-priority; therefore, delayed treatment of these weeds may endanger sensitive plant habitat.

Cumulative Effects

Noxious weed treatment should reduce the number of noxious weeds in areas with *P. floribunda*, but may cause disturbances that increase their populations. Future actions that disturb the ground may cause noxious weeds to gain new ground after treatment stops, and non-priority weed species left untreated may be further spread by any future use or projects in the area. If a decision document is not approved in five years, weeds may again encroach upon sensitive plant habitat.

<u>Alternative 4</u>

Direct and Indirect Effects

Alternative 4, like 2, allows the use of herbicides. Overspray, runoff, or leaching of herbicides may affect some individuals of *P. floribunda*, but since all known weed sites are more than 50′ from sensitive plants, this is unlikely. Manual treatments of weeds located far from sensitive plants are also unlikely to cause any harm due to trampling. Weed treatment should reduce weeds and provide more and better habitat for sensitive plant species.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *P. floribunda* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

Alternative 5

Direct and Indirect Effects

Herbicides are not allowed in this alternative; therefore, there shall be no direct effects upon sensitive plants due to them. Goat grazing (DS-32) may damage plants that are near weed sites (Scotch and musk thistles) to be treated with goat grazing, especially if they are not well supervised or get loose. Clipping, weed whacking, mulching, and tarping may be utilized on some weeds (DS-33); *P. floribunda* plants will suffer direct impacts if they are inadvertently clipped, weed whacked, mulched, or tarped.

Treatment of weeds will reduce the risk that they will invade sensitive plant habitat in the future. Sensitive plants that are trampled, grazed, clipped, whacked, mulched, or tarped may suffer an impaired ability to reproduce, especially if new weed sites come up closer than those now known. Larger weed sites, if left untreated, may potentially degrade sensitive plant habitat in the future. Treatment of Dalmatian toadflax and yellow star-thistle, high priority species for treatment, should make it more possible to defend sensitive plants from these nearby noxious weeds.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *P. floribunda* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas. Untreated areas may serve as a seed bank for future weed infestations, and mitigation measures for any projects in those areas will be necessary in order to help reduce weed spread.

Alternative 6

Direct, Indirect, and Effects

Alternative 6 allows herbicide use and adds another herbicide and two mixes. Because of the expanded number of weed-combating tools, continued herbicide use throughout the years may both reduce the amount of weeds present and reduce the amount of herbicide needed in the future. Herbicide use will be prohibited within 50′ of sensitive plants (DS-40) and would thus cause minimal harm to them. Reduced herbicide use in the future would

further reduce harm to sensitive plants. DS-32 and 33 are addressed in Alternative 5 above. Herbicide use is reduced from Alternative 2 and 4, making it less likely that *P. floribunda* plants will be harmed by their use.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *P. floribunda* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

***Polygonum polygaloides* ssp. *esotericum* (POPOE)**

Alternative 1 - No Action

Direct and Indirect Effects

Under the "No Action" alternative, no weed treatments would take place. Therefore, sensitive plants would not sustain any direct physical damage due to weed management activities.

Indirect effects to this sensitive plant might result from noxious weeds competing for sunlight, minerals, water, and other resources. This competition could weaken the native plants, and noxious weeds could eventually out-compete sensitive plants and take over sensitive plant habitat.

Cumulative Effects

Possible future competition from noxious weeds. Without treatment of existing weed populations in the area around this species, the weeds would be able to colonise any disturbances to sensitive plant habitat.

Alternative 2 - Proposed Action

Direct and Indirect Effects

Under the Proposed Action, weeds could be sprayed with herbicides, but there would be no vehicle-based herbicide spraying within 50 feet of sensitive plants (DS-39) and no spraying in unfavourable weather conditions (DS-45). Since DS-45 also calls for ensuring that no herbicide droplets travel more than 10 feet from the target weed, vehicle-based herbicides would cause no direct effect upon any known population of *P. p.* ssp. *esotericum*. However, hand-spraying or manual treatments are allowed within 50′ of TES plants; therefore, *P. p.* ssp. *esotericum* may suffer from inadvertent herbicide spray and/or trampling.

Indirect effects upon *P. p.* ssp. *esotericum* under Alternative 2 include possible damage to viability or reproductive ability of plants that are trampled upon or sprayed during weed treatment. Disturbance of ground near sensitive plants may provide an opening for invasion by competitive weeds. Beneficial effects to *P. p.* ssp. *esotericum* include control of nearby noxious weeds that may reduce the risk that weed seeds or rhizomes might invade their habitat, and reduce the risk that future projects or people in the area could

unwittingly transport weed seeds into *P. p.* ssp. *esotericum* habitat. Treatment of noxious weeds in the area might prevent them from invading habitat of *P. p.* ssp. *esotericum*, and help prevent future projects in the area from moving weed seed into the same.

Cumulative Effects

By reducing noxious weeds, weed treatments will reduce propagules that could spread to nearby *P. p.* ssp. *esotericum* habitat through grazing, workers for the Sagebrush Steppe project, OHV's, and recreationists. If a new decision document is not approved after 5 years, noxious weeds may regain ground and threaten sensitive plant habitat.

Alternative 3

Direct and Indirect Effects

Since there will be no herbicide use under Alternative 3, there will be no direct or indirect effects upon *P. p.* ssp. *esotericum* due to herbicides. Squarrose knapweed, a high-priority species for treatment, lives within 1 mile of a POFL occurrence: treatment of this weed site may cause mechanical injury to sensitive plants if care is not exercised. Many nearby weeds are not high-priority; therefore, delayed treatment of these weeds may endanger sensitive plant habitat.

Cumulative Effects

Noxious weed treatment should reduce the number of noxious weeds in areas with *P. p.* ssp. *esotericum*, but may cause disturbances that increase their populations. Future actions that disturb the ground may cause noxious weeds to gain new ground after treatment stops, and non-priority weed species left untreated may be further spread by any future use or projects in the area. If a decision document is not approved in five years, weeds may again encroach upon sensitive plant habitat.

Alternative 4

Direct and Indirect Effects

Alternative 4, like 2, allows the use of herbicides. Overspray, runoff, or leaching of herbicides may affect some individuals of *P. p.* ssp. *esotericum*, but since all known weed sites are more than 50′ from sensitive plants, this is unlikely. Manual treatments of weeds located far from sensitive plants are also unlikely to cause any harm due to trampling. Weed treatment should reduce weeds and provide more and better habitat for sensitive plant species.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *P. p.* ssp. *esotericum* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

Alternative 5

Direct and Indirect Effects

Herbicides are not allowed in this alternative; therefore, there shall be no direct effects upon sensitive plants due to them. Goat grazing may damage plants that are near weed sites (Scotch and musk thistles) to be treated with goat grazing, especially if they are not well supervised or get loose. Clipping, weed whacking, mulching, and tarping may be utilized on some weeds; *P. p.* ssp. *esotericum* plants will suffer direct impacts if they are inadvertently clipped, weed whacked, mulched, or tarped.

Treatment of weeds will reduce the risk that they will invade sensitive plant habitat in the future. Sensitive plants that are trampled, grazed, clipped, whacked, mulched, or tarped may suffer an impaired ability to reproduce, especially if new weed sites come up closer than those now known. Larger weed sites, if left untreated, may potentially degrade sensitive plant habitat in the future. Treatment of Dalmatian toadflax and yellow star-thistle, high priority species for treatment, should make it more possible to defend sensitive plants from these nearby noxious weeds.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *P. p.* ssp. *esotericum* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas. Untreated areas may serve as a seed bank for future weed infestations, and mitigation measures for any projects in those areas will be necessary in order to help reduce weed spread.

<u>Alternative 6</u>

Direct, Indirect, and Effects

Alternative 6 allows herbicide use and adds another herbicide and two mixes. Because of the expanded number of weed-combating tools, continued herbicide use throughout the years may both reduce the amount of weeds present and reduce the amount of herbicide needed in the future. Herbicide use will be prohibited within 50′ of sensitive plants (DS-32) and would thus cause minimal harm to them. Reduced herbicide use in the future would further reduce harm to sensitive plants. Goat grazing and weed whacking, etc, are addressed in Alternative 5 above. Herbicide use is reduced from Alternative 2 and 4, making it less likely that *P. p.* ssp. *esotericum* plants will be harmed by their use.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *P. p.* ssp. *esotericum* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

***Rorippa columbiae* (ROCO)**

Alternative 1 - No Action

Direct and Indirect Effects

Under the "No Action" alternative, no weed treatments would take place. Therefore, sensitive plants would not sustain any direct physical damage due to weed management activities.

Indirect effects to this sensitive plant might result from noxious weeds competing for sunlight, minerals, water, and other resources. This competition could weaken the native plants, and noxious weeds could eventually out-compete sensitive plants and take over sensitive plant habitat.

Cumulative Effects

Possible future competition from noxious weeds. Without treatment of existing weed populations in the area around this species, the weeds would be able to colonise any disturbances to sensitive plant habitat. Three sites of Canada thistle, a rhizomatous noxious weed, exist within 1 mile of *Rorippa columbiae*. With no action taken, this weed has the potential to invade and outcompete *R. columbiae* in its habitat.

Alternative 2 - Proposed Action

Direct and Indirect Effects

Under the Proposed Action, weeds could be sprayed with herbicides, but there would be no vehicle-based herbicide spraying within 50 feet of sensitive plants (DS-31) and no spraying in unfavourable weather conditions (DS-34). Since DS-34 also calls for ensuring that no herbicide droplets travel more than 10 feet from the target weed, vehicle-based herbicides would cause no direct effect upon any known population of *R. columbiae*. However, hand-spraying or manual treatments are allowed within 50′ of TES plants; therefore, *R. columbiae* may suffer from inadvertent herbicide spray and/or trampling.

Indirect effects upon *R. columbiae* under Alternative 2 include possible damage to viability or reproductive ability of plants that are trampled upon or sprayed during weed treatment. Disturbance of ground near sensitive plants may provide an opening for invasion by competitive weeds. Beneficial effects to *R. columbiae* include control of nearby noxious weeds that may reduce the risk that weed seeds or rhizomes might invade their habitat, and reduce the risk that future projects or people in the area could unwittingly transport weed seeds into *R. columbiae* habitat. Treatment of noxious weeds in the area might prevent them from invading habitat of *R. columbiae*, and help prevent future projects in the area from moving weed seed into the same.

Cumulative Effects

By reducing noxious weeds, weed treatments will reduce propagules that could spread to nearby *R. columbiae* habitat through grazing, workers for the Sagebrush Steppe project, OHV's, and recreationists. If a new decision document is not approved after 5 years, noxious weeds may regain ground and threaten sensitive plant habitat.

Alternative 3

Direct and Indirect Effects

Since there will be no herbicide use under Alternative 3, there will be no direct or indirect effects upon *R. columbiae* due to herbicides. DS-06 prohibits the use of manual treatments upon rhizomatous weeds like Canada thistle; therefore, no injury would result to *R. columbiae* because the closest noxious weeds are rhizomatous.

Cumulative Effects

Noxious weed treatment should reduce the number of noxious weeds in areas with *R. columbiae*, but may cause disturbances that increase their populations. Future actions that disturb the ground may cause noxious weeds to gain new ground after treatment stops, and untreated weed species may be further spread by any future use or projects in the area. If a decision document is not approved in five years, weeds may again encroach upon sensitive plant habitat.

Alternative 4

Direct and Indirect Effects

Alternative 4, like 2, allows the use of herbicides. Overspray, runoff, or leaching of herbicides may affect some individuals of *R. columbiae*. Manual treatments of weeds located far from sensitive plants are unlikely to cause any harm due to trampling. Weed treatment should reduce weeds and provide more and better habitat for sensitive plant species.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *R. columbiae* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

Alternative 5

Direct and Indirect Effects

Herbicides are not allowed in this alternative; therefore, there shall be no direct effects upon sensitive plants due to them. Goat grazing may damage plants that are near weed sites (Scotch and musk thistles) to be treated with goat grazing, especially if they are not well supervised or get loose. Clipping, weed whacking, mulching, and tarping may be utilized on some weeds; *R. columbiae* plants will suffer direct impacts if they are inadvertently clipped, weed whacked, mulched, or tarped.

Treatment of weeds will reduce the risk that they will invade sensitive plant habitat in the future. Sensitive plants that are trampled, grazed, clipped, whacked, mulched, or tarped may suffer an impaired ability to reproduce, especially if new weed sites come up closer than those now known.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *R. columbiae* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas. Untreated areas may serve as a seed bank for future weed infestations, and mitigation measures for any projects in those areas will be necessary in order to help reduce weed spread.

Alternative 6

Direct, Indirect, and Effects

Alternative 6 allows herbicide use and adds another herbicide and two mixes. Because of the expanded number of weed-combating tools, continued herbicide use throughout the years may both reduce the amount of weeds present and reduce the amount of herbicide needed in the future. Herbicide use will be prohibited within 50′ of sensitive plants (DS-32) and would thus cause minimal harm to them. Reduced herbicide use in the future would further reduce harm to sensitive plants. Goat grazing and weed whacking, etc. are addressed in Alternative 5 above. Herbicide use is reduced from Alternative 2 and 4, making it less likely that *R. columbiae* plants will be harmed by their use.

Cumulative Effects

Management of noxious weeds will reduce their numbers and better the chances for survival of sensitive plants and their habitat. Future projects in areas with *R. columbiae* such as grazing, timber harvesting, *etc.* will be less likely to spread noxious weeds into those areas.

Appendix S2.3: Plants Biological Evaluation Addendum Supplement

Supplement to the Addendum to the Botany Biological Evaluation for Modoc National Forest Noxious Weed Treatment Project

Modoc National Forest, California
Sensitive Plant Species
04/25/2007

Summary
A new Sensitive Plant List was approved by the Pacific Southwest Regional Forester in October 2006. This list removed two species from the Forest Sensitive list and added ten others. This document will analyse effects upon these new sensitive species. All proposed actions will remain as described in the Modoc National Forest Noxious Weed Treatment Final Environmental Impact Statement.

It is my determination that:
Implementing the Preferred alternative and Design Standards "may affect individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viablility to the population or species" of all 10 sensitive plant species analyzed in this document.

Prepared by: _____ Date: 4/25/2007
Julie Laufmann TEAMS

Prepared by: Forest Jay Gauna, Botany Intern

Reviewed by: Cheryl Beyer, Forest Botanist

Introduction

This supplement to the addendum to the Botany Biological Evaluation for the Modoc National Forest Noxious Weed Treatment Program analyzes ten Sensitive plant species that are known or suspected to occur on the Modoc National Forest. These species were added to the regional Sensitive Species list in a letter dated July 27, 2006 (Appendix A). The new list became effective October 1, 2006.

Purpose of this Addendum

What this Addendum does:

- Updates the existing BE and addendums to the BE by analyzing direct, indirect and cumulative effects to 10 new species recently added to the regional sensitive plant list.
- Provides determination statements of impacts to each newly added species for each alternative proposed in this Environmental Impact Statement (EIS).

What this Addendum does not do:

- Does not change any of the proposed actions in the Environmental Impact Statement
- Does not include any new project design features
- Does not address any new treatment methods, strategies, or new weed species
- Does not change any determinations of the previously analyzed species

Proposed Action

A description of the alternatives may be found under the heading "Alternatives and their Effects upon Sensitive Plants" in the addendum to the Botany Biological Evaluation for Modoc National Forest Noxious Weed Treatment Project (1/29/2006, pg.5). The preferred alternative is alternative 6.

Purpose of Project

The purpose of the project is to aggressively and efficiently eradicate, or control and contain, 14 specific noxious weed species on the Modoc National Forest utilizing manual, chemical, or manual and chemical treatments. Please see the Final EIS (FEIS) for more information.

This action will help preserve the native biodiversity of the Forest and promote the ecosystem health of forested and rangeland habitats by maintaining or improving native forbs and grass communities.

Consistency with Laws, Plans, and Policies

All alternatives would be consistent with direction in the Modoc National Forest Land and Resource Management Plan as amended, and the Modoc National Forest Integrated Weed Management Strategy (2005).

Sensitive Species List Updates

Species removed from list

Two species formerly considered Sensitive have been removed from the list and placed on the Forest Watchlist: *Iliamna bakeri* (Baker's globemallow) and *Pogogyne floribunda* (profuse-flowered pogogyne).

Species added to list

Ten species have been added to the Modoc National Forest Sensitive Plant Species List. These are: *Astragalus lemmonii* (Lemmon's milkvetch), *Botrychium pumicola* (pumice moonwort), *Bruchia bolanderi* (Bolander's candlemoss), *Helodium blandowii* (Blandow's bogmoss), *Lomatium roseanum* (adobe parsley), *Lupinus latifolius* var. *barbatus* (bearded lupine), *Meesia triquetra* (threeranked humpmoss), *Meesia uliginosa* (broadnerved humpmoss), *Ptilidium californicum* (Pacific fuzzwort), and *Thelypodium howellii* ssp. *howellii* (Howell's thelypody) (see Table 1 below). No surveys for these specific plants have been conducted since they were just added to the list October, 2006 (Appendix A).

Table 1: Ten new sensitive plant species added to the Modoc National Forest Sensitive Plant Species List (*October, 2006- Appendix B)*

Code	Sensitive Species	Common Name	Habitat
ASLE6	*Astragalus lemmonii*	Lemmon's milkvetch	Usually occurs in wetlands, in Great Basin sagebrush scrub.
BOPU2	*Botrychium pumicola*	pumice moonwort	Pumice gravel in openings in lodgepole or whitebark pine, moist in late spring.
BRBO2	*Bruchia bolanderi*	Bolander's candlemoss	High mountain meadows in lodgepole pine; on moist, organic soil.
HEBL2	*Helodium blandowii*	Blandow's bogmoss	Bogs and fens in subalpine coniferous forest.
LORO7	*Lomatium roseanum*	roseflowered desertparsley	Open, dry, basalt overlying clay soils within low sagebrush.
LULAB	*Lupinus latifolius* var. *barbatus*	bearded lupine	Wet places in mesic upper montane coniferous forest.
METR70	*Meesia triquetra*	threeranked humpmoss	Mineral fens and wetland sites within mesic upper montane forest.
MEUL70	*Meesia uliginosa*	broadnerved humpmoss	Meadows, fens, seeps in upper montane coniferous forest; damp soil.
PTCA5	*Ptilidium californicum*	Pacific fuzzwort	On bark, in moist mature hemlock or white fir, not burned for 30 yrs.
THHOH	*Thelypodium howellii* ssp. *Howellii*	Howell's thelypody	Great Basin scrub, alkaline adobe meadows and seeps.

Astragalus lemmonii **Lemmon's milkvetch**

Description: Perennial, from a somewhat fleshy to woody taproot, loosely matted to open and widely branched, herbage green but sparsely strigose, with basifixed hairs. Stems slender, several to many, radiating from a superficial root-crown. Several inflorescences often paired in the axils. Pods are small producing few seeds.

Habitat: Within sagebrush scrub: Moist grassy, sedgy, or rushy flats bordering streams and lake shores; vernally moist summer-dry alkaline meadows, seeps, marshes and swamps; occasionally found in non-wetlands. Forms rare and scattered colonies. Found in Lassen, Mono, Modoc, Plumas, and Sierra Counties; Nevada, and Oregon.

Elevation: 4,200 – 7,225 feet.

Flowering Period: late May to early August Identification Period: late May to early August

Threats: Land conversion and pipeline construction.

Botrychium pumicola **pumice moonwort**

Description: Perennial herbaceous plants, 6-14 cm long producing one or sometimes two above ground leaves. Trophophore stalk 0--10 mm, 0.1--0.5 times length of trophophore rachis. The blade is dull, and leathery. Sporophores 1--3-pinnate, 1--1.5 times length of trophophore.

Habitat:
Botrychium pumicola typically grows in loose volcanic (pumice) soils, often, at lower elevations, in frost pockets or comparable areas that retain moisture into late spring. Plants occur on dry, fine to coarse pumice gravel and scree without any admixture of humus in relatively open to fully exposed sites with little competing vegetation on sparsely vegetated pumice fields and gently rolling slopes, from subalpine lodgepole forest to above timberline that are covered in winter by several feet of snow (Abrams; Camacho; Coville; Farrar 2006; Kozloff; Wagner '86; Wagner '93; Willamette). *Botrychium pumicola* has been found growing with *B. lanceolatum* and *B. simplex*. *It* has been found in southwestern Oregon where approximately 118 populations have been reported. About 60% have less than 20 plants/stems; less than 15,000 plants in total (www.natureserve.org 2007). There is one 1941 siting of a juvenile plant on Shastina, a secondary cone of Mt. Shasta in California, "in a basin near the spur on the south bank of Diller Canyon, west side of Shastina near timberline" (Farrar 2006).

Elevation: 5,900 ft. to 8,850 ft.

Sporulating Period: Unknown. Identification Period: July-September (PacifiCorp)

Threats: Fern collecting; habitat disruption by recreational use, timber harvesting, pumice mining. About 30,00 tons of pumice and pumicite are mined each year from northeastern California, with almost all coming from deposits at Glass Mountain, Medicine Lake Highlands, Modoc National Forest. Quarrying these deposits began in this region in the mid-1940's.

Bruchia bolanderi **Bolander's candlemoss**

Description: Plants tiny, 5.1–12 mm tall. Leaves short, linear, narrowly acuminate to subulate, serrulate, green to light brown, 1.1–2.8 mm long. Capsules are the most conspicuous part of the plants. Spores papillose.

Habitat: Occurring as individual plants among grasses, or forming large colonies in openings, on moist, disturbed soil with organic content, shaded to partial sun in the alpine or subalpine zones. Montane meadows and streambanks within mixed conifer or lodgepole forest are favoured habitat. The species is opportunistic, taking advantage of minimal competition from other vegetation and disturbed sites, such as the vertical soil banks of small meadow streams or headcuts. Associated species include *Pinus contorta* and the mosses *Aulacomnium palustre* and *Pohlia* spp. *Bruchia bolanderi* is found in Fresno, Maiposa, Modoc, Nevada, Plumas, Tehama, Tulare, and Tuolume Counties in California. It is also found in Oregon (CNPS 2001). On the Modoc National Forest it has been found at two locations within the same drainage in the north Warner Mountains.

Elevation: 5,575 ft. to 9,200 ft.

Growing Period: Summer Identification Period: Late Summer.

Threats: The ephemeral nature of this species and its occurrence in disturbed sites allow some flexibility in management. It is sometimes found growing on the steep banks of headcuts. Restoration of these streams may impact plants. Trampling along recreation trails has the potential to decimate populations.

Helodium blandowii **Blandow's feathermoss**

Description: Plants yellow-green, in loose tufts: with a growth pattern that simulated the look of a feather. Stems 4–11 cm long, more or less erect, densely clothed in unbranched (but lobed) green filamentous paraphyllia becoming brown below. Branches unequal, simple, widely spaced on stem, about 1 cm long. Stem leaves large, more or less triangular. Branch leaves small (about 0.8 mm long) and contorted when dry, broadly ovate-acuminate to ovate-lanceolate. Capsules rare; when present, smooth, oblong-cylindric.

Habitat: Forming mats and small hummocks in montane "minerotrophic" or "moderately rich" fens, usually with calcareous groundwater. Sometimes under sedges and shrubs around the edges of mires, or along streamlets in mires. Associated vascular species include *Agrostis idahoensis*, *Betula glandulosa*, *Salix geyeriana*, *Carex limosa*, *Eleocharis pauciflora*, and *Scheuchzeria palustris*. Associated mosses include *Aulacomnium palustre*, *Calligeron stramineum*, *Hamatocaulis vernicosus*, *Meesia triquetra*, *Tomenthypnum nitens*, *Philonotis fontana*, *Drepanocladus vernicosus*, *Hypnum lindbergii*. *Helodium blandowii* is known from California, Nevada, Oregon, Utah, Washington, and elsewhere (CNPS 2001).

Elevation: 6,550 ft. to 8,875 ft.

Flowering Period: Unknown. Identification Period: Unknown

Threats: Peatlands are fragile ecosystems which are impacted by trampling from domestic stock, water diversion and impoundment, drain-age projects, road construction and continued use, and the commercial harvest of peat and sphagnum moss. Hydrologic alteration caused the "well-documented extinction" of this species in Britain.

Lomatium roseanum **Adobe Parsley**

Description: Long-lived perennial usually over 10 cm tall. Root tuberous, thick. Flowers yellow, aging to whitish. Fruit only very narrowly laterally winged; dorsal ribs wingless.

Habitat: Loose, rocky habitat. Specifically: open, dry basalt talus stripes and scree fields overlying clay soils on gentle slopes in low sagebrush vegetation with *Artemisia arbuscula*, *Poa secunda*, *Elymus elymoides*, *Arenaria aculeata*, *Phlox* spp., *Erigeron linearis*, etc.

Elevation: 5,750 ft. to 6,175 ft.

Flowering Period: April-June Identification Period: April-June

Threats: No literature available.

Lupinus latifolius* var. *barbatus **Bearded Lupine, Klamath Lupine**
Description: Perennial forb arising from a stout stem (commonly several to many) 2 or more feet high. Flowers 8–10 mm, scattered, mostly pale. Ovules 6–7. Fruit 2–4½ cm, quite densely hairy. Seeds 3–4 mm, mottled dark brown.

Habitat: Mesic; wet, shady to open, sunny clay banks along streams and on the margins of meadows, within upper montane coniferous woodlands (CNPS; Jepson; Henderson; Hitchcock). Found in Lassen and Modoc Counties in California, and in Oregon.

Elevation: 4,925 ft. to 8,200 ft.

Flowering Period: June-July Identification Period: June-July

Threats: Threatened by grazing

Meesia triquetra **Three-ranked humpmoss**

Description: In small tufts or cushions. Plants acrocarpous, dioicous, often large, dark-green to grass-green above, occasionally red-brown below due to dense rhizoids. Stems not or little branched, pale-brown to yellow-brown, closely foliate, 2–14 cm high. Leaves decurrent, squarrose (spreading) when moist, triangular to ovate to lanceolate, somewhat crispate (contorted), 2–3½ mm long, tristichous (in three obvious ranks). Capsule asymmetrical, 2¾–5½ mm long including the neck. Spores finely papillose. Circumboreal distribution. Infrequently encountered

in California; most likely in relict habitats. Currently known on the Modoc NF from one location in the south Warner Mountains.

Habitat: Mosses of wetland sites, specifically, within wet woods in the wettest portions of extreme rich fens.

Elevation: 3,975 ft. to 9,000 ft.

Sporulating Period: unknown Identification Period: July-September

Threats: Rich fen habitat is easily modified; surface water chemistry of rich fens is sensitive to climatic and anthropogenic influences. Threatened by trampling from domestic stock.

Meesia uliginosa **broadnerved humpmoss**

Description: Plant autoicous. Stems 1–4 cm long, often branched. Leaves erect, linear to ligulate-lingulate, somewhat contorted when dry. Capsule up to 4 mm long including neck; neck long, often wrinkled when dry. Spores finely papillose.

Habitat: Fens, peaty soil banks, seeps, meadows, rock fissures upon exposed, damp down decorticated logs and organic soil within upper montane to subalpine coniferous forest. Specifically, upon calcareous substrates; usually in alpine or arctic regions, but occurring at lower elevations in rich fens. Circumboreal distribution with scattered occurrences in California. On occurrence has been found on the Modoc National Forest in the north Warner Mountains.

Elevation: 3,950 ft. to 8,550 ft.

Sporulating Period: October Identification Period: August-October

Threats: Trampling from livestock and hydrologic alteration

Ptilidium californicum **Pacific fuzzwort**

Description: Dioicous, small to medium-sized liverwort. Golden-green to golden, but more typically reddish-brown, can also be purplish-red, or coppery red, resembling a dense fuzzy mat, occurring in small or large patches. Leaves deeply bi-lobed; with underleaves prominent, wider than the stem but about or less than half the size of the leaves. Sporophytes abundant from May to August.

Habitat: This plant has a narrow environmental specificity: it is found in (and serves as an indicator species of) old-growth forest. It is typically epiphytic on bark at the base of standing mature to old-growth trees (*Abies concolor*, *A. magnifica*, and *Pseudotsuga menziesii*) or recently fallen logs; rarely on other organic substrates such as decaying logs and stumps, or humus covering boulders. At the southern end of its range (Oregon and California) this species is distinctly restricted to middle elevation forests; Survey and Manage). World-wide distribution with nar-

row environmental specificity. Uncommon in Northern California, found just west of the Modoc National Forest.

Elevation: 1,275 ft. to 5,725 ft.

Sporulating Period: May-August Identification Period: year-round

Threats: The survival of *Ptilidium californicum* in the southern end of its range (i.e., northern California) depends upon the protection of the known sites as dispersal sources (Christy). The major threat facing *P. californicum* is loss of popu-lations due to management activities that directly or indirectly impact the habitat or populations by disrupting stand conditions necessary for its survival. These include treatments such as: removal of colonized substrate, stand treat-ments that result in changes in microclimatic conditions or forest structure, or harvest of special forest products that may include individuals of this taxon. Spray paint used to mark 'leave,' 'take,' and 'wildlife' trees within project areas severely impact this species (Survey and Manage).

***Thelypodium howellii* ssp. *howellii* Howell's thelypody**

Description: *Thelypodium howellii* ssp. *howelli* is a waxy, biennial or annual 4 to 35 in. (1-9 dm) tall that is generally branched above the middle. The plant may be completely hairless, or have short, stiff hairs at the base. The inflorescence (flower cluster) is elongated and open. The flowers are lavender to purple with a greenish base. The seeds are plump.

Habitat: Open wet to dry meadows and flats, pastures, moist alkaline soils, swamps, sandy banks, river valleys, and at the margins of ponds and lakes. Found in California, Oregon, and Washing. Known in California from fewer than twenty occurrences. Endangered in Oregon. Occurrences noted in Lassen, Modoc, and Shasta Counties.

Elevation: 4,000 to 5,100 feet.

Flowering Period: May-July Identification Period: May-July

Threats: Grazing by livestock

Sensitive Species Effect Analysis Methodology

The Forest Service Manual (FSM) 2670.5 defines sensitive species as those plants and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers, density, or habitat capability that reduce a species existing distribution.

The management direction for sensitive species as outlined in FSM 2670.22 is in part, to ensure that species do not become threatened or endangered because of Forest Service actions, and to maintain viable populations of all native species.

The sensitive species evaluated in this supplement may have the potential to occur in treatment areas. Because it is unknown if all of these species occur on the forest and limited surveys have been conducted, effects analysis will be based on the presence of potential habitat based on Cal-Veg (US Forest Service 1981). Design Standards to minimize or avoid effects to endangered, threatened or sensitive species include surveys for sensitive plants prior to treatment. Design Standards that benefit sensitive plants can be found in Chapter 2 of the FEIS and the Addendum (pg 14).

For a brief description of the alternatives and direct and indirect effects on Sensitive plants see Addendum to Botany Biological Evaluation for Modoc National Forest Noxious Weed Treatment Project (1/29/2006, pg. 6-14).

Noxious Weeds Targeted

No additional noxious weeds are targeted that apply to this supplement. For a complete discussion of species targeted see pg 14-15 of the Addendum to the Botany Biological Evaluation for Modoc National Forest Noxious Weed Treatment Project (1/29/2006).

Environmental Consequences of Action Alternatives

This section of the document will address environmental consequences of alternatives with respect only to the species identified within this document. No changes to the proposed actions or alternatives will occur, therefore, the discussion of treatment methods discussed in pages 15-28 of the Addendum to the Botany Biological Evaluation for Modoc National Forest Noxious Weed Treatment Project (1/29/2006) will be similar to the discussion of sensitive species evaluated in this supplement. All tables related to treatment methods, discussion on herbicide drift, Maximum Application Rates and offsite application rates for proposed herbicides in the FEIS and Toxicity Values (Table 8), Calculated Hazard Quotients (Table 9), and Risk Assessment for Herbicides Proposed in the FEIS (Table 10) will apply to this addendum and will not be duplicated within this document.

Direct, Indirect and Cumulative Effect for Species Evaluated in this Addendum.

Definitions:

Direct, indirect, and cumulative effects are defined in NEPA (40 CFR 1508.7 and 1508.8).

A direct effect "is caused by the action and occur at the same time and place."

Indirect effects "are caused by the action and are later in time or farther removed in distance, but are reasonably foreseeable. They may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems."

A cumulative effect is "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future ac-

tions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

Direct, indirect, and cumulative effects for each alternative are discussed below for the 10 Sensitive species evaluated within this document and on the Forest.

Because these species were just added to the forest's sensitive plant list and no surveys have been conducted, potential habitat for these 10 species was derived from current literature, cross-linked to the Cal-Veg layer then intersected with known noxious weed locations. The number of noxious weed sites within 100 feet of these 10 sensitive plant habitats are presented in table 2.

Lack of fine-scale habitats within CalVeg results in a coarsely-defined sensitive plant potential habitat on the Modoc National Forest. For example, CalVeg does not have fen alliances, and therefore, habitat for sensitive plants that are obligate fen species had to be modelled using wet meadows, which includes some inappropriate or unsuitable habitat. Additionally, noxious weeds can thrive and persist in very broadly categorized habitats as well, and therefore, sensitive species and noxious weeds listed within table 2 represent a very coarse representation of potential sensitive plant occurrences/habitats and proximity and potential impacts from noxious weeds. Project Design Standards would be implemented to ensure sensitive plant potential habitat was surveyed for plants prior to treatment.

Table 2: Sensitive Plant Species With Potential Habitat Near Documented Noxious Weed sites.

Sensitive species	Number of noxious weed sites within 100' of potential sensitive plant habitat[1]	Number of noxious weed sites within 100' of potential sensitive plant habitat that may be treated with herbicides	Noxious weeds identified within 100' of potential sensitive plant habitat
Astragaluslemmonii	20	6	Scotch thistle, Mediterranean sage, Dyer's woad, crupina, Dalmatian toadflax, Canada thistle
Botrychium pumicola	2	2	Dyer's woad, Scotch thistle
Bruchia bolanderi	7	7	Scotch thistle, Canada thistle
Helodium blandowii	1	1	Canada thistle
Lomatium roseanum	5	5	Scotch thistle, Dyer's woad, Canada thistle
Lupinus latifolius var. barbatus	11	11	Scotch thistle, Canada thistle, Dyer's woad
Meesia triquetra	11	10	Scotch thistle, Dalmatian toadflax, Canada thistle
Meesia uliginosa	11	10	Scotch thistle, Dalmatian toadflax, Canada thistle
Ptilidium californicum	0	0	none
Thelypodium howellii ssp. howellii	67	13	Scotch thistle, Klamath weed, yellow starthistle, Mediterranean sage, Dyer's woad, Dalmatian toadflax, Canada thistle, Crupina

Direct Indirect and Cumulative Effects

Alternative 1 - No Action

Direct and Indirect Effects

For the "No Action" alternative, no weed treatments would take place under this FEIS. Therefore, sensitive plants would not sustain any direct physical damage due to weed management activities.

Indirect effects to this sensitive plant might result from noxious weeds competing for sunlight, minerals, water, and other resources. This competition could weaken native plants, and noxious weeds could eventually out-compete sensitive plants and take over sensitive plant habitat.

Cumulative Effects

Sensitive plant species may sustain possible future competition from noxious weeds. Without treatment of existing weed populations in the area around areas where these sensitive plants may exist, weeds would likely continue to colonize impacting the areas.

Alternative 2 - Proposed Action

Direct and Indirect Effects

Under the Preferred Action, physical methods such as hand pulling and use of hand tools, cultural methods such as seeding, and herbicides as listed in the FEIS could be used on currently identified noxious weed sites.

The removal of invasive plants using manual techniques (i.e. handpulling, digging with hand tools) could directly affect sensitive plants in situations where the invasives are co-located with these species. Direct negative effects would be unintentional injury to these species. These effects should be minimized with Design Standards in place and adequately trained field crews. These short-term impacts, if kept to a minimum in relation to population size, would be more than compensated by the long-term positive benefits of removal of aggressive, competitive noxious weeds. Manual control crews could potentially directly impact sensitive plants through trampling of individuals or creation of erosive conditions within or upslope of populations. These impacts may have a more long term negative impact, but again if minimized, the benefit to the species would be more positive than negative.

Herbicide impacts could only occur if sensitive plants are identified within known noxious weed sites. Design Standards stipulate that there would be no herbicide spraying within 50 feet of sensitive plants, although wicking can take place (DS-32), and no spraying in unfavorable weather conditions (DS-34). Since DS-34 also calls for ensuring that no herbicide droplets travel outside the drip zone from the target weed, vehicle-based herbicides would cause no direct effect on these 10 sensitive species if they occur within the identified weed sites. There is a potential that inadvertent trampling may occur to these 10 sensitive plants, however, Design Standard – 01 provides for site specific surveys to be conducted prior to implementation of project activities, and any sensitive plants present could be avoided.

Impacts of invasive species to lichens, bryophytes, and fungi is not widely documented in the literature, likely due to taxonomic problems, lack of experts, the small size and intermixing of taxa in the field and the life history and variation of species. It is however, widely recognized that alteration or loss of habitat resulting from invasive species infestations likely would affect these species. Unknown effects from herbicide treatments are possible. Treatment of common bryophytes and lichens with glyphosate and triclopyr indicated loss of species abundance and richness in northwest Ontario 2 years post treatment

(Newmaster et al. 1999). However, bryophytes and lichens show species-specific responses to herbicides. Colonists and drought-tolerant species are somewhat resistant even when subjected to twice the normal application rate. And recovery of these species via the soil spore bank or spore dispersal from local refugie needs further investigation (Newmaster et al. 1999).

Indirect negative impacts from manual control could be attributed to soil disturbance. This could cause shifts in microsite condition such as reduction in soil moisture, disruption of mychorrhizal associations and cause an increase in surface temperatures. All of these indirect effects could lead to a shift in species composition away from the native community upon which listed plants depend, however, this is unlikely. One possible scenario is that the removal of one invasive species would encourage another invasive to take its place through various means of introduction (e.g. windblown seeds, human transport, breaking dormancy of other species seeds). It is likely that these impacts would occur at a small scale (less than 1 acre patches or scattered in small patches across an area) and follow-up monitoring of the treated sites and additional treatments or restoration methodologies would likely reduce negative impacts. The implementation of cultural methods (DS-20: Areas with bare soil resulting from noxious weed treatments that are greater than ¼ acre in size will be assessed for need for rehabilitation, and, DS-21: Areas with bare soil created by the treatment of noxious weed, the site would be evaluated for rehabilitation.) would help to reduce the potential of this happening in the future.

Positive benefits from the removal of the invasive species overshadows the indirect negative impacts. Sensitive plant populations would be affected positively by providing the space for increased growth in population size. One possible scenario is that removal of invasives will encourage native seed dormant in the soil to germinate due to less competitive conditions. Dremann and Shaw (2002) documented the success of converting live oak woodland from 99 percent exotic species cover to 85 percent native plant cover through a strategy of timed manual/mechanical removal that released the native seed bank. No reseeding was necessary

Cumulative Effects

Present and reasonably foreseeable future actions will continue to provide opportunities for invasive species to establish. Roads will continue to be a major conduit for invasive plants. Forest Service projections suggest that recreation uses of National Forests will continue to increase. Other land management and use activities such as grazing, vegetation management, fuels management (Healthy Forest Initiative), and fire suppression will continue to cause ground disturbances that can contribute to the introduction, spread and establishment of invasive plants on National Forest system lands (USDA, 2005).

While past activities may have contributed to the impact on these newly added sensitive species forest wide, neither the pre-disturbance condition nor previous sensitive species occurrences are known. Therefore, the baseline for comparison of effects to these sensitive plants is the current *inventory (which at this time is two known sites for Bruchia bolanderi, and one each for* Meesia triquetra and *M. uliginosa*, and zero for all other species evaluated in this document). While some adverse effects to future identified sensitive plants and their habitat are possible from treatments they are unlikely to be significant because the extent and threats posed by treatment are generally very small compared to the known range of sensitive species habitats forest-wide. Project design standards mitigate known risks and the monitoring and adaptive management plans would ensure uncertain risks are also mitigated.

<u>Alternative 3 –</u>

Direct and Indirect Effects

Under this alternative only physical methods such as hand pulling and hand tools can be used. Cultural methods such as reseeding with native seed is also allowed. Direct and indirect effects would be the same as described in Alternative 2 for impacts from physical and cultural methods.

No impacts from herbicide treatments would occur with this alternative.

Cumulative Effects

Cumulative effects would be the same as those discussed in Alternative 2, however, the potential for noxious weed to spread into sensitive plant habitat is likely to be considerably higher due to the lower effectiveness of treatments used with this alternative, especially for large infestations and those infestations of rhizomatous species.

Alternative 4 –

Direct and Indirect Effects

Alternative 4 is the similar to Alternative 2, however; it also proposes the use of early detection rapid response (EDRR) techniques to treat future unknown noxious weeds on the forest. Project design standards that require sensitive plant surveys prior to treatment in identified habitat (DS-01) as well as design standards to protect sensitive plant occurrences would be implemented. Direct and indirect effects would be the same as those discussed in Alternative 2.

Cumulative Effects

Cumulative effects would be the same as those discussed in Alternative 2; however, long-term benefits from EDRR would be higher because new noxious weed sites would be treated in a timelier efficient manner. For a complete review of EDRR effectiveness see Chapter 2 of the FEIS.

Alternative 5 –

Direct and Indirect Effects

Alternative 5 provides a non-herbicide alternative that contains the same physical methods as described in all other alternatives (hand pulling and use of hand tools – pulling grubbing, chopping, digging) but adds additional physical methods such as: clipping by hand, weed eaters, and mulching. Goat grazing is proposed on >4 and <25 acres for thistle. Early detection rapid response strategies are also proposed in this alternative using above stated methods. No herbicide use is proposed.

Direct and indirect effects would similar to those described in alternative 3. Additional potential effects from the added physical methods could be unintentional clipping or cutting of sensitive plant flower heads or plant parts which may impact vigor (reduction in photosynthesis ability) and/or subsequent decrease in reproduction potential (seed production). However, this is highly unlikely, as none of the sensitive species resemble any of the 14 noxious weed species. Mulching techniques have the potential to have negative effects on soil microorganisms and non-target species' seed viability in areas where treatments occur. Sensitive plant vigor could also be diminished by field crews trampling nearby plants. As with other alternatives these impacts should be minimal with properly trained crews.

Design Standards that require sensitive plant surveys prior to treatments in potential habitat would reduce most impacts and any short-term impacts would be more than compensated by the long-term positive benefits of removal of aggressive, competitive noxious weeds

Cumulative Effects

Cumulative effects would be the same as those discussed in Alternative 2; however, long-term benefits from EDRR would be higher because new noxious weed sites would be treated in a timelier, more efficient manner. For a complete review of EDRR effectiveness see Chapter 2 of the FEIS.

Alternative 6 –

Direct and Indirect Effects

Alternative 6 provides the opportunity to use three additional herbicide formulations not included in alternatives 2 and 4. This alternative also includes the additional manual treatment methods as described in alternative 5 as well as EDRR strategy.

Direct and indirect effects would similar to those described in alternative 5 for the added non-herbicidal methods and effects described in alternative 2 for herbicidal treatment effects.

Cumulative Effects

Cumulative effects would be the same as those discussed in Alternative 2 and Alternative 5, however, long-term benefits from EDRR and the addition of more herbicide choices that target and effectively treat specific noxious weed would be greater because new noxious weed sites would be treated in a timelier, more efficient manner. For a complete review of EDRR effectiveness see Chapter 2 of the FEIS.

Determination statement

It is my determination that implementing the Preferred Alternative and Design Standards "may affect individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species" of all 10 sensitive plant species analyzed in this document.

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Appendix A

File Code: 2670 **Date:** July 27, 2006
Route To:

Subject: 2006 Sensitive Plant Species List

To: Forest Supervisors

Enclosed is the FY06 Revision of the Regional Forester's List of Sensitive Plant Species. This supercedes all previous lists, and goes into effect as of October 1, 2006. Forest Service policy (FSM 2670.3) states that Biological Evaluations (BEs) must be completed for Sensitive Species, and signed by a journey-level biologist or botanist. The BE must be signed prior to any National Environmental Policy Act (NEPA) decision document. Projects with BEs signed prior to October 1, 2006 do not need to analyze effects to the newly-listed sensitive plant species. BE's signed after October 1, 2006, must include an evaluation of effects of proposed management actions on these species or their habitats occurring within the analysis area.

The National Forest Management Act (NFMA) requires the Forest Service to "provide for a diversity of plant and animal communities" [16 U.S.C. 1604(g)(3)(B)] as part of our multiple use mandate. For forests that have plans developed under the 1982 NFMA planning rule, we must maintain "viable populations of existing native and desired non-native species in the planning area" (36 CFR 219.19 Source: 47 FR 43037, September 30, 1982). The Sensitive Species program is designed to meet this mandate and demonstrate our commitment to maintain biodiversity on National Forest System lands. The program is our proactive approach to conserving species to prevent a trend toward listing under the Endangered Species Act of 1973, and to ensure the continued existence of viable, well-distributed populations.

Species on the Sensitive Species Lists are considered sensitive for every forest where they occur in the region. Forest level distribution information is included for clarity and ease of reference. Should a sensitive species or suitable habitat within the range/distribution for that species be located on a forest where it was not previously known to occur, the forest must inform the Regional TES Program Manager (animals) or Regional Botanist (plants) who will update the distribution section.

This revision of the Sensitive Plant Species List began with The NatureServe's Heritage Database rankings to ensure consistency in species included on the list across federal agencies nationally and locally, and between regions within each agency. The list is expected to be dynamic, with review and possible revision occurring on a five-year cycle to more accurately reflect the changing management situation. Complete criteria for the review process are included as electronic Enclosure #1 for these plant species. Botanists across the region contributed their time and expertise to the evaluation process. The revision would not have been possible without their efforts.

Evaluation forms are available for every species examined for potential inclusion on the list. To provide basic information supporting concerns for viability or trend toward federal listing for the

species, evaluation forms are available for all plants determined to be sensitive. Forests should already have copies of these forms for these plant species.

Forests have the option to establish a "Watch List" for plants. Several forests have already established such lists through their Forest Land and Resource Management Plans. These species do not meet all the criteria to be included on the Regional Forester's Sensitive List but are of sufficient concern that they should be considered in the planning process. To avoid confusion with CDFG's "Special Plants," we recommend the term, "Watch List." Watch Lists are dynamic and may be updated to reflect changing conditions and new information. The Watch List and supporting documentation should be retained in the planning file and considered during project planning. To analyze potential impacts to these species, consider the context, intensity, and duration of likely effects. Appropriate analysis may range from formal surveys to simple documentation of a lack of potential habitat. Do not incorporate analysis for the Watch List species into the Biological Evaluation, which is reserved for Sensitive Species.

For forests with plans developed under the 1982 NFMA planning rule, we will update the sensitive plants list on a five-year cycle. We will assist forests initiating their plan revision under the new planning rule by providing a database of all G1-3 ranked species and T1-3 ranked species. Regular updates to the Sensitive Species Lists and Forest Watch Lists are key steps in demonstrating our commitment to maintaining biologically diverse and healthy ecosystems. I commend you for the efforts you have made in compiling the information to make this revision possible.

If you have any questions, you may contact Art Gaffrey, Director, Ecosystem Conservation, at (707) 562-8719, or Diane Ikeda, Regional Botanist, at (707) 562-8938.

/s/ Beth G. Pendleton (for)
BERNARD WEINGARDT
Regional Forester

Enclosures

cc: Chris Knopp
Diane Ikeda
Diane Macfarlane

Appendix S3:

Botanical Report

Appendix S3.1: Botanical Report

File Code: 2600, 2080

Date: December 23, 2002

To: Irene Davidson - Interdisciplinary Team Leader

Subject: Botanical Report - Modoc National Forest Noxious Weed Control Project

INTRODUCTION

Botanical Review for the proposed Modoc National Forest Noxious Weed Control Project has been completed. The review process for this project included a Prefield Review for Threatened, Endangered, and Sensitive (TES) plants. Previous survey work discovered many of the weed locations proposed for treatment. Surveys for TES plants have been accomplished in many areas across the Forest for a variety of projects. Many of the proposed treatment sites remain without TES surveys.

MANAGEMENT SPECIES

As defined here, Management Species include those for which management requirements have been specifically defined through the Threatened and Endangered Species Act of 1973, the Sierra Nevada Forest Plan Amendment, or other Forest Service direction. These species include TES, Watch List and Noxious Weeds. In addition to summarizing the Biological Evaluation and Noxious Weed Risk Assessment, this report addresses Watch List species.

THREATENED AND ENDANGERED PLANTS

A biological assessment would be prepared if threatened or endangered plant species were suspected in the project area. One Threatened species, Orcuttia tenuis is suspected to occur on the Modoc National Forest. This species is found near vernal pools or vernal pool like drainage edges usually in oak and/or pine woodlands. During review it was determined that no habitat for this species occurs within the proposed treatment areas, therefore these activities will have “No Effect”. No Endangered plant species are suspected or known to occur on lands administered by the Modoc National Forest, therefore proposed activities would have “No Effect” on these species. No Biological Assessment will be prepared for this project.

SENSITIVE PLANTS

Surveys for Threatened, Endangered and Sensitive (TES) plants have been conducted in many areas across the Modoc National Forest. Although surveys are not complete in all proposed treatment areas, sufficient analysis of the risks to TES plants can be accomplished with current information. Even though they may exist, there are no known instances where sensitive plants and noxious weeds occur in such close proximity that the proposed control measures would impact the sensitive plants.

Both the Proposed Action and the No Action alternatives may affect sensitive plants, but in different ways. The effect from the Proposed Action will be that some sensitive plants may be

directly damaged or even killed by the weed control activities, but preventing further spread of the weeds will ultimately have a beneficial effect. Not implementing weed control activities may affect sensitive plants indirectly, resulting in high competition from the weeds and possible loss of individuals, occurrences or susceptible populations.

EFFECTS ANALYSIS

Proposed Action

DIRECT EFFECTS

Surveys are not complete throughout the proposed treatment areas; therefore it must be assumed that some undiscovered sensitive plant occurrences exist. Effects to undiscovered occurrences can be addressed without further surveys.

Sensitive plants may be damaged or killed by grubbing, digging and pulling noxious weeds, but only if the plants are interspersed with the weeds. In the same regard, chemical treatment may also damage or kill sensitive plants. There are no known situations on the Modoc National Forest where A, B or C rated noxious weeds are actually growing this close to sensitive plants, but it is possible. If the situation were known to exist, appropriate control measures, including possible chemical treatment, would still be recommended for the benefit of the sensitive species. Some plants may be damaged by foot traffic and vehicle traffic as workers access the sites. Overall, direct effects may initially have a negative impact on a small portion of sensitive plant occurrences.

INDIRECT EFFECTS

If sensitive plants are in close proximity to treatment sites, the indirect effects of both physical and chemical treatments will be that of decreasing competition and lessening the chance of possible future site conversion from the more aggressive and competitive noxious weeds. When the weeds are removed, essential resources (water, space, sunlight and nutrients) will be more readily available to the sensitive plants that remain. A weed-free site is more likely to be re-colonized by the sensitive plants. Even the “sacrifice” of a few individuals in a sensitive plant population in order to eradicate or limit the spread of an advancing noxious weed is ultimately a beneficial action for the sensitive species.

CUMULATIVE EFFECTS

Other projects planned for the Modoc National Forest will be impacting a portion of sensitive plant populations and habitat. Some of the current project proposals and continuing actions are Blue Fire Restoration, Hackamore Thinning, herbicide application in Long/Damon area, Modoc Complex Fire Restoration, and prescribed fire programs. In addition, livestock grazing will go on throughout the range of most of the suspected sensitive plants, and effects from herbivory and trampling will continue. Recreational activities may impact some sensitive plants, the most severe effects arising from unregulated OHV use. The current proposal is to treat only A, B and C rated noxious weeds. Other noxious weeds, as well as other aggressive non-native plants, do exist throughout the Forest and have been documented in some sensitive plant occurrences. These other weeds (two examples are medusahead and cheatgrass) will continue to affect sensitive plants by competing for resources.

Natural disturbances, such as wildfire, drought, flooding, and natural erosion processes will continue, with varying effects. Iliamna bakeri will be rejuvenated from wildfire; Calochortus longebarbatus var. longebarbatus populations will fluctuate with drought and wetter conditions; our annual sensitive plants, Mimulus evanescens, Phacelia inundata, Pogogyne floribunda, and Polygonum polygaloides ssp. esotericum, will experience population swings in response to varying climatic conditions. At this time, there is no evidence that these cumulative effects,

coupled with effects from the current proposal, will cause a downward trend for any of the sensitive plants.

No Action

DIRECT/INDIRECT EFFECTS

Without active noxious weed control, the weeds will continue to spread unchecked. Prevention measures, such as equipment washing and restricting access to infested sites, will be implemented as projects occur, but there will be no control measures. The existing weed sites will expand and spread to new areas by wind, vehicle traffic, animal movement and other means. Because of their competitive advantage, when the weed sites are already near or within sensitive plant occurrences, the weeds can be expected to displace sensitive plants within the reasonably foreseeable future (10-20 years). Over a longer period of time (30+ years), entire sensitive plant occurrences could be lost, the plants not able to effectively compete for the limiting resources of water, space, sunlight and nutrients. As the noxious weeds spread to new areas, additional sensitive plant occurrences would be affected.

Are these effects severe enough to cause loss of viability to sensitive plant populations or to cause a trend toward federal listing? Certainly, some occurrences could be lost, and given enough time (50-100 years or more of no noxious weed control), it is reasonable to assume that some sensitive plant populations could lose viability and eventually be lost. Especially at risk are those species that occur only at one or very few sites, with a low number of plants, and exist in sites that are susceptible to weed invasion. Species with these criteria are Botrychium ascendens, Mimulus evanescens, and Rorippa columbiae. These species are not likely to lose population viability from noxious weed invasion in the next 10-20 years, but as time goes on and there is no attempt to actively control the weeds, there will come a time when it will become likely that these populations will lose viability from the effects of weed competition. Loss of population viability in the long term is not likely for the remaining sensitive plants, which occur in larger numbers, at several locations, and/or in habitats that are less susceptible to weed invasion. My determination for this project is based on the relatively short time frame of the lifespan of a NEPA decision (<10 years).

CUMULATIVE EFFECTS

Effects from other management activities and natural processes are the same as described above for the Proposed Action. With the No Action Alternative, these effects will contribute to a somewhat faster rate of spread for the noxious weeds. For instance, weed seeds will be carried to new sites by continued livestock grazing, recreational OHV use and everyday vehicle traffic on roads.

DETERMINATION

<u>Proposed Action</u>

It is my determination that implementation of the Proposed Action “may affect individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the populations or species” for all 19 Modoc National Forest sensitive plants.

<u>No Action</u>

It is my determination that Implementation of the No Action alternative “may affect individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species” for all 19 Modoc National Forest sensitive plants.

Table 1: Sensitive Plant Summary of Determinations

Sensitive Species Suspected on the Modoc NF	Common Name	ProposedAction	No Action
Astragalus anxius	Ash Valley milkvetch	MAIH	MAIH
Astragalus pulsiferae var. suksdorfii	Suksdorf's milkvetch	MAIH	MAIH
Botrychium ascendens	upswept moonwort	MAIH	MAIH
Botrychium crenulatum	crenulate moonwort	MAIH	MAIH
Botrychium lineare	slender moonwort	MAIH	MAIH
Botrychium montanum	western goblin	MAIH	MAIH
Calochortus longebarbatus var.	long-haired star tulip	MAIH	MAIH
Cypripedium montanum	mountain lady's-slipper	MAIH	MAIH
Eriogonum prociduum	prostrate buckwheat	MAIH	MAIH
Eriogonum umbellatum var. glaberrimum	green buckwheat	MAIH	MAIH
Galium glabrescens ssp. modocense	Modoc bedstraw	MAIH	MAIH
Galium serpenticum ssp. warnerense	Warner Mountains bedstraw	MAIH	MAIH
Iliamna bakeri	Baker's globe mallow	MAIH	MAIH
Ivesia paniculata	Ash Creek ivesia	MAIH	MAIH
Mimulus evanescens	ephemeral monkeyflower	MAIH	MAIH
Phacelia inundata	playa phacelia	MAIH	MAIH
Pogogyne floribunda	profuse-flowered pogogyne	MAIH	MAIH
Polygonum polygaloides ssp. esotericum	Modoc County knotweed	MAIH	MAIH
Rorippa columbiae	Columbia yellow cress	MAIH	MAIH

NE = No effects

MAIH = May affect individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species.

WAIFV* = Will affect individuals or habitat with a consequence that the action may contribute to a trend towards federal listing or loss of viability to the population or species.

* Trigger for a Significant Issue as defined in NEPA

WATCH LIST PLANTS

Watch list species have been thus categorized because they do not meet all the criteria to be included on the Regional Forester's Sensitive List, but are of sufficient concern that we need to consider them in the planning process. These include species that are locally rare (as opposed to declining throughout their range), are of public concern, occur as disjunct populations, are newly described taxa, or lack sufficient information on population size, threats, trend or distribution. Such species make an important contribution to forest biodiversity and are addressed as appropriate through the NEPA process. To better identify these species, Forests have been encouraged to develop "watch lists" of species. These watch lists are dynamic and updated as the need arises to reflect changing conditions and new information. The creation of the sensitive species and watch lists are key steps in meeting our commitment as an agency to maintain biologically diverse and healthy ecosystems (CNPS Inventory, 2001).

Three watch list species are known to exist within 300 feet of proposed weed treatment sites. Gratiola heterosepala, Bogg's Lake hedge-hyssop, exists near two proposed treatment sites for Scotch thistle. Potentilla newberryi, Newberry's cinquefoil, exists near one proposed treatment site for Canada thistle. Scutellaria galericulata, marsh skullcap, is documented about 200 feet from another proposed treatment site for Canada thistle. Undiscovered occurrences of watch list plants may be present near proposed weed treatment sites. The effects to these watch list species will be similar to those described for sensitive plants. There is a small chance that some individuals will be affected, but viability of populations will be maintained.

NOXIOUS WEEDS

The risk assessment process has eight factors to consider when analyzing projects. A matrix was used to look at pre-existing conditions in the planning area and to consider factors generated by the implementation of the proposed action. Details of the assessment are found in the Noxious Weed Risk Assessment document in the project file.

Noxious weeds are present in and near the planning area in locations that have been previously disturbed by human activity. Species found during field surveys and those present nearby or along access routes are listed in Table 1 below. All plants listed in this section have the potential to dominate and out-compete native or other desirable species.

Table 2: Noxious Weed Species

Common Name	Scientific Name	State Rating	Extent of Infestation
Crupina	Crupina vulgaris	A	1 site
Dalmatian toadflax	Linaria dalmatica	A	10 sites
Diffuse knapweed	Centaurea diffusa	A	11 sites
Musk thistle	Carduus nutans	A	12 sites
Plumeless thistle	Carduus acanthoides	A	1 site
Scotch thistle	Onopordum acanthium	A	329 sites
Spotted knapweed	Centaurea maculosa	A	13 sites
Squarrose knapweed	Centaurea squarrosa	A	3 sites
Wavyleaf thistle	Cirsium undulatum	A	1 site
Canada thistle	Cirsium arvense	B	25 sites
Dyer's woad	Isatis tinctoria	B	56 sites
Mediterranean sage	Salvia aethiopis	B	23 sites
Tall whitetop	Lepidium latifolium	B	1 site
Klamathweed	Hypericum perforatum	C	3 sites
Yellow starthistle	Centaurea solstitialis	C	8 sites

Seven of the eight factors were rated and a risk level was assigned to each factor. When the assessment for this project was completed it had three high risk, one moderate risk and three low risk factors. The final factor is an overall rating based on the rated factors.

Mitigation Measures

For this project, prevention is very important for reducing the risk of noxious weed spread. OHV use is the only factor related to this project that carries significant risks for introducing or spreading weeds. Specifically, the risk is the possible transport of weed parts or seeds into the project from areas previously traveled, and transport of weeds out of the area. The following mitigation measures will be applied during project implementation.

The Proposed Action includes a specific prevention measure for the control of noxious weeds.

OHVs will be clean before initial entry into a treatment area, so that no mud or other debris that could carry weed seeds remains attached to the equipment. The equipment will be visually

inspected and attached mud or debris that could carry weed seeds will be removed at the treatment area before moving to a new site.

Table 3: Risk Assessment Summary

Factors	Current condition	Risk
Weed spread factors not connected to Proposed Action (pre-existing circumstances)		
1. Inventory	Complete	Low
2. Known noxious weeds	Present	High
3. Habitat vulnerability	Previous disturbance, low cover	High
4. Vectors unrelated to proposed project	Existing roads, livestock	Moderate
Weed spread factors related to the Proposed Action		
5. Habitat alteration expected as a result of the project	Limited ground disturbance	Low
6. Increased vectors as a result of project implementation	Occasional use of off-road equipment	Low
7. Mitigation measures	Implement all relevant mitigation measures	Low
Overall assessment of Risk for Project Numerous High risk factors = High overall risk Few High risk factors = Moderate overall risk No High risk factors = Low overall risk		
Anticipated weed response to proposed action		Moderate
Comments: Two factors remain at high risk – Presence of high priority weed species, and high habitat vulnerability. With mitigation measures implemented during the project the risk is lowered, but the project still carries a MODERATE risk for increasing the spread of noxious weeds.		

NOXIOUS WEEDS EFFECTS ANALYSIS

No Action (Prevention Measures allowed, but No Control Measures)

DIRECT/INDIRECT EFFECTS

This alternative would not implement noxious weed control measures. Prevention measures would still be employed as appropriate for all Forest activities. No direct effects to noxious weeds would occur. By not actively controlling noxious weeds, currently known weed sites would be allowed to regenerate themselves and spread to new areas. Weed seeds that may not have been produced if control measures were implemented would then be available for dispersal to new sites. The methods of dispersal vary by species. Seeds are carried to new sites by vehicle traffic (both on and off-road), wind and animals. Several weed species, including diffuse knapweed, Mediterranean sage, form a somewhat round structure (similar to tumbleweed) that can be tumbled by the wind for long distances, scattering seed along the way. Eventually, healthy native plant communities would be infiltrated. Even now, a significant effort is required to keep the advance of noxious weeds in check, much less to actually eradicate them. If they are allowed to spread further into the various plant communities across the Forest, that effort will be multiplied.

CUMULATIVE EFFECTS

Modoc County Agricultural Department (County) has a treatment plan for treating noxious weeds in the county. Their first priority is to treat State of California "A" rated species. Some noxious weed species, such as Yellow Starthistle are "C" rated species but are not predominant in the County and are also treated, to eradicate them from the County. Under an agreement with the Modoc National Forest, the County has treated Scotch thistle, Dalmatian toadflax, dyer's woad and knapweed occurrences on National Forest Land in the past. These treatments will no longer be allowed with the selection of the No Action alternative. Some of the gains from past treatments will be lost in a few years of unchecked weed seed production.

Many projects carrying a risk of noxious weed spread are currently being implemented across the Forest. These include timber management actions (site preparation, planting, thinning, harvesting), prescribed fire, juniper removal and aspen enhancement projects, wetlands creation and maintenance programs, and recreational development and site maintenance. Ground disturbance creates exposed soil and decreases native plant cover. Noxious weeds colonize these disturbed areas easily. Equipment can move soil containing weed seeds from one area to another. Increased traffic along access routes gives weeds an additional opportunity to spread along roads. Even with preventive measures incorporated into project design and implementation, all of these activities create disturbed conditions that are more vulnerable to weed establishment, and all may still provide dispersal routes for hitchhiking weed seeds.

Grazing occurs across most of the Forest. The effects of grazing include vegetation trampling, herbivory, and potential for weed spread from their movements. Seeds and plant parts can become lodged in their hooves and hair and be distributed anywhere the cows move in an area. For the most part, livestock do not eat noxious weeds. When the desired plants at a site are grazed, their competitive ability is decreased, giving a further advantage to noxious weeds. When cows congregate, they can cause damage to vegetative cover. The resulting disturbed soil provides a good place for noxious weeds to establish. Livestock may not only spread noxious weeds within their allotments, they can bring weeds with them when they arrive and take weeds with them when leaving the Forest. This can then increase weed occurrences in the county and in other areas of the Forest.

With the exception of the County weed treatments, all of the above activities will likely continue into the foreseeable future and will likely result in the establishment of new noxious weed sites.

Proposed Action (Implementation of Physical and Chemical Treatments)

DIRECT/INDIRECT EFFECTS

Noxious weeds will be killed (treated) in this alternative. As with the No Action alternative, prevention measures will be implemented. Control of the spread and production of seeds is the key to weed management for most of our noxious weeds. Only a portion of the sites will be treated each year, so seed production will continue at the untreated sites, adding to the seed bank in the soil. When a weed site is treated the plants will be killed, but seed will remain in the soil and will germinate and grow in future years. Repeated treatments over the course of many years are required to eradicate weed populations. Persistent efforts, effectively killing the plants or at least preventing seed production, will eventually deplete the seed bank in the soil. Skipping even one year of treatment will allow the weeds to replenish the seed bank, adding years to the time required for eradication.

It soon becomes apparent that eradication of all noxious weeds is not a feasible goal. Particular sites may be targeted for eradication efforts, but the main strategy must be to set a realistic goal of preventing the spread of the existing weeds. Control, rather than eradication, means that treatments will prevent or reduce seed production some years, but not every year. Limited

funding and resources for accomplishing weed control restrict the number of sites that may be treated. Without an army of weed warriors battling the spread of these well-adapted plants, it becomes clear that even stopping the increase of weeds is not attainable. So, our real goal is to slow the spread of these invasive plants.

The control of perennial noxious weed species requires more than preventing seed production. Our perennial noxious weeds proposed for treatment are Canada thistle, Dalmatian toadflax, Klamathweed, tall whitetop, spotted knapweed, squarrose knapweed, and wavyleaf thistle. Except the two knapweeds, these all reproduce by creeping rootstocks in addition to seed. Hand-pulling alone will not effectively control well-established populations of these plants, so chemical treatments are often recommended. Continued treatments, even if not done every year, will slow the spread of the weeds.

CUMULATIVE EFFECTS

The effects of ongoing actions and those of the foreseeable future are the same as described for the No Action alternative, with one exception. Physical and chemical treatments will be allowed; the work will be performed by the County, private contractor or Forest Service personnel. Continuing to control the weeds at these sites would maximize the benefit of previous treatments.

Prepared by: _____ Date: _____

Bruce Davidson, Botanist

Appendix S3.2: Botanical Report Addendum

Addendum to the Botanical Report for Modoc National Forest Noxious Weed Treatment Project

Modoc National Forest, California

5/23/2006

Summary

The USDA Forest Service, Modoc National Forest proposes to treat noxious weeds on the Forest.

A Biological Assessment (BA) has been prepared for threatened and endangered plant species suspected or occurring within the project area. *Orcuttia tenuis*, slender Orcutt grass, a Threatened species, occurs on the Forest. This species is found near vernal pools or vernal pool-like drainage edges. No Endangered or Proposed plant species are suspected or known to occur on lands administered by the Modoc National Forest.

A Biological Evaluation (BE) had been prepared for Forest Sensitive plant species in 2002, and an Addendum updated that report in 2006. A Botany Report had been prepared in 2002 which summarized the 2002 BE and 2002 Noxious Weed Risk Assessment, and addressed watchlist species. This report updates the information on watchlist species and evaluates the effects of the Noxious Weed Treatment Project on diversity of native plant communities and diversity of native plant species on the Modoc National Forest. This information is based on the Forest rare plant GIS layer and reports, Project Design Standards, alternative descriptions in the Final Environmental Impact Statement, and the BE for this project.

It is my determination that:

- **Implementation of the Preferred Alternative and Design Standards as detailed in the Final Environmental Impact Statement for the Noxious Weed Treatment Project – will not adversely affect the viability of watch list plant species, diversity of native species, or diversity of native plant communities.**

Prepared by: Cheryl Beyer, Forest Botanist

This Addendum to the Botany Report presents an update of the Watchlist species and a discussion of the diversity of native plant communities and species. For a comparison of the actions in the Alternatives, please see Appendix B.

Watchlist Species Update

These species make an important contribution to forest biodiversity and should be maintained under the provisions of NFMA, and addressed as appropriate through the National Forest Policy Act (NEPA) process. Forests are encouraged to establish and maintain a "Watch List" of such species (Davidson 2002). These watch lists are dynamic and updated as the need arises to reflect changing conditions and new information. The creation of the sensitive species and watch lists are key steps in meeting our commitment as an agency to maintain biologically diverse and healthy ecosystems (CNPS Inventory, 2001).

A number of plant species reviewed for Regional Sensitive Species list revision did not meet the criteria to be included on the Region 5 List, but are of more localized concern and need to be considered in the planning process. These include species that are locally rare (as opposed to declining throughout their range), are of public concern, occur as disjunct populatins, are newly described taxa, lack sufficient information on population size, threats, trend, or distribution, etc.

Two watchlist species are known to exist within 50 feet of proposed weed treatment sites. The watchlist species that have a noxious weed site within 50 feet are Bogg's Lake hedge-hyssop and silvery false lupine, in the figwort and pea family, respectively.

Although these are the only sites currently known where watchlist species occur within 50 feet of a noxious weed, new sites could be found in the future. Given a conservative rate of spread of noxious weeds (10%), additional watchlist occurrences could be at risk for impact from noxious weeds. Under alternatives that contain Early Detection – Rapid Response clauses, new sites within 50 feet of watchlist species could be treated. Early Detection – Rapid Response treatments as proposed in Alternatives 4, 5, and 6 may occur at places not currently known, and may, in the future, affect other watchlist species or sites.

As shown in the Biological Evaluation, the Hazard Quotient (HQ) at 50 feet is below 1 for all herbicides except chlorsulfuron, which targets mustard (Brassicaceae) and pigweed (Chenopodiaceae) family plants. Only two watchlist species (Masonic rockcress and many-flowered thelypodium) are in the mustard family, and none in the pigweed family. Chlorsulfuron would most likely be used for Tall whitetop, a noxious weed usually occurring in moist to wet habitats. Neither of these two watchlist species occurs in that type of habitat.

Hazard Quotients are a way of estimating ecological risk. When the HQ is below 1, harmful effects are not likely. If the HQ equals 1, the contaminant alone is not likely to cause ecological risk. If the HQ is greater than 1, the harmful effects are likely due to the contaminant in question. Bogg's Lake hedge-hyssop (*Gratiola heterosepala*) exists near two proposed treatment sites for Scotch thistle at Emigrant Springs, DG036ONAC and DG037ONAC. Habitat for this watchlist

species is marshes and swamps (lake margins), vernal pools/clay. The Forest has 18 occurrences of this species, ranging in size from 2 to more than 10,000 individuals.

Silvery false lupine (*Thermopsis californica* var. *argentata*) exists near the proposed treatment sites for Dalmatian toadflax near Lava Lake, BV006LIDA. Habitat for this species is lower montane coniferous forest, and juniper woodland. This occurrence is located within an old timber sale (1957) in which the forest canopy has been removed and seeding of wheatgrass appears to have taken place.

Effects to watchlist species are similar to those addressed for Diversity of Native Plant Communities and Native Plant Species below. The Project Design Standards for soils, water quality, control of drift, the application methods proposed, and adherence to label instructions for herbicides will reduce herbicide effects to watchlist species. Please see "**Effects To Watchlist Species**" for full discussion of effects to watchlist species.

Discussion of Diversity of Native Plant Communities and Native Plant Species Diversity

Regulations written to implement the National Forest Management Act (NFMA) define diversity as "the distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan" (USDA 1991). Diverse plant communities depend on a diversity of species. By maintaining vegetative diversity in a natural dispersion pattern and in sufficient amounts, the Forest can meet another regulatory obligation: to maintain viable populations of the Forest's animal species by providing suitable habitat conditions (USDA 1991).

Plant communities, as found in the Calveg GIS coverage, with the smallest acreage, on the Modoc NF, and therefore at greater risk of being lost (S.Smith, pers. comm. 2006), are those potentially associated with wetlands: Willow, Perennial Grass, Annual Grass-Forb, Wet Meadows, and Water (as named in the Forest GIS layer). A query of the Modoc NF GIS layer showed that no noxious weed occurrences are within the Willow or Perennial Grass communities. Tables that show what weed occurrences are found in wetland communities of Annual Grass-Forb, Wet Meadow, and Water, are located in Appendix A. The largest acreage is in Dalmatian toadflax (850.8 acres), which is listed in both the 'wet meadow' and 'water layers.' This occurrence of a noxious weed will have minimal treatment (treatment of the periphery) in Alternatives 5, and 6. However, overall loss of any particular plant community is not expected from treatments in any of the action alternatives. Loss of plant community would be more likely under climate change.

Continuous broadcast use of one herbicide or a combination will often select for plant species that have the greatest tolerance, say grass species if the herbicides target broad-leaf plants (http://wric.ucdavis.edu/yst/manage/management10.html). If this happens, species diversity could be reduced. However, in the action alternatives that use herbicides (Alternatives 2, 4, and 6), broadcast spraying is not an option. Application methods are by wick or directed spray treatment.

Additionally, 'continuous' spraying is not proposed in the FEIS. Therefore, the native plant diversity of the Forest will not be compromised in this regard from treatment by herbicides in this Project.

Population shifts through repeated use of a single herbicide may reduce plant diversity and cause nutrient changes. Thus, a variety of integrated treatments would most likely avoid adverse impacts to native plant diversity (USDA 2005). Alternative 6 is the alternative that is the most integrated, including both manual, cultural, and herbicide treatments; Alternative 6 includes the most variety of chemicals in the toolbox.

Broadcast of herbicides has the potential to shift species composition and reduce diversity of native plant communities, as less herbicide-tolerant species are replaced by more herbicide-tolerant species. However, broadcast is not a treatment method in this project. Certain herbicides and the methods by which they are applied have the potential to harm plant pollinators (USDA 2005). Please see Beyer (2006a).

In the absence of a healthy plant community composed of desirable species, one noxious weed may be replaced by another equally undesirable species (http:// wric.ucdavis.edu/yst/manage/management10.html). Therefore, to encourage native plants to restock larger areas that have become bare ground due to noxious weed treatments, seeding of desirable species (plants native to the area, or sterile non-natives) may be done if a large area of bare ground is left after noxious weed treatment and if a nearby healthy native plant community is not available. See Design Standards tables that address bare areas in the Modoc National Forest Noxious Weed Treatment Project (e.g. DS-20)..

Invasive plants themselves threaten ecological diversity at varying scales by potentially changing the structure and function of native plant communities. Potentially, noxious weeds are creating monocultures where a heterogeneous landscape once naturally existed (USDA 2005).

Please see "**Effects to Native Plant Communities and Native Plant Species Diversity**" for a discussion of effects to native plant communities and native plant species diversity.

Effects To Watchlist Species

Alternative 1-No Action:

Direct and Indirect Effects: Identified noxious weeds can continue to grow and compete with watchlist plants for space and resources. New noxious weed species may become established and compete with watchlist plants. Noxious weeds that produce allelopathic substances (toxic chemicals produced that have a negative impact on other organisms) can prevent other plants, including watchlist plants, from growing in those locations. As weeds increase, there would be a corresponding increase in weed propagules, such as seeds and rhizomes that could continue to spread the infestations, further reducing plants, populations, and/or habitat of watchlist species.

Cumulative Effects: Natural events (fire, flood, drought, disease, insects, landslides, climate change) have affected watchlist plants in the past, and continue to do so. Where, normally, native ruderale plants would reinvade after a natural disturbance, and, gradually, later-stage seral natives, including watchlist plants, would move in, now noxious weeds, highly adapted to infesting disturbed sites, are just as likely to invade and take over these places, and change the conditions on those sites so that they remain inhabited primarily by the weeds themselves, not giving natives and watchlist plants an opportunity to grow or compete on the site.

The effects from many past actions may have affected watchlist plants and may continue to impact them. Roads, railroads and powerline construction and maintenance have created vectors or pathways where weeds may have found a route for infestation, in addition to the injury or removal of watchlist plants during those activities, such as when roads were created, plants may have been killed or injured. Not only have these vectors created conditions that may have allowed noxious weeds to invade, compete and spread along these corridors, but also these corridors may have isolated some native communities from one another by creating barriers such as habitat change -- open, dry and hot vs. shaded, moist, cool (such as a wide open swath for a powerline) -- across which some watchlist plants cannot easily share pollen, leading to possible long-range genetic problems in small populations of watchlist species.

Some past road maintenance had spread noxious weeds that were in the cinders and gravel of the borrow material, creating, in some cases, monocultures of weeds in place of native communities that may likely have included watchlist plants and other plants of diversity concern. This is especially true of medusahead, a C-rated noxious weed in Modoc County, which will not be treated as part of this project at this time. However, similar situations can occur with any weed that competes with native flora.

Fire suppression has allowed, in the past, for non-fire-adapted species to thrive, selecting against fire-adapted species. Past fire suppression and overgrazing most likely is one cause for the western juniper to invade native grasslands and sagebrush steppe, and changed these areas to juniper woodlands having little understory.

Canopy cover removal during past timber management and fuels reduction most likely has changed understory soil moisture and light conditions – possibly affecting some cool-forest communities and watchlist plants such as sphagnum (*Sphagnum* spp.). Only one small occurrence of sphagnum, a watchlist species, is known on the Modoc NF, occurring in the upper Lassen Creek area within a plantation. Plant communities and their accompanying species that require low light and moist soil may have subsequently been selected against in these places. Plantation-like conditions may have replaced more diversified native communities in some cases.

Road construction and trampling by cows, in the past, most likely has changed hydrologic function and connectivity of springs and seeps, drying habitat and causing enough change in plant communities dependant upon special aquatic features (such as peatlands) so that, where once these plants had habitat, this habitat no longer exists for watchlist plants such as sundew and sphagnum. Cow trails have in the past cut across watchlist plant habitat, trampling individuals and degrading habitat. Past actions of dam building, goosenest island construction, and dug-outs for watering holes and stock ponds have likely changed the hydrology in some cases. Subsequently, some vernal pool plant communities most likely may have been inundated, and others dried up, while vernal pool habitat may have been inadvertently created by other actions. Vernal pool plant watchlist species include Boggs Lake hedge hyssop, Downingia, and Newberry's cinquefoil.

Similar projects on the Forest may continue into the present to effect watchlist plants and habitat. Additionally, pile burning has the potential to sterilize the soil and kill the native seedbed, creating disturbed openings where weeds can invade and begin to disperse their propagules. Pile burning can also potentially eliminate the watchlist plant seedbank.

Effects of reasonably foreseeable future actions from projects that are on the schedule of proposed actions (SOPA) include plant community changes from the proposed sagebrush steppe ecosystem restoration project. This project covers a large area of the Forest, and plans are to revert back to a landscape less dominated by juniper. Grazing will continue on allotments on the Forest. Where critical aquatic features that support plant communities such peatlands and seeps are found within allotments, there is the potential for trampling, which can change micro-topography and subsequently alter the conditions on which a plant community may depend. Trampling has the potential to expose the organic soils; this may facilitate loss of these fine-textured soils via gullies created when cows inadvertently expose these soils to eroding processes, as in some moonwort habitat. (Common moonwort, *Botrychium simplex*, is a watchlist plant.) Watchlist plants of these habitats include sundew, moonwort, bog birch, sphagnum, and flat-leaved bladderwort.

Most likely, cows will continue to congregate in shady areas during hot summer months, including under trees or along creeks and at springs. This may lead to trampling and stressing native vegetation and degrading watchlist plant habitat in those areas. Many watchlist species grow in shady areas. Recreation (OHV, horseriding, hiking, camping), firewood gathering, and many other activities have the potential to affect watchlist plants and habitat by trampling,

spreading weed seeds, and picking or collection. In the long-term, this potential gradual degradation of native and watchlist plant communities and habitats could lead to loss of some of these species from the Forest. In the foreseeable future, however, it is unlikely that Alternative 1 would lead to a listing onto the sensitive list of any watchlist plant species on the Forest. This determination is based on the fact that none of these plants is rare enough to be on the sensitive list, which would be the first change in status before a plant is recommended for listing as Threatened or Endangered.

Alternative 2:

Direct and Indirect Effects: Alternative 2 would allow for an aggressive treatment program for noxious weed control. Reductions in occurrences of the treated weeds, and in size of the occurrences would be expected. Since new weeds and new or expanding occurrences would not be treated, the overall area occupied by noxious weeds on the Forest may actually be able to increase. If this happens, noxious weeds will most likely compete aggressively for resources with some watchlist plant species.

Production of weed propagules would be reduced on the sites treated, although there still would be viable noxious weed seed in the seedbank on termination of this 5-year program, as many weed seeds remain viable for years – up to 30 years for Scotch thistle. With the removal of competitive noxious weeds at the treated sites, watchlist plants and habitat could be enhanced in those areas.

Since herbicides are designed to kill plants, and, therefore, some damage to watchlist plant species is possible despite cautious planning and implementation. Some native plants, including watchlist species, may be injured or killed. Plants could also be damaged or removed during manual or herbicide treatment, either directly or indirectly, such as by trampling or exposing roots.

Herbicide spray, drift, runoff, leaching, or groundwater movement may result in mortality to individuals, reduce their productivity, or lead to abnormal growth patterns. For ground applications of herbicides, the closer the watchlist species is to the application site, the greater is the likelihood of damage. Specific Design Standards for the different alternatives address how close herbicide treatments can come to water and ephemeral pools. Soil Design Standards address sensitive soils. These Design Standards for water and soils should be sufficient to protect Boggs Lake hedge hyssop. Even if plants were injured or killed, in no case is this determined to lead to a listing of any watchlist plant species on the Forest.

During herbicide application, the level and extent of damage to watchlist plants depends, in part, on site-specific conditions, such as wind speed. Application instructions for each herbicide must be followed by the applicator, and can be found in the label directions. Herbicides can move off-site in water, soil and wind. Site-specific soil and water characteristics, as well as

herbicide formulation characteristics, affect this movement. Effects from herbicide movement are reduced by Design Standards (please see FEIS for a listing by alternative).

The potential to harm watchlist species is also dependent on herbicide characteristics. Herbicides vary as to their potency, selectivity, and persistence. These factors all play a role in how much harm can occur. Measures taken to limit exposure, such as application methods may reduce herbicide movement off-site.

Some bare ground may be exposed during manual treatments as the weeds are removed, and noxious weeds, since they are aggressive invaders, may again take over these bare places. Herbicide treatment is less likely to be ground disturbing, and thereby, less likely to exposing fresh soil for invasion.

New noxious weed species, and new and expanded sites, will not be treated in this alternative. This potentially leaves these weeds and locations as sources of weed plants and propagules that may compete with watchlist plants.

As noxious weeds are removed, natives, including watchlist plants, have the chance of replacing them, or natives may be reseeded at sites that are too large to reseed naturally in a timely fashion, before weeds again take over. These seeded species could potentially compete with watchlist species. However, care in choice of seed mixtures is part of the Design Standards.

Cumulative Effects:

There could be an additive cumulative effect to susceptible non-target species if herbicide use is repeated over time on the same site. This cumulative effect would be most likely where the treatment toolbox is most limited (as in Alternatives 2 and 4). However, this effect is generally only found where spray is broadcast, and the treatment methods in this project are directed spray and wick.

Over a five-year period, watchlist plants would have to compete less with noxious weeds, and noxious weeds would be less of a threat to watchlist plant habitat. After five years, if a new decision document to control noxious weeds is not approved, noxious weeds may again start to encroach on watchlist plant habitat.

Also, see Cumulative Effects under Alternative 1.

Alternative 3:

Direct and Indirect Effects: Alternative 3 would result in the reduction of some noxious weeds, and consequently reduction in competition with watchlist plants for a period of five years. However, only non-rhizomatous weeds would be treated, and, therefore, the rhizomatous species (for example, canadian thistle or dalmatian toadflax) would continue to grow - possibly expanding in occurrence size - and produce propagules that could spread those weeds.

No Early Detection – Rapid Response Strategy would be included in this alternative, and therefore new sites, expanded sites, or new noxious weeds would not be treated, allowing for

untreated expanding noxious weed infestation, and most likely, additional competition to watchlist plants.

Some bare ground may be exposed during manual treatments as the weeds are removed, and noxious weeds may again invade these bare, disturbed places. Or, as noxious weeds are removed, natives have the chance to replace them, or may be reseeded at some sites.

Some native plants, including watchlist species, may be injured or killed by the treatment methods either directly or indirectly, as by trampling or inadvertent mechanical injury.

Cumulative Effects: Manual treatment of noxious weeds could create more disturbed ground that is prime habitat for aggressive noxious weeds. Unless this project is continued to outlast the seedbank, and desirable species seed in naturally or from cultural treatments, these areas could become dense weed patches upon termination of the project, effectively keeping out watchlist species.

Rhizomatous noxious weeds would continue to grow and occurrences may increase in size. New sites and expanded sites may continue to grow unimpeded and new noxious weeds that invade would be allowed to grow and infest the Forest. Weed seedbanks will not be treated, and these may be a continuing source of noxious weeds. Noxious weeds would most likely continue to compete with watchlist plants. Also, please see Cumulative Effects under Alternative 1.

Alternative 4:

Direct and Indirect Effects: Alternative 4 provides for aggressive treatment of noxious weeds, utilizing a wide range of treatment methods. All known noxious weed infestations, including rhizomatous species, will be treated by herbicide or manual methods. This alternative would be in effect for 10 years, instead of the 5 years of Alternatives 2 and 3, and therefore, the chances for complete removal of occurrences of noxious weeds would be more likely, especially for smaller infestations. Early Detection – Rapid Response Strategy would allow treatment of the same weeds with the same treatments on new sites or sites that have expanded, which will provide more effective treatment, and could result in the complete removal of many sites of the 14 known noxious weeds.

As noxious weeds are removed, watchlist plants have the chance to replace them, if the habitat is appropriate. Watchlist plants and habitat would be enhanced by this alternative. Some watchlist plants may be injured or killed by the treatment methods, both manual and herbicide, either directly or indirectly. Please see Direct Effects under Alternative 2.

Cumulative Effects: Due to the aggressive noxious weed treatment, overall noxious weed infestations will diminish across the Forest, which would improve the situation for watchlist plants that are competing with those species. Only the largest occurrences of rhizomatous species may still have plants at the end of 10 years.

Manual treatment of noxious weeds could potentially create more disturbed ground -- prime habitat for aggressive noxious weeds. Unless this treatment is continued to outlast the seedbank, these areas could become dense weed patches upon termination of the project in 10 years, and provide a new flush of competition with watchlist plants several years later.

Weed seedbanks will not be treated, and these may be a continuing source of noxious weeds. Also, please see Cumulative Effects under Alternative 2.

Alternative 5:

Direct and Indirect Effects: Alternative 5 would result in the reduction of some noxious weeds, with the accompanying reduction in competition to watchlist plants and degradation of their habitat. However, two large infestations – one of Dyers woad and one of common crupina – will not be treated. Watchlist plants within those two infestations may experience reduced vigor, and their habitat may become degraded. This alternative would be in effect for 10 years, instead of the 5 years of Alternatives 2 and 3, and therefore, the chances for complete removal of occurrences of noxious weeds would be more likely, especially for smaller infestations.

Only small infestations of non-rhizomatous weeds would be treated, and, therefore, the larger occurrences of rhizomatous species would continue to grow - possibly expanding in occurrence size - and produce propagules that could spread those weeds. Rhizomatous noxious weeds that have not been eliminated completely would be expected to re-infest areas, and possibly come back in denser stands, competing aggressively with any watchlist plants.

Manual treatments have been found to stimulate the roots of rhizomatous species, and even the small occurrences treated in this alternative, unless treated persistently over a long time, may not effectively control or eliminate these species, providing no relief if watchlist plants are nearby.

New sites and expanded sites and new noxious weeds can be treated in this alternative through Early Detection – Rapid Response Strategy. This will eliminate any increase in competition to watchlist plants from new information. It is unknown what new sites might be discovered under Early Detection – Rapid Response Strategy. It has been determined that none of the alternatives in this project would cause a listing of any of the watchlist species. This determination is based on the fact that none of these plants is rare enough to be on the sensitive list, which would be the first change in status before a plant is recommended for listing as Threatened or Endangered.

No effect to sensitive plants is expected from treatment of noxious weeds by goat grazing. Grazing will be limited, and fences and herders will control the goats.

Also, please see Direct and Indirect Effects for Alternative 3.

Cumulative Effects: The large untreated sites could become a source for many, new satellite sites if careful, annual inventory is not performed. Manual treatment of noxious weeds could

create more disturbed ground that is prime habitat for aggressive noxious weeds to reinfest and compete with watchlist plants. Unless this treatment is continued to outlast the seedbank, and desirable species seed in naturally or from cultural treatments, these areas could become dense weed patches upon termination of the project.

Untreated rhizomatous noxious weeds would continue to grow and occurrences may increase in size. New sites and expanded sites and new noxious weeds can be treated in this alternative, and therefore these new occurrences most likely will be controlled or eliminated since they most likely will be small. Weed seedbanks will not be treated, and these may be a continuing source of noxious weeds. Also, please see Cumulative Effects under Alternative 3.

Alternative 6 – Preferred Alternative:

Direct and Indirect Effects: Due to the number of weed control techniques available under Alternative 6, it would be expected to provide for the most variable and aggressive treatment and control of noxious weeds, on those acres treated, and enhancement for those watchlist species that occur near those treated sites, as competition from noxious weeds would be removed. However, the treated acres would be much less than in Alternatives 2 and 4. On the 6000 acre Dyers woad site, the 850 acre Dalmatian toadflax site, and the large common crupina site only the periphery would be treated in this alternative, and, therefore, large acreages would be left untreated, and watchlist plant habitat within those areas could continue to become degraded as noxious species increased in density.

On the sites where treatment would take place, it is expected that noxious weed populations would be greatly reduced, and watchlist plants and habitat would be enhanced. This alternative would be in effect for 10 years, instead of the 5 years of Alternatives 2 and 3, and therefore, the chances for complete removal of occurrences of some noxious weeds would be more likely, especially for smaller infestations.

Manual treatment of weeds will remove noxious weeds where that treatment will be used, but has the potential to increase noxious weed infestation by disturbing the soil and providing ideal conditions for the germination of the weed seed. Although watchlist plants would benefit from weed removal, if germination of weed seeds is enhanced on the disturbed soil, the benefit may be lost.

New sites and expanded sites and new noxious weed species can be treated in this alternative, and therefore these new occurrences most likely will be controlled or eliminated. Please see discussion under Direct Effects for Alternative 2, 4, and 5.

Cumulative Effects: Noxious weeds on the large untreated sites will probably increase in density, further degrading habitat for native species and watchlist plants. These sites could also become a source for many, new satellite sites if careful, annual inventory is not performed, and subsequently provide aggressive competition to watchlist plants. However, the perimeter of the large infestations would be treated to provide containment of the site.

Untreated rhizomatous noxious weeds within the large Dalmatian toadflax site would continue to grow and occurrences may increase in density. Watchlist plants within this site could be negatively affected by increased competition for resources. New sites and expanded sites and new noxious weed species can be treated in this alternative, and therefore these new occurrences most likely will be controlled or eliminated since they most likely will be small.

Weed seedbanks will not be treated, and these may be a continuing source of noxious weeds. Also, please see the Cumulative Effects discussion under Alternatives 2, 4, and 5.

Effects To Native Plant Communities and Native Plant Species Diversity

Alternative 1-No Action:

Direct and Indirect Effects: Under the No Action Alternative, it is anticipated weeds would continue to spread within the Modoc National Forest. As weeds increase, there would be a corresponding decrease in native plant cover and, subsequently, a decrease in intact native plant communities, and in plant diversity, especially where weeds spread to the point of becoming monocultures. Plant communities are aggregations of individual plants, and are somewhat stable, but do evolve over time. What affects the species, and species diversity, will also affect the communities in which they are included, and subsequently, diversity of plant communities. Soil erosion may increase because the root systems of weeds are generally less binding of soil particles, and those eroding and disturbed landscapes will be more susceptible to continued invasion by weeds.

Cumulative Effects: Natural events (fire, flood, drought, disease, insects, landslides, climate change) have affected plant communities in the past, and continue to do so. However, where native ruderale plants would reinvade after a natural disturbance, and, gradually, later-stage seral natives would move in, new noxious weeds, highly adapted to infesting disturbed sites, are just as likely to invade and take over these places, and change the conditions on those sites so that they remain in an early seral stage, inhabited primarily by the weeds themselves.

The effects of many past actions continue to affect native plant communities and plant diversity. Roads, railroads and powerline construction and mainenance have created vectors or pathways for continuing weed infestation, and have essentially isolated some native communities from one another by creating barriers (isolating sections of a vernal pool, for example, by the raised bed of the track) or by changing intervening habitat -- open, dry and hot vs. shaded, moist, cool (such as a wide open swath for a powerline) -- across which unadapted plants cannot easily pass. Some past road maintenance has spread noxious weeds that were in the cinders and gravel of the borrow material, creating, in some cases, monocultures of weeds in place of native communities. Grazing by cows selectively removed and continues to remove palatable species such as native bunchgrasses, and leaves less palatable species such as noxious weeds to benefit from the reduced competition. Canopy cover removal during timber management and fuels reduction has changed understory soil moisture and light conditions – conditions necessary for some cool-forest communities. Plant communities that require low light and moist soil have subsequently been selected against in these places. Plantation-like conditions have replaced native communities in some cases. Road construction and trampling by cows has changed hydrologic function and connectivity of springs and seeps, drying habitat and causing enough change in special aquatic features (such as fens) so that many no longer support communities they once had, such as sphagnum or three-ranked hump moss. Dam building, goosenest island construction, dug-outs for watering holes have changed the hydrology in the Devils Garden area,

and subsequently, some vernal pool plant communities had been inundated, and others dried up, while vernal pool habitat may have been inadvertently created by other actions.

Projects on the Forest continue to effect native plant communities and plant diversity. Pile burning can sterilize the soil and kill the native seedbed, creating disturbed openings where invasives can invade intact native communities and begin to disperse their propagules. Fire suppression continues to allow non-fire-adapted species to thrive, squeezing out fire-adapted species. Juniper has invaded native grasslands and sagebrush steppe, and changed these areas to juniper woodlands with little understory.

Effects of reasonably foreseeable future actions include effects from projects that are on the schedule of proposed actions (SOPA). The proposed sagebrush steppe ecosystem restoration project could change the native plant communities over a large area of the Forest back to one that is less dominated by juniper. Grazing will continue in the Warner Mountains, where critical aquatic features such as fens and seeps are drying and their organic soils are being lost from trampling by cows. Cows will continue to congregate in shady areas under trees or along creeks and at springs, trampling and stressing native vegetation, leading to a change in species composition. Recreation (OHV, horseriding, hiking, camping), firewood gathering, and many other activities have the potential to affect native communities and plant diversity. In the long-term, this gradual degradation of native communities could lead to a downward trend in extent and diversity of native plants and communities.

Alternative 2:

Direct and Indirect Effects: Alternative 2 would allow for an aggressive treatment program for noxious weed control, resulting in positive impacts to native plant communities and native plant diversity. Inadvertent trampling and injury of native plants and thus plant communities by the treatment crews, could result, but the benefits from reduced competition for sunlight, water, space, and nutrients should outweigh these inadvertent side-effects of treatment.

Depending on the herbicide used, there may be some loss of vitality or even death of some native plants if drift, runoff or subsurface movement moves herbicide to non-target areas and it is taken up by native plants. Some herbicides are specific to certain groups (dicots vs. monocots) or families (grass or mustard family for example), and widespread spraying could selectively remove some of these. However, widespread spraying is not proposed. Herbicide treatments in this project will be by directed spray or wick. Therefore, although some individual plants may be effected, widespread removal of certain groups or families from plant communities would not result, nor would changes in direction of communities, from say mixed forb/grass to an all-grass community.

Although manual treatment of weeds will remove individual plants, this treatment has the potential to increase noxious weed infestation by disturbing the soil and providing ideal conditions for the germination of the weed seed or overlooked rhizomes in the soil. New noxious

weeds and new sites would not be treated, and in these places, native plant communities may become degraded during the project and plant diversity reduced.

Cumulative Effects: The 5-year life span of this project would most likely not be sufficient to outlast the viability of most of the seeds of noxious weeds. Most likely weeds would begin to germinate after termination of the project, and over time, they could again become a source of competition with native plants and subsequently, communities. Also see Cumulative Effects under Alternative 1.

Alternative 3:

Direct and Indirect Effects: Alternative 3 could have beneficial impacts to native communities and native plant diversity as there would be some weed control implemented, and therefore native plant and weed competition would be reduced, and communities would remain intact. However, because some weed species may be spread as a result of ground disturbance or incomplete removal, there are caveats with this manual treatment only alternative, especially since the life of the project is only 5 years, much less than the length of time that many noxious weeds seeds and propagules can still remain viable and reinfest the site. Manual treatment of weeds has the potential to increase weed infestation by disturbing the soil and thereby providing ideal conditions for the germination of the weed seed in the soil. New noxious weeds and new sites would not be treated, and in these places, native plant communities may become degraded even during the project, and native plant diversity reduced. As an example, cheatgrass and medusahead have invaded sagebrush communities within the Forest. These communities have been changed by the replacement of native grasses and many forbs with these non-native, invasive grasses, even though sagebrush is still there. The communities have changed in many places from sagebrush/native grass and forb to sagebrush/cheatgrass or sagebrush/medusahead. Some negative effects, such as inadvertent trampling by the treatment crews, could also result.

Noxious weeds with rhizomes will not be treated in this alternative. Consequently, native communities and diversity in those areas could continue to be negatively impacted from competition with these aggressive weeds.

Areas with bare soil resulting from weed treatments that are greater than ¼ acre in size will be evaluated to assess a need for rehabilitation. Re-vegetation seed mixes have the potential to unbalance native communities nearby if not carefully chosen. However, these mixes will be designed on a site-specific basis to consider objectives and conditions at each site, and if there is any negative effect, it should be minimal.

Cumulative Effects: The 5-year life span of this project would most likely not be sufficient to outlast the viability of most of the seeds of noxious weeds. Most likely weeds would begin to germinate after termination of the project, and over time, again become a source of competition with native plants and subsequently, communities. Disturbance of the soil during implementation of this alternative could provide a ready site for reinvasion of noxious weeds, or stimulate the weed seedbank. It is possible that on some sites the density of noxious weeds, over time, could

become greater than at the beginning of the project. Also see Cumulative Effects under Alternative 1.

Alternative 4:

Direct and Indirect Effects: Alternative 4 allows for the aggressive treatment of noxious weeds, utilizing a wide range of treatment methods. Due to the aggressive noxious weed treatment, Alternative 4 would, overall, be beneficial to native plant communities and diversity. Although some negative effects, such as inadvertent trampling by the treatment crews, could result, the benefits from reduced competition for sunlight, water, space, and nutrients should outweigh these inadvertent side-effects of treatment.

Depending on the herbicide used, there may be some loss of vitality or even death of some native plants if drift, runoff or subsurface movement moves herbicide to non-target areas. Manual treatment of weeds has the potential to increase noxious weed infestation by disturbing the soil and providing ideal conditions for the germination of the weed seed in the soil. Some herbicides are specific to certain groups (dicots vs. monocots) or families (grass or mustard family for example), and widespread spraying could selectively remove some of these. However, widespread spraying is not proposed. Herbicide treatments in this project will be by directed spray or wick. Therefore, although some individual plants may be effected, widespread removal of certain groups or families from plant communities would not result, nor would changes in direction of communities, from say mixed forb/grass to an all-grass community.

All known sites and new sites of the known 14 weeds would be treated over a period of 10 years, which is long enough to exhaust the seedbank of many of the 14 noxious weeds. This alternative would be beneficial to native plant communities and plant diversity across the Forest. However, new weeds would not be treated, and native communities and plant diversity may therefore become degraded over time if new noxious weeds invade. Also see Direct and Indirect Effects under Alternative 2.

Cumulative Effects: The 10-year life span of this project would most likely be insufficient to outlast the viability of many but not all of the seeds and propagules of noxious weeds. Most likely weeds would begin to germinate after termination of the project, and over time, again become a source of competition with native plants and subsequently, communities. Also see Cumulative Effects under Alternative 1.

Alternative 5:

Direct and Indirect Effects: As with Alternative 3, Alternative 5, a manual-treatment-only alternative would have benefits to native plant communities and diversity. Occurrences of non-rhizomatous species other than the infestations over 500 acres would be treated, and over time, some of these treated occurrences would be contained, controlled, or eradicated. The 913 acres of rhizomatous weeds would not be treated, and competition could be intense between native communities and weeds, with invasives taking over in many cases. Although new weeds and

new sites could be treated for non-rhizomatous species, those that reproduce vegetatively would continue to grow, spread, and compete.

Bare areas created by the treatment of noxious weeds would be evaluated for rehabilitation. Appropriate seed mixes and certified weed free mulch would be applied as needed so as not to compete or unbalance local native communities.

Effects from the treatment of noxious weeds by goat grazing may include some removal or injury to native plants, but should not injure communities or native plant diversity. All goat grazing treatments would be carefully monitored to ensure that weed treatment objectives are met without damaging nearby native plant communities through trampling or overgrazing. Removal of noxious weeds by goats would eventually have a beneficial effect as native plant communities are restored to the site. See also, Direct and Indirect Effects under Alternative 3.

Cumulative Effects: The 10 year life span of this project would most likely be insufficient to outlast the viability of most of the seeds of noxious weeds on treated sites, thus benefiting native plant communities and diversity at first, but, unless a new decision extends the treatment time period, benefits may be lost. Seeds will remain viable on untreated sites, and the noxious weed seedbank will continue to accumulate there. Disturbance of the soil during implementation of this alternative could provide a ready site for reinvasion of noxious weeds, or stimulate the weed seedbank if treatments are not done in a timely fashion. It is possible that on untreated sites the density of noxious weeds, over time, could become greater than at the beginning of the project. Also see Cumulative Effects under Alternative 1.

Alternative 6 – Preferred Alternative:

Direct and Indirect Effects: Alternative 6 would provide for the most variable and aggressive treatment of noxious weeds. Due to the number of weed control techniques available under Alternative 6, it would be expected to provide the most control of invasive species for treated sites. In the long term, outside of the 6000 acre Dyers woad site, the 850 acre Dalmatian toadflax site, and the large common crupina site, it is expected that noxious weed populations would be greatly reduced, and in many cases, eradicated. In the long term, it is expected that native plant communities will have less competition for available water and nutrients, resulting in stable, healthy native plant communities. However, in the two large untreated infestations, native plant communities could become severely degraded and reduce native plant diversity.

Cumulative Effects: The 10 year life span of this project would most likely be insufficient to outlast the viability of most of the seeds of noxious weeds on treated sites, thus benefiting native plant communities and diversity at first, but, unless a new decision extends the treatment time period, benefits may be lost. Seeds will remain viable on untreated sites, and the noxious weed seedbank will continue to accumulate there. Disturbance of the soil during implementation of manual treatments in this alternative could provide a ready site for reinvasion of noxious weeds by stimulating the weed seedbank or weed rhizomes still in the soil. It is possible that on

untreated sites the density of noxious weeds, over time, could become greater than at the beginning of the project. Also see Cumulative Effects under Alternative 1.

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Appendix A

'At-Risk' Plant Communities (Cover Type) with Noxious Weeds

Table 1 – Weed Occurrences in Annual Grass-Forb Alliance (HG) Vegetation Type

COVER TYPE	VEG. TYPE	NAME	ID NUMBER	T	R	S	ACRES
HEB[1]	HG	DALMATIAN TOADFLAX	BV006LIDA	T42N	R6E	28	860.00
HEB	HG	DIFFUSE KNAPWEED	DH001CEDI3	T45N	R6E	22	0.70
HEB	HG	SCOTCH THISTLE	BV122ONAC	T39N	R10E	33	0.10
HEB	HG	SCOTCH THISTLE	BV180ONAC	T40N	R8E	28	0.10
HEB	HG	SCOTCH THISTLE	BV188ONAC	T41N	R8E	28	0.10
HEB	HG	SCOTCH THISTLE	BV211ONAC	T41N	R9E	17	0.75
HEB	HG	SCOTCH THISTLE	BV282ONAC	T41N	R9E	26	25.00
HEB	HG	SCOTCH THISTLE	DH033ONAC	T45N	R6E	22	0.27

Table 2 – Weed Occurrences in Wet Meadows (Grass-Sedge-Rush) Alliance (HJ) Vegetation Type

COVER TYPE	VEG. TYPE	NAME	ID NUMBER	T	R	S	ACRES
HEB	HJ	CANADA THISTLE	DG009CIAR4	T46N	R11E	7	0.10
HEB	HJ	CANADA THISTLE	DG014CIAR4	T47N	R11E	31	0.10
HEB	HJ	CANADA THISTLE	DG018CIAR4	T44N	R10E	29	0.10
HEB	HJ	DALMATIAN TOADFLAX	BV006LIDA	T42N	R6E	28	860.00
HEB	HJ	DIFFUSE KNAPWEED	DG004CEDI3	T46N	R11E	18	0.10
HEB	HJ	DYERS WOAD	BV008ISTI	T39N	R11E	18	0.10
HEB	HJ	DYERS WOAD	BV020ISTI	T37N	R10E	20	?
HEB	HJ	SCOTCH THISTLE	BV018ONAC	T36N	R8E	17	0.10
HEB	HJ	SCOTCH THISTLE	BV040ONAC	T36N	R8E	3	0.10
HEB	HJ	SCOTCH THISTLE	BV043ONAC	T37N	R8E	34	0.10
HEB	HJ	SCOTCH THISTLE	BV226ONAC	T39N	R10E	14	0.10
HEB	HJ	SCOTCH THISTLE	BV256ONAC	T39N	R11E	18	0.10
HEB	HJ	SCOTCH THISTLE	BV280ONAC	T41N	R9E	17	0.09
HEB	HJ	SCOTCH THISTLE	BV307ONAC	T36N	R8E	17	?
HEB	HJ	SCOTCH THISTLE	DG053ONAC	T42N	R9E	16	0.10
HEB	HJ	SCOTCH THISTLE	WM006ONAC	T45N	R15E	4	0.07

Table 3 – Weed Occurrences in Water (WA) Vegetation Type

COVER TYPE	VEG. TYPE	NAME	ID NUMBER	T	R	S	ACRES
WAT[2]	WA	CANADA THISTLE	DG004CIAR4	T43N	R9E	12	0.10
WAT	WA	CANADA THISTLE	DG006CIAR4	T43N	R9E	1	0.10
WAT	WA	CANADA THISTLE	DG009CIAR4	T46N	R11E	7	0.10
WAT	WA	CANADA THISTLE	DG015CIAR4	T43N	R9E	12	0.10
WAT	WA	DALMATIAN TOADFLAX	BV006LIDA	T42N	R6E	28	860.00
WAT	WA	SCOTCH THISTLE	BV040ONAC	T36N	R8E	3	0.10
WAT	WA	SCOTCH THISTLE	BV306ONAC	T36N	R8E	6	?
WAT	WA	SCOTCH THISTLE	DG036ONAC	T43N	R12E	2	0.10
WAT	WA	SCOTCH THISTLE	DG039ONAC	T43N	R13E	7	0.10

[1] Herbaceous [2] Water

APPENDIX B

Summary Comparison of Alternatives for the Noxious Weed Treatment Project

Alternatives / Alternative Features	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Treatment Timeframe	**Ongoing**	**5 years**	**5 years**	**10 years**	**10 years**	**10 years**
Treatment Sites and Acres	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**
Total Inventoried Weeds (2004)	541/6908	541 / 6908	541 / 6908	541 / 6908	541 / 6908	541 / 6908
Inventoried Weeds Fully Treated	**20-30** ac/yr[1]	520 / **5,995**	494 / **5,993**	520 / **5,995**	520 / **180**	538/ **241**
Inventoried Weed Sites Receiving Partial Treatment2	0/0	16/904[2]	0/0	16/904[2]	0/0	0/0
Inventoried Weeds Receiving Limited Treatment3	0/**0**	0/**0**	0/**0**	0/**0**	9/**100**[3]	3/**100**[3]
Inventoried Weeds Not Treated4	6,878[1]	5/9[4]	47/916[4]	5/9[4]	5 / 5515	0/6,567[4]
Proportion of Inventoried Weeds Treated	0.4%	n.a. / 87 %	91% / 87%	99 % / 99 %	100 % / 4 %	100 % / 5 %
Noxious Weeds Treated Through Early Detection – Rapid Response (acres)5		0 acres	0 acres	Up to **200** acres (100 ac max/yr)	Up to **200** acres (100 ac max/yr)	Up to **200** acres (100 ac max/yr)
Total Acres of Weeds Treated	**20-30** ac/yr1	**6,899** acres	**5,993** acres	**7,099** acres	**480** acres	**541** acres
Treatment Methods for Inventoried Noxious Weeds (2004)	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**
Physical – hand pulling, hoeing, grubbing	0/0	161/31	494/5,993	161/31	0/0	0/0
Physical+ – Physical plus, clipping seed head or plant, weed eater, mulch/tarp	20-30 ac/yr1	0/0	0/0	0/0	527/139	116/19
Physical and/or Herbicide Treatments	0/**0**	333/**5,961**	0/**0**	333/**5,961**	0/**0**	371/**116**
Herbicide	0/**0**	42/**907**	0/**0**	32/9**07**	0/**0**	46/**65**
Limited Treatment3	0/0	0/0	0/0	0/0	9/100	3/100
Goat Grazing (potential) (physical/herbicide)	0/0	0/0	0/0	0/0	5/41 **(no herbicide)**	5/**41**
Total Acres Potentially Treated with Herbicides (includes ED-RR acres)6	0/**0**	355/**6,868**	0/**0**	355/**7,068**	0/**0**	425/**522**

[1]Under Current Management (Alt. 1), approximately 20 to 30 acres of noxious weeds are treated each year through other site specific NEPA decisions as part of other projects in accordance with the Modoc NF Integrated Weed Management Strategy (2005).

[2]These sites are rhizomotous species that occur within 10 feet of H2O. Those sites that are within 10 feet of H2O would not be treated. Sites with acreage ooutside of this 10 foot no treatment zone would receive partial treatment. The acreage within the 10 foot zone would not be treated, the acreage outside the 10 foot zone would be treated with herbicides.

[3]Includes treating along borders of infestations to prevent spread using the methods specific to each alternative. Treatment is estimated at 100 acres to be proportionally distributed based on the size of the individual infestations. These acres are included in the Inventoried Noxious Weeds Treated acreage.

[4]Excluded in Alt. 2 and Alt. 4: 5 sites of rhizamotous species that are within 10' of live water and partial acreage of 16 sites of rhizamotous species that are within 10' of live water. Rhizamotous species will not be treated by physical methods in these alternatives. Excluded in Alt. 3: 47 sites of rhizamotous species. Excluded in Alt. 5: 5,658 acre Dyer's woad, 850 acre Dalmatian toadflax, 159 acre crupina, and 6 sites of rhizamotous species. These sites will receive limited treatment around the perimeter estimated at 100 acres proportionally distributed based on the size of these sites. Excluded in Alt. 6: 5,658 acre Dyer's woad, 850 acre Dalmatian toadflax, 159 acre crupina. These sites will receive limited treatment around the perimeter estimated at 100 acres proportionally distributed based on the size of these sites.

[5]May use any of the methods approved for use in this NEPA decision.

[6]For Alt. 2 this includes the acres under the physical and/or herbicide method plus the herbicide treated acres. Alt. 4 adds the same categories as Alt. 2 plus adds in the potentially treated 200 acres through early detection rapid response. Alt. 6 includes the Physical and/or Herbicide acres, the herbicide acres, the acres under goat grazing, the acres under the limited treatment category, and the 200 acres under Early Detection-Rapid Response.

Appendix T:

Watershed and Soils Specialist Report

Modoc National Forest

Noxious Weed Treatment Project

Soils and Watershed Report

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TEAMS Enterprise Unit

For the:

Modoc National Forest

1/18/2008

Introduction

This project Soils and Hydrology report was finalized by Forest Service Hydrologists, Carol Thornton and Jenny Fryxel after review of the DEIS and draft soil and watershed report prepared by Peter Adams, Forest Hydrologist, who was assigned to other projects.

The effect of invasive plant treatments on soil and water is of public concern. There is concern that herbicide treatment on riparian areas could adversely impact water quality and aquatic ecosystems.

The purpose of this document is to analyze, interpret and discuss potential effects of invasive plant treatments on soil and water resources, located on the Modoc National Forest. Project design standards (DS) were developed to minimize the effects of invasive plant treatments on these resources.

The Modoc National Forest is proposing to treat noxious weeds across the Forest by using herbicides, physical methods, and cultural treatments, or a combination of these approaches, over a 5- to 10-year timeframe (USDA Forest Service 2007). The noxious weeds are located in approximately 50 6th-field watersheds across the forest and could potentially affect 0.61 percent of soil map units located on the Modoc National Forest. Please refer to Table 1 and Appendix A for descriptions of the soil map units that have either sensitive or shallow soils on sites that contain noxious weeds. (Appendix A is part of the Watershed and Soils specialist report, found in Appendix T, Watershed and Soils, of this final EIS.)

The 39 5th-field watersheds that are proposed to be treated under this decision lie within the jurisdictional area of three different regional water boards (RWB): Central Valley, Lahonton and North Coast. There are 143 6th-field watersheds within the 39 5th-field watersheds. Approximately 80 percent of these 6th-field watersheds are located within the Central Valley RWB and the remainder is divided between the Lahontan and North Coast RWBs. Each RWB has a different water quality standard for pesticide delivery to the surface and ground waters, with the Lahonton RWB having a no-herbicide-detected standard. Standards for the other RWB are a limit of 0.07 mg/l for 2,4-D and a limit of 0.7 mg/l for glyphosate. All three of the RWB Basin Water Quality Plans meet the State of California standard for water quality.

Analysis Area

The analysis area for direct and indirect effects is the Modoc National Forest and lands administered by the Forest. The total acreage within the Forest's boundary consists of approximately 2,029,647.7 acres. Of those acres, 1,679,007.3 are administered by the Forest Service, which is approximately 83 percent of the area. The Modoc National Forest is located in the extreme northeast corner of California. The cumulative effects analysis area is comprised of the 39 5th-field watersheds that are either totally or partially found within the Forest's administrative boundary. Approximately 39 percent of the total area of these 39 5th-field watersheds is located within the Forest boundary.

Regulatory Framework

Federal Legislation

Federal and state laws, policies, and regulations control the use of herbicides on National Forest System lands, including the Clean Water Act and the Federal Water Pollution Control Act. Section

208 of the 1972 amendments to the Federal Water Pollution Control Act (Public Law 92-500) specifically mandated identification and control of non-point source pollution. Clean Water Act Section 303(d) directs the State of California to list Water Quality Limited Water bodies (303(d)-listed streams) and develop total daily maximum loads (TDML) to control the non-point source pollutant causing loss of beneficial uses.

In the State of California, the Central Valley, Lahonton and North Coast RWBs compile this information for each region. The information is then combined into a single report by the State Water Resources Control Board. The Safe Drinking Water Act and its 1996 amendments require states to delineate public water sources, to determine potential sources of contamination, and to determine the most susceptible areas at risk for contamination. This project would comply with the standards and criteria determined by each of the three regional water quality boards.

Forest Service-related Regulation

The regulatory framework of the Modoc is guided by federal laws and regulations as well as direction from three separate forest plans. In general, the applications of these three guiding documents are as follows: the Big Valley Sustained Yield Unit is managed under the 1991 Modoc National Forest Land and Resource Management Plan (LRMP). The Medicine Lake Highlands are guided by the Northwest Forest Plan and the rest of the Forest is administered under the Sierra Nevada Framework amendment of 2004 (Figure 1). Forest plan direction is found in the 1991 Modoc National Forest LRMP, the Sierra Nevada Forest Plan Amendment (SNFPA) of 2004, and the plan referred to as the Northwest Forest Plan (USDA Forest Service 1991). Each of these guiding documents has differing direction for riparian areas. Management direction for soils, found in these three guiding documents, focuses on maintaining soil productivity and the restoration and maintainance of the physical, chemical and biological integrity of the Forest's waters, as directed by the Clean Water Act. For consistency in the Noxious Weed Treatment Project, the Forest Supervisor determined that the Sierra Nevada Forest Plan Amendment Record of Decision direction for riparian-area management will be followed Forest wide, since it provides the highest level of protection to the aquatic resource.

To help restore and maintain these aspects of water-related resources, riparian conservation objectives (RCOs) and aquatic conservation strategy objectives (ACSOs) were developed to provide specific management direction. This approach also supports the Forest's mission to provide habitat for riparian and aquatic-dependent species as directed by the National Forest Management Act, Organic Act, and Safe Drinking Water Acts.

Maintenance of soil productivity is essential to sustaining ecosystems and is mandated by every act of Congress directing national forest management. Region 5 Forest Service Handbook 2509.18.2 (USDA Forest Service 1995a) establishes regional objectives for the soils management program. The Modoc National Forest LRMP directs that soil productivity be maintained by applying guidelines to areas where management prescriptions are applied and that, as a minimum, 85 percent of areas affected by soil-disturbing activities will not exceed soil property thresholds, as defined in guidelines A-G. (Modoc National Forest Plan pages 4-21 to 4-22).

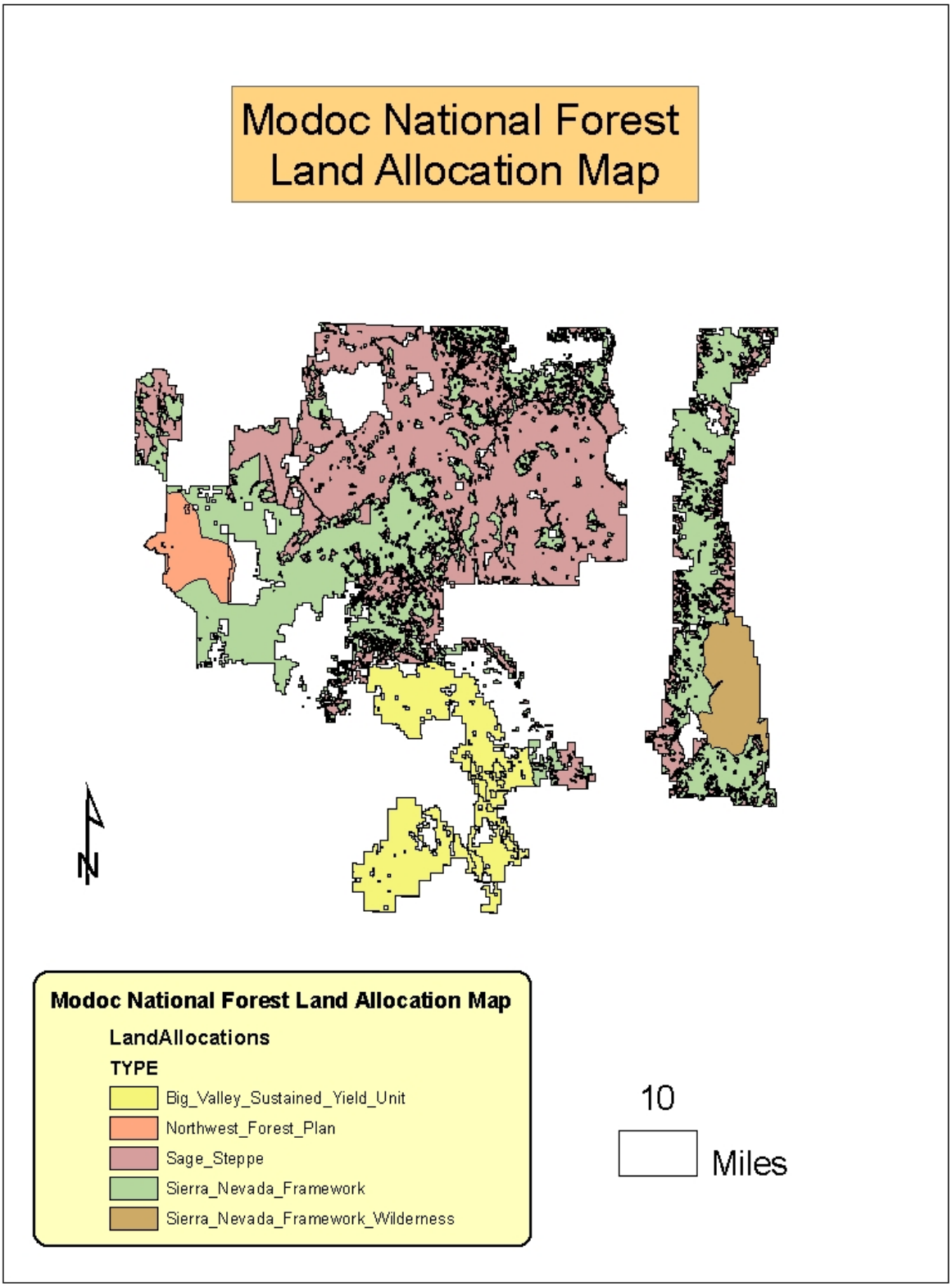

Figure 1. Modoc National Forest land allocation map

Methodology for Analysis

Project design standards were developed to ensure compliance with Region 5 direction, Modoc National Forest Plan, Sierra Nevada Framework and Northwest Forest Plan direction. Information used to develop these design standards include analysis of herbicide properties from SERA (Syracuse Environmental Research Associates, Inc.) risk assessments, soil characteristics and properties relative to herbicide properties and the proximity of treatment sites to streams. The acres to be treated under each alternative by non-herbicide and herbicide methods, as well as types of herbicides used, were compared by alternative.

Herbicide degradation in the environment is tied strongly to soils. The analysis focuses on herbicide application since this is the highest risk of the proposed actions. Main topics compared across the alternatives are (1) the risks to soil biology, (2) soil and water interactions, and (3) vegetation cover and soil erosion.

The Forest Service has a contract with Syracuse Environmental Research Associates, Inc. (SERA) to conduct human health and ecological risk assessments. These assessments are for herbicides that may be proposed for use on National Forest System lands. The information contained in this report, and in the EIS, relies on these risk assessments. Herbicide effects to stream aquatic resources were analyzed in risk assessments for each of the five herbicides included in the alternatives. The risk assessments considered worst-case scenarios including accidental exposures and application at maximum reported rates. Although the risk assessments have limitations (see R6 2005 FEIS pages 3-95 through 3-97, and the Human Health section of the Modoc Invasive Weed EIS), they represent the best science available.

The GLEAMS (Groundwater Loading Effects of Agricultural Management Systems) model examines the fate of herbicides in various soils under a variety of environmental conditions. This model was used for all the Forest Service SERA risk assessments. This is a well-validated model for herbicide transport and is the best available at this time. The SERA Risk Assessment analysis takes the herbicide concentration provided by GLEAMS and uses them in a dilution model for a stream or pond to get the water contamination rates for specific scenarios. The risk assessment model assumes broadcast treatment along a small perennial stream. The model ran a 10-acre square field as well as a treatment area modeled as 50 feet wide and 1.6 miles long (10 acres). The model also assumes even rainfall every 10 days. The herbicide concentration was very similar for both scenarios. Modeling 10 acres along a stream would overestimate herbicide in streams on the Forest as no broadcast of herbicide is proposed anywhere and buffers are required on streams (different buffer widths depending on alternative). The SERA worksheets were adjusted for the application rates to be used under this project. While the parameters do not always accurately reflect parameters at treatment sites, using this approach is considered conservative because in actuality the infestations are scattered, streams are buffered from herbicide application and broadcast applications are not allowed.

For two sites, the GLEAMS-Driver 1.8 model was used because it allows the user to input more site-specific data, particularly local climate data and treatment acreage. The model is conservative and probably overestimates herbicide concentrations because it assumes broadcast application along a stream as opposed to the targeted treatment proposed with this project.

The risk assessments, interdisciplinary team discussions, and monitoring studies of herbicide use in forested areas were used to create design standards, particularly for stream buffers and near water resources, to protect streams from potential adverse effects of treatments.

Affected Environment for Soil and Water Resources

Climate

The climate for most of the Forest ranges from warm, dry summers to cold moderately wet winters. Weather varies considerably with elevation, slope, aspect, and season. Winters are marked by the occurrence of frequent low-pressure systems and cooler temperatures reflect the influence of maritime polar air. Precipitation tends to be lighter on the Modoc Plateau, increasing in amount in the mountain areas and falls mainly as snow. Precipitation tends to taper off after March, as the flow pattern of storms shifts to the north, resulting in warm summers with light precipitation (USDA Forest Service 1983).

These patterns are reflected in the mean precipitation for Alturas, California. Mean precipitation is highest between the months of November through March, where the average precipitation is greater than 1 inch per month. The average annual precipitation is 12.2 inches per year. Correspondingly, the warmest months, which range from June through September, have the lowest precipitation averages for these months. During these months, the precipitation averages between 0.24 inches per month to a high of 0.99 inches per month (http://forest.moscowfsl.wsu.edu/cgi-bin/fswepp/rc/copypar.pl). Rainfall intensities vary from low to moderate. Rainfall intensities may vary from 1.4 to 3.0 inches for a two-year, 24-hour storm event, although the amount varies across the Forest (USDA Forest Service 1983).

Geology

The geology on the Forest has been influenced predominantly by faulting, volcanic activity, and erosion. From 60 million years ago to the present, the area has experienced volcanic activity. The Forest's three major geomorphic provinces evolved from these dominating geologic processes. The provinces are: the Cascade Range, Great Basin and Modoc Plateau (USDA Forest Service 1983).

The Cascade Range province is dominated by the Medicine Lake Highlands, which is a broad shield volcano, and considered to be active. It is currently among the top five candidates in California for future activity. Cinder cones are common and the associated bedrock is dominated by andesitic flows and pyroclastics. In recent geologic time, there has been additional activity resulting in domes and flows of rhyolitic obsidian, rhyodacites, and rhyolitic pumice. Basaltic lavas are also present, comprising a series of flows, such as the Modoc Basalt, Burnt Lava, and Black (Callaghan) and Point Pot Crater flows.

The Modoc Plateau province is relatively flat and the monotonous central portion of the survey area is called Devil's Garden. The area is capped by fissure erupted basalts that range in age from 25,000 to 20 million years ago and andesitic volcanic rocks are also present. Geologically recent basaltic cinder cones are scattered across the Plateau, and are generally associated with northwest-southeast trending faults.

The Basin and Range province is located around the Warner Mountain area, and reflects the extreme western extent of this province. Warner Mountain is formed by a westward-tilting fault block. Bedrock in this area is almost entirely volcanic in origin. Pyroclastics dominated the majority of the mountain range, with minor amounts of andesite and basalts, obsidian flows, rhyolitic rocks, volcanic mudflows and welded tuffs occurring. Sedimentary rocks of volcanic origin are present; glacial deposits may exist but have been difficult to identify. The Adin

Mountains are also present in this province and represent a series of anticlines and synclines, which have been dissected by faults (USDA Forest Service 1983).

Soils

There are approximately 2 million acres of soils mapped within the Modoc National Forest. These soils have been grouped into 22 map units, each of which consists of numerous individual soils and a wide variety of land types (USDA Forest Service 1983). These soils reflect the region's ongoing volcanogenic history, and are derived primarily from basalts, andesite, tuff, pyroclastic pumice, cinders and volcanic ash, of various ages; although some other parent material is present.

Map units defined during soil mapping on the Forest, in the early 1980s, were grouped into seven general assemblages, reflecting differing landscapes and land capabilities. These assemblages and their characteristics are summarized below in Table 1, from the Modoc Soil Survey dated 1983.

Based on a review of Table 1, it is obvious that the parent material for soils on the Forest is volcanogenic in nature. Soils in the vicinity of the Warner Mountain Ranger District are generally more erosive then elsewhere on the Forest due to recent geologic uplift of area. On the Basalt Plateau, silica duripans are found under shallow soils in this area. Where these shallow soils directly overlie the underlying basalts, the duripans, once they are well developed, thick and highly cemented, function as a barrier to water moving from the soil horizon into the ground water table

The seven general assemblages in Table 1, reflecting differing landscapes and land capabilities have been further subdivided into over 100 soil types and grouped into 207 soil mapping units (USDA Forest Service 1999). Within this survey, soils of concern were identified based on a soil's depth to bedrock, soil internal drainage, and permeability. Soil infiltration is a measurement of how quickly water can infiltrate into the soil from the surface, and soil drainage is a measurement of how quickly water can move through the soil profile. Soil permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Soil drainage is a measurement of the frequency and duration of periods of saturation or partial saturation during soil formation (Adams 2007a). A sensitive soil is defined as a soil with soil permeability of "moderately rapid" or greater, or soil drainage of "somewhat excessively drained" or greater.

Soils with the following characteristics were defined as of concern:

- Soils with a lithic or para-lithic contact (soil depth of less than 12 inches to bedrock) or a soil with a depth to bedrock of less than 20 inches. These soils are defined as "shallow"
- Soils with moderately rapid to rapid permeability
- Soils with ratings of somewhat excessive to excessive soil drainage
- Soils having maximum erosion hazard ratings of high to very high, and those with a runoff potential rating of high to very high.
- Those areas classified as rubble lands, lava fields and rock outcrops, due to high incidences of fracturing.

Table 1. Summary of map units and soil families on the Modoc National Forest

Map Unit	Soil Families	Parent Material	Geomorphic Position	Permeability Range	Maximum Erosion hazard Potential
Lower Elevation Predominantly Woodland Soils, Primarily 0-40% Slope	Lawyer-Elmore & Jacket-Deven-Hibner families	Basalt and volcanic tuff derived principally from basic igneous rock	Basalt plateaus and volcanogenic mountain uplands	Slow-Moderate	Low to High
Lower Elevation Rangeland soils, Primarily 0-40% slope	Bakeoven family-lava flow-Searles family; Puls-Indian creek-Simpson families; Deven-Bieber-Pass Canyon families; Gwin-Ruckles_Pass Canyon families; Supan-Los Gatos-Pass Canyon families; Deven-Keating-Pass Canyon families**	Basalt, cinder cones, tuff,	Basalt plateaus and volcanogenic mountain uplands	Very Slow to Moderately Rapid	Low to High
Predominantly Nearly Level Alluvial Soils That are Subject to Flooding	Aikman-Cardon family	Volcanogenic sediments	Clay basins and drainages of basalt plateaus	Very Slow	Moderate
Lower to Mid Elevation Dominantly Woodland Soils Which Have formed in Relatively Recent Volcanic Parent Materials	Alcot-Sadie-Germany deep families; Alcot-Holland families, pumice overburden; Lava flow-Germany family-Lithic Xerumbrepts; Stonewell-Yallani families; Stonewell-Yallani-Inville families, pumice overburden	Volcanic ash, cinders and recent pyroclastic material, basalt or andesite	Old alluvial fans on basalt plateaus and volcanogenic mountain uplands	Moderately Rapid to Rapid	Low to High
Mid Elevation Soils on Gently Sloping to extremely Steep Mountains in the Eastern Half of the Survey Area	Smarts-DeMasters-Patio families; Bertag-Smarts-Cavanaugh families; Anatone-Bearskin-Merlin families	Basalts, andesites or tuff	Mountain uplands	Slow to Moderate Slow	Moderate to High
High elevation Nearly Level to extremely Steep Soils on the Medicine Lake Highlands and on the Warner Mountains	Divers-Lapine-Kinzel families; Behanin deep-Gralic-Loberg families; Cheadle-Supervisor-Behanin families	Andesite, basalt, tuff cinders or obsidian	Higher elevations on both the Medicine Lake shield volcano and the Warner Mountain range	Slow to Rapid	Moderate to High
Miscellaneous Areas with Little or No Soil Present	Lava flow rock-Rock outcrop; Water	Vesicular basalt flows or obsidian	Medicine Lake Highlands, east side of the Warner Mountain range; Medicine Lake, Clear lake Reservoir and Big Sage Reservoir	Not Applicable	Not Applicable

** Approximately 85% of the acreage involved in this map unit is composed of shallow soils overlying a silica duripan, or over basal or tuff bedrock (USDA Forest Service 1983).

There are 127 soil map units rated as sensitive and/or shallow. They comprise 1,226,588 acres, or approximately 60.4 percent of the area within the Forest. This information is summarized in Appendix A to this report. (Appendix A is part of the Watershed and Soils specialist report, found in Appendix T, Watershed and Soils, of this final EIS.)

Based on Best Management Practices Evaluation Program (BMPEPs) for a multitude of projects including grazing, road maintenance, fuels reduction, timber harvest and prescribed fire, soils on the Modoc National Forest are meeting R5 soil quality standards and Modoc LRMP objectives (Adams 2007*c*).

Soil Conditions within Treatment Areas

A GIS query of known weed occurrences in relation to the forest activity tracking system (FACTS) data was completed. (The query is located in the electronic project record.) In constructing the query, roads were buffered for ¼ mile on each side of the road. The analysis determined that over 90 percent of known weed locations are found within one-quarter mile of roads. These areas have highly disturbed soil conditions. Disturbance typically includes the loss or mixing of surface organics and mineral soil into subsurface mineral soil horizons. This is often due to soil displacement, and/or altered soil structure and porosity, as a result of mineral soil compaction. Conditions affecting vegetative growth, such as available moisture holding capacities and soil porosity, are likely to also have been altered. Because many invasive plants prefer disturbed sites, this creates conditions in which invasive species are able to out-compete native species.

Table 2. Range of size in invasive plant sites on the Modoc National Forest

Size of Infestation	No. of Invasive Plant Sites	Percent of Known Sites
Less than 1 acre	652	94
1 to <5 acres	27	27
5 to < 10 acres	6	<1
10 to < 50 acres	8	<1
50 to < 100 acres	0	<1
More than 100 acres	3	<1
Total	**696**	**100%**

Ninety-four percent of the areas in which invasive species occur on the Modoc National Forest are less than 1 acre in size. The largest defined area of noxious weeds on the Forest is 5,657.8 acres infested with dyer's woad.

Infested sites not along roads can include areas burned by fires and areas where streams have acted as a corridor for movement of plants downstream. Burned areas lack plant cover, generally include disturbances from heavy equipment creating firebreaks, and can have changed soil properties from soil heating. Where streams have acted as a corridor for movement of invasive plants downstream, soils are fairly undisturbed.

As discussed above, there are approximately 2 million acres of soils mapped on the Modoc National Forest. Approximately 64 percent, or 1, 273, 954 of these acres, have soils that contain either a sensitive or shallow soil component. The known or identified noxious weed sites occur on 0.5 percent of the shallow and sensitive soils found on Forest (Adams 2007a).

Effect of Invasive Plants on Soils

Invasive plants can alter soil properties such as pH, nutrient cycling, and changes in composition or activity of soil microbes. Reductions in soil nutrient levels make it difficult for native plants to compete with the invasive plants, and probably affect the soil biotic community health. However, the long-term effects of these changes are not known (USDA Forest Service 2006). As shown in Table 2, 94 percent of the sites are less than an acre, 27 percent are between 1 and 5 acres, and less than 1 percent are greater than 5 acres. See Appendix B of the Modoc Noxious Weed EIS for more details on existing sites.

Soil and Water Interactions – Water infiltration rates and volumes can be reduced on weed-infested sites due to reduced cover (DiTomaso 2000). Significantly greater surface water runoff, indicating less infiltration, has been measured from spotted knapweed-dominated sites compared to adjacent native grass-dominated sites (Lacey, Marlow, and Lane 1989). Compaction, which is present in many weed-infested sites, also tends to reduce infiltration rates. Reductions in soil organic matter can also reduce the amount of water held in the soil profile, especially near the surface (Brady and Weil 1999, Tisdall and Oades 1982).

Vegetative Cover - Total vegetative cover may be reduced on weed-infested sites from that provide by native vegetation and can result in higher evaporation from exposed mineral soil on the surface (Lauenroth, et al. 1994). Soil water stored deeper in the profile may also be depleted more rapidly on sites where vegetative cover provided by weeds is dense and associated transpiration rates are high (Olson 1999).

Soil Erosion – Weed-infested soil has been shown to be more susceptible to erosion than soil occupied by native grass species (Lacey, Marlow, and Lane 1989). Soil erosion in a simulated rainfall test more than doubled in spotted knapweed-dominated rangeland areas when compared to natural bunchgrass/forb grasslands. This is primarily due to significantly lower infiltration rates and higher levels of bare ground on the knapweed-dominated site compared to the uninfested areas (ibid.).

Weeds are less able to dissipate the kinetic energy of rainfall, overland flow, and wind that cause soil erosion, primarily due to the loss of cover provided by native species on site (Torri and Borselli 2000, Fryrear 2000).

Soil Biota - Plants and mycorrhizal fungi are strongly dependent on each other, and species of fungi are associated with specific plants. Presence of non-native plants also leads to changes in the mycorrhizal fungus community (ibid.). These changes could increase the difficulty of reestablishing native vegetation after the invasive plants are removed.

Soil Nutrient Availability - Noxious weeds directly limit nutrient availability by out-competing native species for limited soil resources. Weeds have high nutrient uptake rates and can deplete soil nutrients to very low levels, especially in cases where weed species germinate prior to native species and exploit nutrient and water resources, before native species are actively growing (Olson 1999).

Spotted knapweed has been implicated in reducing available potassium and nitrogen (Harvey and Nowierski 1989). Potassium, nitrogen, and phosphorous levels were shown to be 44, 62, and 88 percent lower, respectively, in spotted knapweed-infested soil than in adjacent grass covered soil (Olson 1999). Some invasive plants are allelopathic to other plants, and produce secondary compounds that can directly increase the population of soil microbes capable of metabolizing this compound, while decreasing the populations of other microbes (ibid.). Allelopathic is defined as

suppression of growth of a plant by a toxin released from a nearby plant of the same or another species.

These changes will affect the soil food web and nutrient cycling, and may have impacts on the native plant community. Weed-infested areas may also indirectly limit nutrient availability as a result of soil erosion from compacted conditions or reduced effective cover. Erosion selectively removes organic matter and the finer sized soil particles that store nutrients for plant use, leaving behind soil with a reduced capacity to supply nutrients.

Water Resources

Overall Watershed Conditions

Stream surveys and stream condition assessments have been conducted since the completion of the 1991 FEIS and LRMP for the Modoc National Forest. Stream surveys and condition assessments have been completed for other analyses from 1995 to the present, both at the project level and cumulative effects levels. Based on gathered information, and the completion of the Modoc NF Watershed Condition Assessment (2001), Forest watersheds are hydrologically stable, with isolated stream reaches that have bank erosion, due to the effects of activities related to Forest management. These reaches were noted to have sustained periods of flow. In addition, review of data mentioned above indicates the majority of streams are considered to be in proper functioning condition (PFC) (Brady and Weil 1999).

Water quality and riparian condition are the two elements potentially affected by invasive plant treatments. The approximately 6,908.4 acres of invasive plants identified for treatment are scattered across the Forest in 29 of 39 5th-field watersheds. Of the 6,908.4 acres identified as having invasive plants, 136.5 acres, or 1.4 percent, are located within areas identified as part of critical aquatic refuges. An additional 2.8 percent of the acres infested with noxious weeds are located within riparian conservation areas.

Water Quality

As stated on page 3, water quality in California is regulated by the Clean Water Act and the Regional Water Boards (RWBs) identify and establish beneficial uses for surface and ground water. Each RWB has developed water quality control plans, also known as basin plans, which provide the basis for protecting water quality in the state of California. Included in each plan are water quality objectives, which the RWB has determined will ensure reasonable protection of beneficial uses identified by the RWB for surface and groundwater (http://www.waterboards.ca.gov/northcoast/programs/basinplan/basin.html).

The three RWBs that include various parts of the Modoc National Forest include the Central Valley Regional Board in areas that drain to the Pit River, the North Coast Regional Board in Klamath Basin lands, and the Lahontan Regional Board in Great Basin lands (Figure 2).

By direction of the Clean Water Act, where water quality is limited, state agencies develop total maximum daily load (TMDL) plans to improve water quality to support the beneficial uses of water. For water-quality-limited streams on National Forest System lands, the Forest Service provides information, analysis, and site-specific planning efforts to support State processes to protect and restore water quality.

The most recent listing was approved for the state of California in 2002, which compiles all the information from each regional water board[1]. GIS data from the State was downloaded and reviewed in context of the Forest boundary and defined areas of noxious weed concentrations. No impaired stream reaches were found to be within defined noxious weed sites on the Forest.

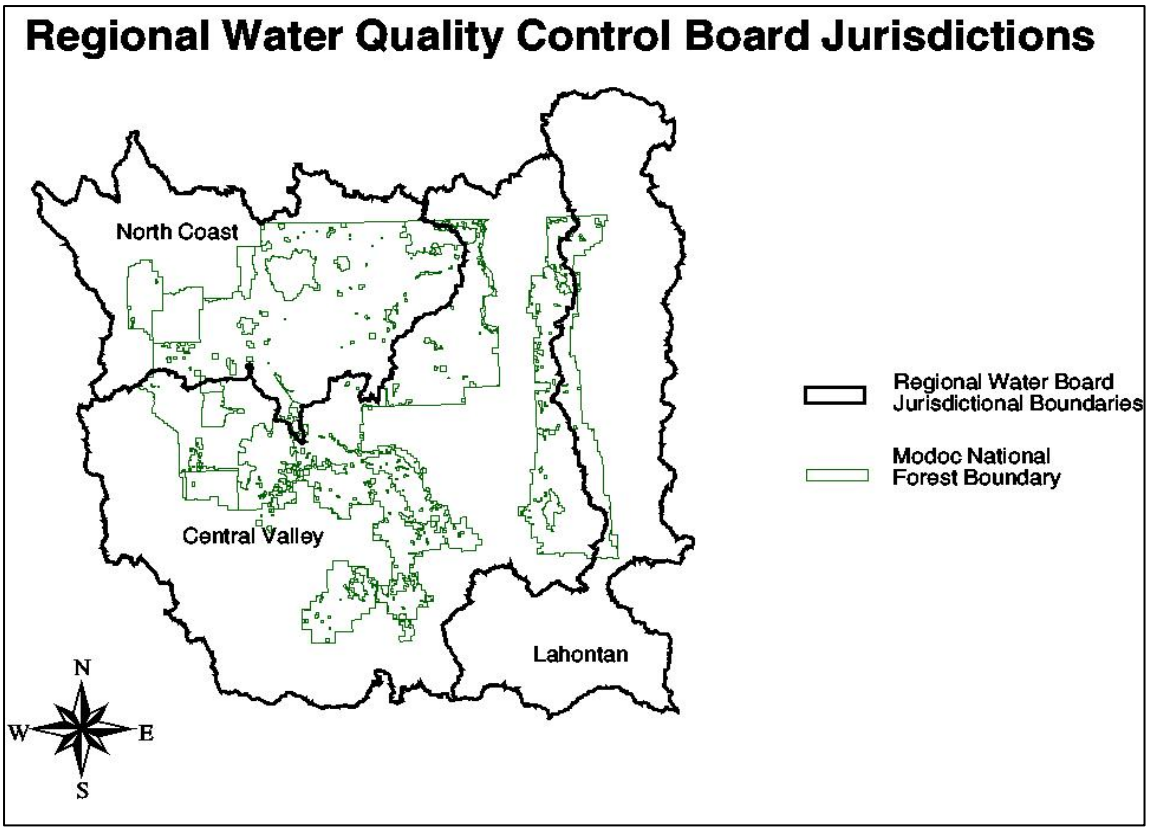

Figure 2. Regional water quality control boards and their jurisdictions on the Modoc National Forest

Water Quantity and Timing

There are approximately 5,922.2 miles of stream within the boundaries of the Modoc National Forest. Of these, 3,229.3 miles are ephemeral, which equates to 55 percent of the total stream miles within Forest boundaries. Approximately 36 percent, or 2,114.9 miles, are intermittent, and 9 percent of the stream miles, or 578 miles, are perennial. The majority of the intermittent and ephemeral streams flow during spring snowmelt and are predominantly dry in later summer and fall. The exception is that flow can occur following a major precipitation event (Adams 2007a).

Twenty of the 39 watersheds involved with the Forest produce a cumulative annual yield of 565,800 acre-feet of water per year. This does not include water yield from private lands found with the Forest boundary (USDA Forest Service 1999).

The amount of water that runs off these watersheds is related to the type of precipitation events (snowmelt versus rainfall) and rainfall intensity. High-intensity and short-duration summer storms have a tendency to yield more runoff than fall and winter storms. As the runoff increases, so does the energy to erode hillsides and transport sediment to the stream network.

[1] http://www.waterboards.ca.gov/rwqcb5/water_issues/tmdl/impaired_waters_list/index.html

Channel Morphology

Stream surveys and stream condition assessments have been conducted on selected perennial streams on the Forest. Specified and approved stream survey protocols have been used to complete stream condition assessment, including stream condition inventory (SCI), Pfankuch ratings, and proper functioning condition (PFC).

The results of stream condition assessments indicate that the majority of streams surveyed are considered to be “in equilibrium” with their geomorphic setting and are considered to be in proper functioning condition. Some channels are considered to be “functioning at risk” due to land management activities on the Forest based on their PFC ratings. Hardcopies of data collected from 1995 to the present are on file at the Forest Supervisor’s office in Alturas, California (Adams 2007b).

Those streams that are in the functioning-at-risk category are considered to be affected by site-specific disturbances. Localized disturbances are more related to site-specific impacts from logging and related infrastructure, such as landings, temporary roads, and skid trails. Additional causes of site-specific disturbances included livestock grazing, road construction, and wildfire (Adams 2007a).

Riparian and Wetland Conditions

Native riparian vegetation plays a key role in forming aquatic habitat for fish and other aquatic species. Roots help stabilize stream banks, preventing accelerated bank erosion and providing for the formation of undercut banks, important cover for juvenile and adult fish. Riparian areas with native vegetation supply downed trees (large wood) to streams. Riparian vegetation stabilizes stream banks, and serves as a filter to prevent the runoff of soil into streams. Riparian vegetation also provides large and small wood to streams, adding to habitat complexity, and providing cover and food sources for aquatic organisms. Aquatic ecosystems have evolved with certain vegetation types; invasive plants do not necessarily provide similar habitat.

The 1991 FEIS to the Modoc Forest Plan states that there were almost 19,000 acres of riparian area found on the Forest. It states that 13, 473 of these acres were adjacent to streams, 2, 803 acres adjacent to springs and seeps; 122 acres adjacent to lakes and 2,583 acres were adjacent to wet meadows. The FEIS indicates that approximately 60 percent of riparian areas was located in the Warner Mountain District, with 20 percent in the Devil’s Garden District, and only 10 percent each on the Big Valley and Doublehead Districts. Five hundred fifty-two miles of stream were found to contain riparian habitat. Riparian vegetation was described to consist of three primary types: grass-forb understory with a willow midstory and no overstory (which was defined as the most common); a grass forb understory with no midstory or overstory (generally associated with wet meadows); and a conifer overstory with mixed-deciduous midstory and an understory, associated with perennial streams, particularly at high elevations (USDA Forest Service 1999). The FEIS also states that at the time of publication there was approximately 233 wetlands covering approximately 35,000 acres of Forest Service administered lands.

The 2004 amendment to the Sierra Nevada Framework defines two areas of interest: Riparian Conservation Areas (RCAs) and Critical Aquatic Refuges. The delineations of RCAs for this FEIS, as described below, are from the Sierra Nevada Forest Plan Amendment FEIS Record of Decision (USDA Forest Service Pacific Southwest Region 2004 p.42). For this FEIS, the terms RCA and Streamside Management Zone (SMZ) are interchangeable.

Perennial Stream RCA: 300 feet on each side of the stream, measured from the bank full edge of the stream.

Seasonally Flowing Stream RCA (includes intermittent and ephemeral streams): 150 feet on each side of the stream, measured from the bank full edge of the stream

Special Aquatic Feature RCA (includes lakes, wet meadows, bogs, fens, wetlands, vernal pools, and springs): 300 feet from edge of feature or riparian vegetation, whichever width is greater.

The primary role of Critical Aquatic Refuges (CARs) is to preserve, enhance, restore or connect habitats for aquatic or riparian dependent species at the local level and to ensure the viability of these species. In many cases, CARs support the best remaining populations of native fish, amphibian, and plant species whose distributions have been substantially reduced elsewhere in the Sierra Nevada. CARs primarily protect occupied habitat of threatened, endangered, or sensitive animal species.[2]

Since the 2004 direction applies to this project, acreages for CARs and RCAs were determined at the time of this report being written. Based on currently available GIS data, analysis determined that there are approximately 127,716 acres of defined CARs within the Forest, 226,693.7 acres of RCAs associated with streams, and 117, 285.9 acres associated with meadows, lakes and springs. Wetlands are often used for recreation and are at risk from invasive plants, such as knotweeds that colonize areas downstream of the original infestation along a stream. Wetlands can be inundated with water year-round, and others are wet only seasonally. Areas that are wet only seasonally can be infested with upland species as well as those species adapted specifically to wetland areas.

Existing conditions for CARs and RCAs were documented in the FEIS for the forest plan. It indicated that in the past, logging practices, road construction, and improper grazing practices contributed to riparian and wetland area degradation. Forest riparian areas were described as generally lacking the desired vegetation expressions to achieve overall management objectives. Riparian areas were noted to not have improved where livestock grazing was season long and where few or no structural improvements had been made. However, from 1995 to the present, surveys have been completed and a WSA completed. Results indicate that a majority of streams surveyed were considered in proper functioning condition (PFC). Watersheds are considered hydrologically stable. However, isolated reaches were noted where there was stream bank erosion or other types of site-specific disturbance are present. Periods of elevated stream flow were also noted (Adams 2007b). Where riparian vegetation is present and that reach has been documented as in PFC, riparian also would be considered in PFC. Data is on file at the Supervisors Office in Alturas, California.

Lakes and Floodplains

Lakes and floodplain areas are often popular for recreation. As a result, these areas are at risk from invasive plants brought in by visitors, as plant parts and seeds can be carried downstream of the original infestation at high flows.

There are numerous lakes and reservoirs that total an estimated 18,115.6 acres, based on current GIS data. GIS layers of floodplains were not available for the Forest and they are not discussed in the Forest Plan. However, perennial streams of lower gradients often have floodplains associated with them.

[2] http://www.fs.fed.us/r5/rsl/projects/frdb/layers/cars.html

Existing-condition information for lakes and floodplains is absent in the 1991 FEIS. However, as discussed above, data has been collected from 1995 to the present and the Watershed Condition Assessment for the Modoc National Forest was completed by Sue Becker et al. in 2000. Watersheds are considered hydrologically stable, and many stream reaches are in PFC.

For those stream reaches involving watersheds that have received a PFC rating, it can be inferred that their floodplains are functioning properly. Data is on file at the Supervisors Office in Alturas, California.

Municipal Watersheds and Domestic Water Supplies

A municipal supply watershed is one that serves a public water system as defined in Public Law 93-523 (Safe Drinking Water Act) or as defined in State safe drinking water regulations. No formal municipal watersheds or whole communities use water on-Forest. There are, however, several domestic water users scattered throughout or downstream from the Forest on numerous streams (USDA Forest Service 1991). While not a formal municipal watershed, the Fort Bidwell Indian Community gets drinking water from an area on National Forest System land. Through formal consultation with the Fort Bidwell Indian Community Council (April 6, 2006), the Forest agreed not to use herbicides to treat noxious weeds in the area of concern that supplies the community with drinking water. This area of concern is depicted on the map in Appendix N of the Noxious Weed EIS. At this time, noxious weeds have not been identified in this area of concern. Further consultation would continue to identify suitable treatment methods under Early Detection-Rapid Response if sites are identified in the future.

Alturas is the only incorporated town in Modoc County that is adjacent to the Forest boundary. The water supply for Alturas comes from groundwater wells. Neither the State Water Resources Control Board nor the Central Valley and North Coast Regional Waterboards identify any municipal watersheds on the Forest.

The California Department of Water Resources (DWR) sampled for herbicide contamination in the Pit River near Alturas, California. The results of the water quality monitoring for the years of 2001 to 2005 is summarized below in Table 3. The results of the monitoring shows that while Glyphosate, Tricloypr, 2,4-D and Dicamba were found in the water samples for the Pit River and the North Fork of the Pit River, none of the samples exceeded the “reporting limit”. The reporting limit triggers a report by the sampling agency to the EPA via the State or Regional Water Boards.

Table 3. Result of water quality monitoring on the Pit River (Lebeouf 2005)

Monitoring Results: 2001 through 2005-Pit River, North Fork, Station # A1210000			
Chemical	**Reporting Limit (ug/L)**	**Results Reported**	**Did the sample exceed the Reporting Limit**
Dicamba	<0.1	<0.1	N
Glyphosate	<25	<25	N
Tricloypr	<0.1	<0.1	N
2,4-D	<0.1	<0.1	N

Roads

GIS analysis of known weed occurrences showed that over 90 percent of known weed occurrences are found along roads. In conducting the analysis, a buffer of 1,320 ft (1/4 mile), was established on the road.

For this project, roads within riparian conservation areas are considered hydrologically connected to streams. The total number of miles of forest road, user-created roads, and railroads within the project area totals an estimated 3,900 miles, based on current GIS. In RCAs associated with streams, there are an estimated 578.0 miles of road, or 15 percent of the total road miles. In RCAs associated with springs, lakes, and reservoirs, there are an estimated 248.3 miles or 6.4 percent of the total road miles. Miles of road within noxious weed polygons, on the forest, total 26.6 miles, which is less than 1 percent of the total road miles.

Water Resources within Riparian Conservation Areas and Critical Aquatic Refuges

Invasive Plants within Riparian Conservation areas and Critical Aquatic Refuges

Table 4 and Table 5 show acres of invasive plants within RCAs and CARs of both perennial and intermittent streams. None of these species are considered specifically riparian. Canada thistle can be found in riparian areas as can Scotch Thistle and Spotted knapweed. Scotch thistle and Spotted knapweed can also be found in wet meadows. The other noxious weed species listed in Table 4and Table 5 are generally forest and upland species. However, spotted knapweed may be found in both moisture loving areas and more forested and upland settings.[3]

Canada thistle, Spotted Knapweed and Dalmatian Toadflax have either all or most of their acreage within RCAs associated with perennial streams. dyer's woad, Klamathweed, musk thistle and Scotch thistle have most of their acreages within RCAs associated with seasonal streams (Table 4 and Table 5).

Table 4 Documented invasive plants acres within RCAs on the Modoc National Forest

Primary Invasive Plant	Acres within Perennial Stream RCA	Acres within Intermittent Stream RCA	Total Acres	% Acreage Associated with Perennial Streams	% Acreage Associated with Seasonal Streams
Canada Thistle	1.2	7.7	8.9	13.2	86.8
Crupina	5.8	29.3	35.2	16.6	83.4
Dalmatian Toadflax	23.9	32.2	56.1	42.6	57.4
Diffuse Knapweed	1.2	1.1	2.3	51.7	48.3
Dyer's woad	3.7	16.3	20.0	18.4	81.6
Klamath Weed/St. Johnswort	0.1	0.5	0.6	16.4	83.6
Mediterranean Sage	4.7	0.8	5.5	85.6	14.4
Scotch Thistle	3.8	27.7	31.4	12.0	88.0
Spotted Knapweed	1.1	0.1	1.2	91.7	8.3
Yellow Starthistle	1.1	0.0	1.1	100.0	0.0
Musk Thistle	0.0	0.4	0.4	0.0	100.0

There are three critical aquatic refuges on the Forest. Mill Creek 1 has no identified invasive weed sites. The sites within riparian areas of Goose Lake and Turner Creek CARs are shown below in Table 5.

[3] http://www.cal-ipc.org/ip/inventory/weedlist.php

Table 5 Documented invasive plants acres within CARs on the Modoc National Forest

Primary Invasive Plant	Acres within Perennial Stream Goose Lake CAR	Seasonal Stream Acres within Goose Lake CAR	Seasonal Stream Acres within Turner Creek CAR	Total Acres	% Acreage Associated with Perennial Streams	% Acreage Associated with Seasonal Streams
Canada Thistle	0.2	0.0	0.0	0.2	100.0	0.0
Dalmatian Toadflax	23.9	19.1	0.0	43	55.6	44.4
Dyer's woad	0.1	12.2	0.0	12.3	0.8	99.2
Klamath Weed	0.0	0.0	0.1	0.1	0.0	100.0
Musk Thistle	0.0	0.0	0.3	0.3	0.0	100.0
Scotch Thistle	0.1	0.7	0.1	0.9	11.1	88.9
Spotted Knapweed	0.1	0.0	0.0	0.1	100.0	0.0

While most invasive plants first occupy disturbed sites, once established, any of these species can begin to invade undisturbed sites (Stohlgren et al. 1999).

Noxious weed acreage comprises 0 - 2.3 percent of the area of 5th-field watersheds (Table 6). Twenty-eight out of 39 5th-field watersheds involved within the Forest's boundary, or 71 percent, have some acreage involved with noxious weeds. However, only two watersheds or 0.05 percent of the total number of watersheds, have acreages totaling greater than 1 percent of the 5th-field watershed's total acreage (Table 6). For Copic Bay watershed, the large percentage of infestation is due to the large dyer's woad site, which consists of 5,676.5 acres. For Round Valley watershed, the large percentage of infestation is due to the Common Crupina site that is on both public and private land.

As treatments under this project would take place only on National Forest System lands, watershed involvement was reassessed by considering only those acres within the Forest boundary. When considering only those lands within the Forest boundary, by 5th-field watershed, then only the Copic Bay watershed has greater than 1 percent of its land infested with noxious weeds (Table 7). As in Table 6, this is due to one large dyer's woad-infested site.

Temperature - While invasive plants may provide some shade, they are replacing native forbs and grasses that are better bank stabilizers and promote narrower and deeper channels. Stable banks tend to provide more shade and consequently keep stream water temperatures lower.

Sediment - There are 8.8 acres of spotted knapweed and 4.1 acres of diffuse knapweed identified for treatment on the Forest. There are 1.1 acres of spotted knapweed within RCAs associated with perennial streams and 0.1 acre within RCAs associated with intermittent streams. Diffuse knapweed acreage is not associated with either RCAs or CARs. Lacey et al. (1989) reported higher runoff and sediment yield on sites dominated by knapweed versus sites dominated by native grasses.

Table 6. Acres infested by invasive plants for whole 5th-field watersheds

5th-field Watershed Name	Hydrologic Unit Code	Acres	Infested Acres	Percentage of Entire 5th-field Watershed Infested
Ash Valley-Cottonwood Creek	1802000212	102250.9	9.8	0.0
Big Valley	1802000217	87632.0	3.0	0.0
Boles-Fletcher Creek	1801020401	216746.0	3.9	0.0
Canby-Pit River	1802000209	157640.0	28.8	0.0
Canyon Creek	1802000207	61749.4	0.4	0.0
Clear Lake	1801020403	143249.0	0.2	0.0
Clover Swale Creek	1802000208	57672.8	0.4	0.0
Copic Bay	1801020411	243169.6	5676.5	2.3
Goose Lake East Shore	1802000103	156132.8	133.3	0.1
Goose Lake West Shore	1802000104	96239.2	1.6	0.0
Horse Creek	1802000301	164558.4	3.5	0.0
Jess Valley	1802000201	64125.0	1.3	0.0
Juniper Creek	1802000216	50660.3	9.5	0.0
Lower Alkali Lake	1808000103	133914.8	0.1	0.0
Lower Ash Creek	1802000215	84393.1	3.7	0.0
Lower South Fork Pit River	1802000203	139538.5	0.3	0.0
Middle Alkali Lake	1808000102	240481.2	0.9	0.0
North Fork Pit River	1802000204	139287.9	2.7	0.0
North Fork Willow Creek	1801020402	90356.0	0.6	0.0
Rattlesnake Creek	1802000205	124105.7	0.8	0.0
Round Valley	1802000213	60382.3	770.1	1.3
Taylor Lake	1802000211	235602.2	883.7	0.4
Tule Lake Sump	1801020410	127974.8	0.1	0.0
Turner Creek	1802000210	49069.5	3.3	0.0
Upper Alkali Lake	1808000101	201463.6	19.8	0.0
Upper South Fork Pit River	1802000202	208686.0	6.4	0.0
Warm Springs Valley	1802000206	44037.9	28.5	0.1
Willow Creek	1802000214	49869.2	0.9	0.0

Table 7. Acres infested by invasive plants for National Forest System land by 5th-field watersheds

Fifth Field Watershed Name/Clipped to FS boundary	Hydrologic Unit Code	Watershed Acres	Infested Acres	Percent Watershed Within Forest That Is Infested
Ash Valley-Cottonwood Creek	1802000212	42543.0	9.8	0.0
Big Valley	1802000217	9554.3	3.0	0.0
Boles-Fletcher Creek	1801020401	216746.0	3.9	0.0
Canby-Pit River	1802000209	109690.8	28.8	0.0
Canyon Creek	1802000207	16276.8	0.4	0.0
Clear Lake	1801020403	109940.6	0.2	0.0
Clover Swale Creek	1802000208	41637.3	0.4	0.0
Copic Bay	1801020411	222634.5	5676.2	2.5
Goose Lake East Shore	1802000103	67613.9	133.2	0.2
Goose Lake West Shore	1802000104	49473.1	1.6	0.0
Horse Creek	1802000301	18440.0	3.5	0.0
Jess Valley	1802000201	64125.0	1.3	0.0
Juniper Creek	1802000216	33326.0	9.5	0.0
Lower Alkali Lake	1808000103	21967.9	0.1	0.0
Lower Ash Creek	1802000215	14842.0	3.5	0.0
Lower South Fork Pit River	1802000203	28964.5	0.3	0.0
Middle Alkali Lake	1808000102	41512.8	0.8	0.0
North Fork Pit River	1802000204	64273.3	2.6	0.0
North Fork Willow Creek	1801020402	62555.5	0.6	0.0
Rattlesnake Creek	1802000205	114438.0	0.8	0.0
Round Valley	1802000213	47791.3	182.5	0.4
Taylor Lake	1802000211	201380.3	878.8	0.4
Tule Lake Sump	1801020410	84210.1	0.1	0.0
Turner Creek	1802000210	49069.5	3.3	0.0
Upper Alkali Lake	1808000101	42668.0	17.4	0.0
Upper Lost River	1801020404	30723.4	2.0	0.0
Upper South Fork Pit River	1802000202	69890.0	2.3	0.0
Warm Springs Valley	1802000206	7665.1	3.0	0.0
Willow Creek	1802000214	33936.1	0.9	0.0

Channel Morphology and Riparian Condition

In the Forest, there are approximately 46.6 acres of noxious weeds associated with perennial streams and 116.2 acres associated with intermittent streams, in RCAs (Table 4). In CARs there are approximately 24.4 acres found associated with perennial streams in the Goose Lake CAR, while 32 acres are associated with intermittent streams. In the Turner Creek CAR there is only 0.5 acre associated with intermittent streams and there is no perennial stream association (Table 5).

Native riparian vegetation plays a key role in forming aquatic habitat for fish and other aquatic species. Tree roots help stabilize stream banks, preventing accelerated bank erosion and providing for the formation of undercut banks, important cover for juvenile and adult fish. Riparian areas with native vegetation supply downed trees (large wood) to streams. In turn, downed trees in streams influence channel morphology characteristics such as longitudinal profile; pool size, depth, and frequency; channel pattern; and channel geometry. Turbulence created by large wood increases dissolved oxygen in the water needed by fish, invertebrates, and other biota. Invasive plants could slow down or prevent the establishment of native trees, decreasing or delaying the future supply of large wood in stream channels (USDA Forest Service 2005)

While invasive grasses and forbs would not directly replace riparian shrubs, in degraded areas where shrubs are no longer present, invasive plants can occupy sites and out-compete native vegetation, limiting opportunities for native shrubs to reoccupy the site.

Lakes and Wetlands

There are 153,187 acres of RCAs surrounding wet meadows, lakes, and springs. Within these areas, approximately 128 acres of invasive plants have been identified (Table 8). Of these, approximately 66 are near lakes, 11 are near springs, and 40 are in meadows. Many of the lakes and springs are within the larger Dalmatian toadflax treatment area.

Table 8. Invasive plant acres within RCAs of lakes, springs, or wet meadows

Invasive Plant	Acres
Canada Thistle	10.8
Crupina	0.7
Dalmatian Toadflax	98.4
Dyer’s woad	3.0
Klamathweed	0.3
Mediterranean Sage	5.3
Musk Thistle	1.1
Scotch Thistle	8.3
Spotted Knapweed	0.0
Squarrose Knapweed	0.1
Yellow Starthistle	0.1
Total	128.0

General Watershed Function

Water temperature regimes promote recovery or enhancement of riparian vegetation. Management activities provide high levels of protection to streams, stream banks, riparian areas, and wetlands. Riparian areas in less than desirable condition have been improved to provide for riparian-dependent resources. These improvements have resulted from better control and

administration of livestock use in riparian areas, reduced timber harvest in forested riparian areas, and more roads being closed or obliterated.

Watershed and fisheries habitat improvement projects have been completed on priority streams, and riparian hardwood communities have been increased or reestablished. Bank stability, water quality, fish and wildlife habitat, recreation opportunities, and aesthetics have improved. Streamside vegetation is more diverse and abundant with native species. Any significant change in total stream flow or timing of high and low flow has primarily been a result of naturally occurring events and conditions.

Project Design Standards and Monitoring

Project Design Standards

Project design standards were developed for each of the proposed alternatives. Design standards are developed to reduce or eliminate impacts related to analysis issues and affected resources areas, and are incorporated as an integrated part of the proposed action and any action alternatives.

While developing the design standards for the proposed action and the other action alternatives, the following soil and water quality characteristics were considered:

- Soil permeability of moderately rapid to rapid (herbicide)
- Soil drainage of somewhat excessively drained to excessively drained (herbicide).
- Soil depth of less then 20 inches to bedrock when a silica duripan does not underlie the soil (herbicide).
- Unique or specialized land forms such as rubble land, rock outcrop, lava flows and saturated water tables (herbicide).
- Distance to high water mark of streams, lakes, ponds, springs and meadows from the application of herbicides
- Mobility of herbicides and considering the method of application within 100 feet of high water mark of streams, lakes, ponds, springs and meadows (herbicide).
- Maximum soil erosion hazard rating of high or very high and water runoff potential (herbicide and physical).

The design standards are listed in Table 9 through Table 12. Alternatives 2 and 4 share the same design standards, while Alternatives 3 and 5 share similar design standards. The design standards for Alternative 6 apply to that alternative alone, and Alternative 1 is the no action alternative. They are based upon standard practices, such as best management practices (BMPs) that have proven to be effective under similar circumstances and conditions (Bakke 2001, USDA Forest Service 2004).

They also would provide sideboards for early detection/rapid response. Implementation of design standards would be mandatory for the alternative selected. This would ensure that treatments would have effects within the scope of analysis. The analysis assumes buffers approximate horizontal (map) distances.

For a full description of the alternative please refer to the “Environmental Consequences” section below or Chapter Two of the Modoc Invasive Weed EIS.

Table 9. Project design standards pertinent to soil or water resources under Alternatives 2 and 4

Design Standard	Soil and Water Design Standard	Purpose of Design Standard	Source of Design Standard
DS-14	Water: Annually the amount of physical disturbance and/or herbicide application would be limited to no more than 15% of each 6th Field Sub-watersheds.	To reduce the potential for indirect or cumulative effects to 6th field watersheds	Modoc LRMP Pg 4-22, S&G Soils #2
DS-15	The specified distances for perennial streams, lakes and special aquatic features are 300 feet and 150 feet for seasonally flowing streams, both of which are consistent with Riparian Conservation Areas as defined the Sierra Nevada Framework (SNF) ROD, 2001. For the Noxious Weed FEIS, the designated zone for all Streamside Management Zones is the Riparian Conservation Areas (RCAs) on the Modoc National Forest. See the definition for Riparian Conservation Area in the glossary. Therefore, for the Noxious Weeds FEIS, the terms SMZ and RCA are interchangeable. For the purpose of noxious weed treatments, SNF RCA standards will apply Forest wide. Within these prescribed RCAs, limited hand treatments may occur for a distance of 10 feet outward from the edge of the High Water Mark.	To protect water quality and stream health from the potential indirect and cumulative effects of proposed noxious weed treatment	Modoc LRMP as Modified by the 2002 Amendment to the Sierra Nevada Framework
DS-16	The RCAs will be maintained with 50% of the acreage of the RCA as undisturbed; disturbance will be limited to no more than 25% of the acreage of the inner half of the RCA.	To protect water quality, stream health and runoff patterns of the RCAs from potential indirect and cumulative effects related to proposed noxious weed treatments.	BMP 1.8 Designation of Streamside Management Zones BMP Stream Course and Aquatic Protection 1.19 (FSHB 2509.22)
DS-17	Water - RCA Treatments: Herbicide treatment within the Riparian Conservation Areas (RCAs) will be as follows: -From the High Water Mark outward to 10 feet, no herbicide use (only Physical Methods). -From a distance of 10 feet to the outer edge of RCAs for Seasonally Flowing or Perennial Streams, only Aquatic Glyphosate may be applied by wicking it onto the plant. -From the outer edge of RCAs for Seasonally Flowing or Perennial Streams, Glyphosate, Clopyralid, Dicamba, and Triclopyr may be applied. -2, 4-D will not be applied within 1,000 feet of the High Water Mark of Seasonally Flowing or Perennial Streams.	To protect water quality from the potential contamination of the water column from the application of those herbicides with the identified potential to move off site and adversely affect soil or water quality.	Developed via IDT discussion to tier to BMP 5.12: Streamside Wet Area Protection During Pesticide Spraying; 1, 000 ft distance from surface or live water developed in consultation with USFWS and Mary Flores, Project Wildlife Biologist.
DS-20	Soils: Areas with bare soil resulting from noxious weed treatments that are greater than ¼ acre in size will be assessed for need for rehabilitation.	To provide guidance for assessing treated areas for rehabilitation	BMP 5-4: Revegetation of Surface Disturbed Areas Soil S&G E, Chapter 4 Modoc LRMP Regional Soil Quality Standards, FSHB 2509.18
DS-22	Annually the Forest Hydrologist, Watershed Specialist or Soil Scientist determines the location of the noxious weed occurrence to be treated to determine if the site to be treated is located on sensitive or shallow soils. If it is determined that the site to be treated contains sensitive or shallow soils then either DS 23 or 24 would be applied, depending on Alternative selected.	To provide guidance in protecting shallow a sensitive soils and water quality	BMP 5.7: Pesticide Use Planning Process; BMP 5-8: Pesticide Application According to Label Directions and Applicable Lega Requirements (FSHB 2509.22

Design Standard	Soil and Water Design Standard	Purpose of Design Standard	Source of Design Standard
DS-23	Soils: On noxious weed sites identified as having sensitive soils and or shallow soils, do not use herbicides with high leaching potential to treat noxious weeds.	To prevent or mitigate the incorporation of pesticides into groundwater	BMP 5.7: Pesticide Use Planning Process; BMP 5-8: Pesticide Application According to Label Directions and Applicable Legal Requirements (FSHB 2509.22)
DS-25	Soils: On those sites with soils identified as having a high or very high erosion potential or a rapid or very rapid risk to runoff do not use Physical and Physical+ methods to treat noxious weeds when the fire weather forecast for the next 24 hours states there is a likely chance of thunderstorms (generally 60-70% or greater as defined by the National Weather Service).	To protect Soil Quality Standards soil productivity and soil hydrologic function	Region 5 Soil Quality Standards FSHB 2509.18 S&G #1, Modoc LRMP Chapter 4
DS-29	Herbicides: When applying herbicides within RCAs, from the High Water Mark outward to a distance of 25 feet, all directed spray must be done in a downward direction. In addition, when the height of a weed is greater than 36 inches, the weed will be laid on the ground and sprayed in a downward direction. This will minimize herbicide drift and confine the herbicide to the drop zone of the individual weed plant being treated. Beyond 25 feet within RCAs and outside of RCAs, herbicides will be applied by on-the-ground applicators directly spraying or wicking the target noxious weed. Spraying will be done in a downward direction to the extent possible.	To control drift within the inner third of the RCA	BMP 5-12: Streamside Wet area Protection During Pesticide Spraying BMP 5-13: Controlling Pesticide Drift During Spray Application Modoc LRMP Water S&G's 1 and 2
DS-34	Control of Drift or Herbicide Migration: All herbicide application will follow EPA approved label directions in regards to control of drift of herbicides during spraying. These directions have specific wind speeds and air temperatures for application of each herbicide. In addition, applicators will utilize droplet size and spray pressure to insure droplets do not travel outside of the drip line target plant.	To control drift of herbicides	BMP 5-8: Pesticide Application According to Label Directions and Applicable Legal Requirements

Table 10. Design standards pertinent to soil or water resources under Alternatives 3 and 5

Design Standard	Soil and Water Design Standard	Purpose of Design Standard	Source of Design Standard
DS-14	Water: Annually the amount of physical disturbance and/or herbicide application would be limited to no more than 15% of each 6th field sub-watersheds.	To reduce the potential for indirect or cumulative effects to 6th field watersheds	Modoc LRMP Pg 4-22, S&G Soils #2
DS-15	The specified distances for perennial streams, lakes and special aquatic features are 300 feet and 150 feet for seasonally flowing streams, both of which are consistent with Riparian Conservation Areas as defined the Sierra Nevada Framework (SNF) ROD, 2001. For the Noxious Weed FEIS, the designated zone for all Streamside Management Zones is the Riparian Conservation Areas (RCAs) on the Modoc National Forest. See the definition for Riparian Conservation Area in the glossary. Therefore, for the Noxious Weeds FEIS, the terms SMZ and RCA are interchangeable. For the purpose of noxious weed treatments, SNF RCA standards will apply Forest wide. Within these prescribed RCAs, limited hand treatments may occur for a distance of 10 feet outward from the edge of the High Water Mark.	To protect water quality and stream health from the potential indirect and cumulative effects of proposed noxious weed treatment	Modoc LRMP as Modified by the 2002 Amendment to the Sierra Nevada Framework
DS-16	The RCAs will be maintained with 50% of the acreage of the RCA as undisturbed; disturbance will be limited to no more than 25% of the acreage of	To protect water quality, stream health and runoff patterns of the	BMP 1.8 Designation of Streamside Management Zones

Design Standard	Soil and Water Design Standard	Purpose of Design Standard	Source of Design Standard
	the inner half of the RCA.	RCAs from potential indirect and cumulative effects related to proposed noxious weed treatments.	BMP Stream Course and Aquatic Protection 1.19 (FSHB 2509.22)
DS-20	Soils: Areas with bare soil resulting from noxious weed treatments that are greater than ¼ acre in size will be assessed for need for rehabilitation.	To provide guidance for assessing treated areas for rehabilitation	BMP 5-4: Revegetation of Surface Disturbed Areas Soil S&G E, Chapter 4 Modoc LRMP Regional Soil Quality Standards, FSHB 2509.18
DS-21	Soils: Areas with bare soil created by the treatment of noxious weed, the site would be evaluated for rehabilitation (Alternative 5).	To ensure that the treatment of noxious weeds is not creating open areas or bare areas for spread of noxious weeds.	BMP 5-4: Revegetation of Surface Disturbed Areas Soil S&G E, Chapter 4 Modoc LRMP Regional Soil Quality Standards, FSHB 2509.18
DS-25	Soils: On those sites with soils identified as having a high or very high erosion potential or a rapid or very rapid risk to runoff do not use Physical and Physical+ methods to treat noxious weeds when the fire weather forecast for the next 24 hours states there is a likely chance of thunderstorms (generally 60-70% or greater as defined by the National Weather Service).	To protect Soil Quality Standards soil productivity and soil hydrologic function	Region 5 Soil Quality Standards FSHB 2509.18 S&G #1, Modoc LRMP Chapter 4
DS-29	Herbicides: When applying herbicides within RCAs, from the High Water Mark outward to a distance of 25 feet, all directed spray must be done in a downward direction. In addition, when the height of a weed is greater than 36 inches, the weed will be laid on the ground and sprayed in a downward direction. This will minimize herbicide drift and confine the herbicide to the drop zone of the individual weed plant being treated. Beyond 25 feet within RCAs and outside of RCAs, herbicides will be applied by on-the-ground applicators directly spraying or wicking the target noxious weed. Spraying will be done in a downward direction to the extent possible.	To control drift within the inner third of the RCA	BMP 5-12: Streamside Wet area Protection During Pesticide Spraying BMP 5-13: Controlling Pesticide Drift During Spray Application Modoc LRMP Water S&G's 1 and 2

Table 11. Design Standards pertinent to soil or water resources under Alternative 6

Design Standard	Soil and Water Design Standard	Purpose of Design Standard	Source of Design Standard
DS-14	Water: Annually the amount of physical disturbance and/or herbicide application would be limited to no more than 15% of each 6th Field Sub-watersheds.	To reduce the potential for indirect or cumulative effects to 6th field watersheds	Modoc LRMP Pg 4-22, S&G Soils #2
DS-15	The specified distances for perennial streams, lakes and special aquatic features are 300 feet and 150 feet for seasonally flowing streams, both of which are consistent with Riparian Conservation Areas as defined the Sierra Nevada Framework (SNF) ROD, 2001. For the Noxious Weed FEIS, the designated zone for all Streamside Management Zones is the Riparian Conservation Areas (RCAs) on the Modoc National Forest. See the definition for Riparian Conservation Area in the glossary. Therefore, for the Noxious Weeds FEIS, the terms SMZ and RCA are interchangeable. For the purpose of noxious weed treatments, SNF RCA standards will apply Forest wide. Within these prescribed RCAs, limited hand treatments may occur for a distance of 10 feet outward	To protect water quality and stream health from the potential indirect and cumulative effects of proposed noxious weed treatment	Modoc LRMP as Modified by the 2002 Amendment to the Sierra Nevada Framework

Design Standard	Soil and Water Design Standard	Purpose of Design Standard	Source of Design Standard
	from the edge of the High Water Mark.		
DS-16	The RCAs will be maintained with 50% of the acreage of the RCA as undisturbed; disturbance will be limited to no more than 25% of the acreage of the inner half of the RCA.	To protect water quality, stream health and runoff patterns of the RCAs from potential indirect and cumulative effects related to proposed noxious weed treatments.	BMP 1.8 Designation of Streamside Management Zones BMP Stream Course and Aquatic Protection 1.19 (FSHB 2509.22)
DS-18a	Water - RCA Treatments: Within the Riparian Conservation Areas (RCAs) outside of the Lahontan Regional Water Board area of jurisdiction, herbicide treatments will be as follows: -From the High Water Mark outward, aquatic formulations of Glyphosate may be used in RCAs for Seasonally Flowing or Perennial Streams (as well as Physical (+) Methods. -From a distance of 10 feet from the High Water Mark outward to the outer edge of RCAs for Seasonally Flowing or Perennial Streams, Glyphosate and Amine forms of 2, 4-D may be used. -From 25 feet from the High Water Mark outward to the outer edge of RCAs for Seasonally Flowing or Perennial Streams, Chlorsulfuron, Dicamba, Clopyralid, Triclopyr; and Tank Mixes 1 and 2 with only amine forms of 2, 4-D. -From 100 feet from the High Water Mark outward to the outer edge of RCAs for Seasonally Flowing or Perennial Streams, Chlorsulfuron, Dicamba, Clopyralid, Triclopyr; and Tank Mixes 1 and 2 with either ester or amine forms of 2, 4-D.	To protect water quality from the potential contamination of the water column from the application of those herbicides with the identified potential to move off site and adversely affect soil or water quality.	Gill, R., 1993. Letter from California Regional Water Quality Control Board - Lahontan Region to Diane K. Henderson, Forest Supervisor on Noxious Weed Control EIS. Nov. 4, 1993.
DS-18b	No more than 10 percent of the acreage with RCAs for the Frog Waterhole (6th Field HUC 180200021103) and RCAs for lakes found within Clarks Valley (6th Field HUC 18020030106) would be treated with herbicide each year, from the edge of the High Water Mark for a distance of 100 feet. When applied from the High Water Mark to a distance of 25 feet from water, herbicides would be applied by wicking them directly on the plant.	To protect water quality and avoid cumulative effects.	Developed by Peter Adams, Forest Hydrologist.
DS-19a	In the areas under the Lahontan Water Quality Control Board jurisdiction (see Figure 3-2), with Alternative 6 no herbicide treatment will occur from the High Water Mark for a distance of 10 feet. From a distance of 10 to 100 feet from the High Water Mark, only aquatic Glyphosate will be used. At a distance greater than 100 feet from the High Water Mark, the other herbicides shown in the Alternative may be applied.	To meet Lahontan RWB Objective of No detectable Pesticides in the water column.	BMP 1.19 Stream course and Aquatic Protection
DS-19b	Do not use herbicides to treat noxious weeds in the Area of Concern that supplies the Ft. Bidwell Reservation with drinking water (see map in Appendix N). If weeds become established in the future, consult with the Ft. Bidwell Tribe to determine suitable treatment methods under Early Detection – Rapid Response.	To protect water quality from the potential contamination of the water column from the application of those herbicides with the identified potential to move off site and adversely affect soil or water quality.	P. Adams and D. Meza, 2006
DS-20	Soils: Areas with bare soil resulting from noxious weed treatments that are greater than ¼ acre in size will be assessed for need for rehabilitation.	To provide guidance for assessing treated areas for rehabilitation	BMP 5-4: Revegetation of Surface Disturbed Areas Soil S&G E, Chapter 4 Modoc LRMP Regional Soil Quality Standards, FSHB 2509.18

Design Standard	Soil and Water Design Standard	Purpose of Design Standard	Source of Design Standard
DS-21	Soils: Areas with bare soil created by the treatment of noxious weed, the site would be evaluated for rehabilitation (Alternative 5).	To ensure that the treatment of noxious weeds is not creating open areas or bare areas for spread of noxious weeds.	BMP 5-4: Revegetation of Surface Disturbed Areas Soil S&G E, Chapter 4 Modoc LRMP Regional Soil Quality Standards, FSHB 2509.18
DS-22	Annually the Forest Hydrologist, Watershed Specialist or Soil Scientist determines the location of the noxious weed occurrence to be treated to determine if the site to be treated is located on sensitive or shallow soils. If it is determined that the site to be treated contains sensitive or shallow soils then either DS 23 or 24 would be applied, depending on Alternative selected.	To provide guidance in protecting shallow an sensitive soils and wa quality	BMP 5.7: Pesticide Use Planning Process; BMP 5-8: Pesticide Application According to Label Directions and Applicable Lega Requirements (FSHB 2509.22)
DS-24a	Soils: Treatment of noxious weeds on sensitive and/or shallow soils utilizing herbicides other than Glyphosate will not exceed 1 acre per 6th field sub-watershed on an annual basis.	To reduce the potential for an indirect or cumulative affect to soil and watershed resources from the treatment of noxious weeds.	FSH 2509.18 R5 Supplement No. 2509.18.95-1 (R5 Soil Quality Standards)
DS-24b	Soils: Limit annual herbicide treatments in 6th field sub-watersheds to no more than 10% of the acreage of the 6th field sub-watershed.	To reduce the potential for an indirect or cumulative affect to soil and watershed resources from the treatment of noxious weeds.	FSH 2509.18 R5 Supplement No. 2509.18.95-1 (R5 Soil Quality Standards)
DS-25	Soils: On those sites with soils identified as having a high or very high erosion potential or a rapid or very rapid risk to runoff do not use Physical and Physical+ methods to treat noxious weeds when the fire weather forecast for the next 24 hours states there is a likely chance of thunderstorms (generally 60-70% or greater as defined by the National Weather Service).	To protect Soil Quality Standards soil productivity and soil hydrologic function	Region 5 Soil Quality Standards FSHB 2509.18 S&G #1, Modoc LRMP Chapter 4
DS-29	Herbicides: When applying herbicides within RCAs, from the High Water Mark outward to a distance of 25 feet, all directed spray must be done in a downward direction. In addition, when the height of a weed is greater than 36 inches, the weed will be laid on the ground and sprayed in a downward direction. This will minimize herbicide drift and confine the herbicide to the drop zone of the individual weed plant being treated. Beyond 25 feet within RCAs and outside of RCAs, herbicides will be applied by on-the-ground applicators directly spraying or wicking the target noxious weed. Spraying will be done in a downward direction to the extent possible.	To control drift	BMP 5-12: Streamside Wet area Protection During Pesticide Spraying BMP 5-13: Controlling Pesticide Drift During Spray Application Modoc LRMP Water S&G's 1 and 2
DS-34	Control of Drift or Herbicide Migration: All herbicide application will follow EPA approved label directions in regards to control of drift of herbicides during spraying. These directions have specific wind speeds and air temperatures for application of each herbicide. In addition, applicators will utilize droplet size and spray pressure to insure droplets do not travel outside of the drip line target plant.	To control aerial drift of herbicides	BMP 5-8: Pesticide Application According to Label Directions and Applicable Legal Requirements

The stream buffers shown below by alternative are synthesized from the above design standards for all alternatives that allow herbicide use.

Table 12. Summary of distances from High Water Mark for Alternatives that allow herbicide use

Herbicide	Distance from High Water Mark (feet)			
	Alt 2	Alt 4	Alt 6	Alt 6 within CARs
	(ft)	(ft)	(ft)	(ft)
Aquatic Glyphosate	10	10	High water mark	High water mark
2-4-D (amine form)	1000	1000	10	100
2-4-D (ester form)	1000	1000	100	100
Non-aquatic Glyphosate	150/300*	150/300*	10	100
Dicamba	150/300*	150/300*	25	100
Clopyralid	150/300*	150/300*	25	100
Triclopyr	150/300*	150/300*	25	100
Chlorsulfuron	None Allowed	None Allowed	25	100
Mixture 1 (Chlorsulfuron + 2,4-D)	None Allowed	None Allowed	25	100
Mixture 2 (Dicamba + 2,4-D)	None Allowed	None Allowed	25	100

*150 ft. for intermittent streams and 300ft. for perennial streams

These design standards are assumed to protect the treatment areas presently inventoried as well as new or previously undiscovered infestations that would be treated using the range of methods described in detail in the proposed action of the *Modoc National Forest Noxious Weed Treatment Project EIS*. The intent of the Early Detection/Rapid Response approach is to treat new infestations when they are small so that the likelihood of adverse treatment effects is minimized. **The approach is based on the premise that the impacts of similar treatments to similar acreages are predictable, even though the precise location or timing of the treatment may be unpredictable.**

Herbicide use would become more restrictive as treatment occurs closer to water. Design standards and herbicide use buffers within RCAs and CARs were developed based on label advisories, interdisciplinary team discussions ((Table 9, Table 10, Table 11) Bakke 2001) SERA risk assessments, and monitoring results from previous monitoring for Region 5.

Monitoring

The Modoc National Forest Noxious Weed Treatment Project EIS Appendix H documents, in detail, the monitoring approach that will be used for both implementation and effectiveness monitoring (USDA Forest Service 1991, Appendix H-Monitoring). Implementation monitoring would determine whether the selected alternative was implemented as directed, and whether the objectives and priorities were realistic and achievable. Effectiveness monitoring would determine if the treatments were effective in meeting the planned objectives.

It would also determine if the noxious weeds were continuing to spread beyond the control actions and if treatment methods were effective in preventing the spread of noxious weeds into traditional Tribal gathering areas.

Table 13 Summary comparison of alternatives

Alternative Features	Alt 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Number of herbicides used	0	5	0	5	0	6+ 2 mixes
Containment versus eradication at large sites	-	no	no	no	yes	yes
Early Detection/Rapid Response	no	no	no	100acres/year 200 acres total	100acres/year 200 acres total	100acres/year 200 acres total
Treatment Methods	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**
physical	20-30	161/31	494/5993	161/31		
Physical+					527/139	116/19
Physical or chemical		333/5961		333/5961		371/116
chemical		32/907		32/907		46/65
Total pounds of herbicide used	0	3,341-15118 lbs ae		3,341-15118 lbs ae		137-1832 lbs ae
Goats	0	0	0	0	5/41	5/41
Total Acres Treated	**20-30**	**6899**	**5993**	**7099**	**480**	**541**

Environmental Consequences

Explanation of Proposed Action and other Action Alternatives

Six alternatives have been proposed for analysis. The characteristics of each alternative are summarized in below:

Alternative 1: a forest-wide noxious weed program would not be implemented.

Alternative 2: Under this alternative, the Modoc National Forest proposes to treat noxious weeds using herbicides and physical methods over a five-year time frame. The annual combination of methods used would vary depending on noxious weed species, distance from water or other sensitive areas, and the most economical and efficient treatment methods available. There would be no aerial spraying of herbicides and there would be no herbicide use within 10 feet of water. Listed below are features of Alternative 2:

- Between 300 to 1,500 acres would be treated annually for the next five years.
- A total of 536 sites would be treated.
- Physical methods would be used at 161 sites (31 acres) that are less than 10 feet from any water source to include manual hand pulling, digging, grubbing, and hoeing.
- Use of physical and/or herbicide methods on 333 sites (5,961 acres) located greater than 10 feet from any water source targeting nonrhizomatous noxious weed species.

- Treatment using herbicide would occur on 26 sites (2.4 acres) located greater than 10 feet from any water source and comprised of rhizomatous species.
- Partial treatment would occur on 16 sites of rhizomatous species that have some acreage within 10 feet of water. On these 16 sites, the acreage within 10 feet of water would not be treated and the acreage that is further than 10 feet from water would be treated with aquatic glyphosate (904.3 acres).
- No treatment would occur at five sites (0.45 acres). These sites are comprised of rhizomatous species and are within 10 feet of water.
- Herbicides would be applied by directed spray and wicking treatments.
- Herbicides include: Clopyralid, Dicamba, Glyphosate, Triclopyr, and 2,4-D.
- Herbicide treatments would include use of surfactants and dyes. Surfactants increase the absorption of herbicide by the weeds, and dyes assist the applicator in efficiently treating target weeds.

Alternative 3: Alternative 3 does not include the use of herbicides. Listed below are features of Alternative 3:

- Treating between 300 to 1,500 acres annually for the next five years,
- Treatment using physical methods to include manual hand pulling, digging, grubbing, and hoeing would occur on 494 sites (5,993 acres).
- No treatment would occur on 47 sites (916 acres) as these sites are comprised of rhizomatous species and physical methods are ineffective in treating rhizomatous species.

Alternative 4: Alternative 4 focuses on providing flexibility in physical and herbicide treatment methods for current occurrences and expanding or new infestations of noxious weeds. Alternative 4 includes an Early Detection - Rapid Response Strategy not included in Alternatives 2 and 3. Listed below are features of Alternative 4:

- Treating a total of 6,899 acres at 536 sites over the next 10 years (average annual 500-1,500 acres)
- Physical treatment methods would be utilized at 161 sites (31 acres) that are less than 10 feet from any water source.
- Use of physical and/or herbicide methods on 333 sites (5,961 acres) located greater than 10 feet from any water source and with nonrhizomatous noxious weed species.
- Treatment with herbicides would occur on 26 sites (2.4 acres) located greater than 10 feet from any water source and comprised of rhizomatous species.
- Partial treatment would occur on 16 sites of rhizomatous species that have some acreage within 10 feet of water. On these 16 sites, the acreage within 10 feet of water will not be treated and the acreage that is further than 10 feet of water would be treated with aquatic glyphosate (904.3 acres).
- No treatment would occur at five sites (0.45 acres). These sites are comprised of rhizomatous species and are within 10 feet of water.
- Herbicides would be applied by directed spray and wicking treatments.
- Herbicide treatments include: Clopyralid, Dicamba, Glyphosate, Triclopyr, and 2-4-D.
- Herbicide treatments in Alternative 4 would include use of surfactants and dyes. Surfactants increase the absorption of herbicide by the target weeds, and dyes assist the applicator in efficiently treating target weeds.

- An Early Detection - Rapid Response Strategy would be implemented in this alternative. This strategy would provide the opportunity to treat new sites of the identified species that have developed, existing sites that have expanded, and new sites of new noxious weeds using the same treatments as outlined for the noxious weed species identified, provided that environmental effects are within the design standards, and effects analyses are reflected in this EIS. Proposed treatment under Early Detection – Rapid Response would be capped at 200 acres over the life of the alternative with no more than 100 acres being treated in any given year. The rationale for this cap is to provide limited flexibility to treat new and/or expanding weed sites while remaining within the range of effects as displayed in this analysis.

Alternative 5: Alternative 5 provides a non-herbicide alternative with additional non-herbicide treatments, and an Early Detection - Rapid Response Strategy. Alternative 5 includes additional manual treatment methods not included in Alternatives 2 and 3. Alternative 5 includes an Early Detection - Rapid Response Strategy. Under Alternative 5, only the perimeter of a 5,658-acre site (DH013ISTI) of dyer's woad would be treated with either herbicide or physical methods. Listed below are features of Alternative 5:

- Utilize non-herbicide methods to eradicate, control, or contain approximately 280 acres at 541 known sites of noxious weed species.
- There is potential to treat 5 sites (41 acres) using goat grazing. These sites may alternatively be treated using physical methods.
- Treatment using physical methods, including manual hand pulling, grubbing, hoeing, clipping (including use of "weedeaters"), and mulching/tarping would occur on 527 sites (139 acres).
- There would be limited treatment to contain infestations on 9 sites (6,728 acres). These sites include the large dyer's woad site (5,658 acres), one crupina site (159 acres) and seven sites of rhizomatous noxious weeds (913 acres). The common crupina site is part of a larger site on adjacent private lands (an additional 586 acres). Limited treatment of these sites is expected to be 100 acres. Project design standards have been implemented in determining the treatment method that these acres will receive. These sites are comprised of rhizomatous species and are greater than 0.10 acre. Physical methods are not as effective in treating rhizomatous species as herbicides, thus treatment goals would only include containment of the current infestation.
- An Early Detection - Rapid Response Strategy would be implemented in this alternative. This strategy would provide the opportunity to treat new sites of the identified species that have developed, existing sites that have expanded, and new sites of new noxious weeds using the same treatments as outlined for the noxious weed species identified, provided that environmental effects are within the design standards, and effects analyses are reflected in this EIS. Proposed treatment under Early Detection – Rapid Response would be capped at 200 acres over the life of the alternative with no more than 100 acres being treated in any given year. The rationale for this cap is to provide limited flexibility to treat new and/or expanding weed sites while remaining within the range of effects as displayed in this analysis.

Alternative 6: Alternative 6 proposes use of additional herbicide formulations, while treating fewer acres with herbicides, and proposes additional manual treatment methods. Alternative 6 provides the opportunity to use an additional herbicide (chlorsulfuron) and two mixtures of herbicides not included in Alternatives 2 and 4. Alternative 6 also includes the additional manual treatment methods and the Early Detection - Rapid Response Strategy included in Alternative 5.

Under Alternative 6, only the perimeter of a 5,658-acre site (DH013ISTI) of dyer's woad, the 159-acre (BV001CRVU2) Common Crupina and the 851 acre Dalmatian toadflax (WM003LIDA) sites would be treated with either herbicide or physical methods. Physical methods are physical treatments which include manual hand pulling, grubbing, hoeing, clipping (including use of "weedeaters"), and mulching/tarping. Under Alternative 6, the Modoc National Forest proposes to treat noxious weeds over a ten-year time frame. Listed below are features of Alternative 6:

- Treating approximately 341 acres (541 known sites).
- Treatment using physical methods, including manual hand pulling, grubbing, hoeing, clipping (including "weedeaters"), and mulching/tarping would occur on 116 sites (19 acres).
- Treatment using physical methods listed above and/or herbicides would occur on 371 sites (116 acres).
- Treatment using herbicide methods would occur on 46 sites (65 acres).
- There is potential to treat five sites (41 acres) using goat grazing. These sites may alternatively be treated with physical and/or herbicide methods.
- Limited treatment methods along major travel ways to reduce potential for spread would occur on three sites (5,658 acre dyer's woad site, 159 acre common crupina site, and 850 acre Dalmatian toadflax site). These sites would be treated around the borders to contain the infestations. The estimated number of acres treated would be 100 acres along the borders. These treatment acres are estimated proportionally to the size of the current inventoried acres for these three sites.
- Herbicide treatments include: Chlorosulfuron, Clopyralid, Dicamba, Glyphosate, Triclopyr, 2-4-D, and two herbicide mixtures (Mix 1: Chlorosulfuron + 2,4-D, and Mix 2: Dicamba + 2,4-D).
- No 2,4-D treatments would be applied to noxious weed occurrences greater than 2 acres in size.
- Herbicide treatments in this alternative would include use of surfactants and dyes. Surfactants increase the absorption of herbicide by the target weeds, and dyes assist the applicator in efficiently treating target weeds.
- Herbicide treatments would be the primary treatment for rhizomatous species.
- An Early Detection - Rapid Response Strategy would be implemented in this alternative. This strategy would provide the opportunity to treat new sites of the identified species that have developed, existing sites that have expanded, and new sites of new noxious weeds using the same treatments as outlined for the noxious weed species identified, provided that environmental effects are within the design standards, and effects analyses are reflected in this EIS. Proposed treatment under Early Detection – Rapid Response would be capped at 200 acres over the life of the alternative with no more than 100 acres being treated in any given year. The rationale for this cap is to provide limited flexibility to treat new and/or expanding weed sites while remaining within the range of effects as displayed in this analysis.

Effects on Soil and Water Resources

The following sections discuss the general effects of manual, mechanical and herbicide treatments on soil and water resources. Specific differences in alternatives are detailed after the general discussion.

Effects to Soils

General Effects of Physical Treatment

Physical treatments are proposed under all alternatives. Proposed physical treatments are hand pulling, grubbing, digging and hoeing. Physical methods are proposed under Alternatives 5 and 6, and include the clipping of the seed head or plant including using a “weedeater” as well as mulching and tarping.

The overall impacts of these activities are low. These methods would temporarily decrease ground cover, leading to incremental effects from erosion or slight decreases in soil moisture from ground cover reductions. These methods would not lead to adverse effects on soils since soil organic matter would be supplemented from cut vegetative material. These methods would also loosen small amounts of soil at the surface, potentially increasing the chance of localized erosion. This is a very minor and temporary effect and changes would be within the natural range of variability. The use of weedeaters would not contribute to soil disturbance.

The proposed manual treatments result in an input of dead root material, in the form of dead roots into the soil. As the roots are broken down in the soil food web, nutrients are released. The use of hand clipping would also provide organic material, in those cases where the whole plant is cut and dropped to the ground. Rainfall may cause these nutrients to be lost to surface runoff or to groundwater. Where bare soils occur, if they are combined with high nutrient levels, these areas may provide ideal conditions for the establishment of many invasive species. However, in lower intensity infestations, non-target vegetation could provide erosion control as well as a seed source for establishing native vegetation. In areas with larger amounts of bare soil (0.25 acre), Alternatives 2 and 4 design standards would require restoration activities to be considered in order to reestablish native vegetation. The intent is to reestablish competitive local, native vegetation post-treatment in areas of bare ground, to control soil erosion and provide native competition to invasive plant seeds.

Removal of plant roots would break mycorrhizal hyphae in the soil and probably cause a transient reduction of mycorrhizal function. Studies on crop plants have shown that leaving an undisturbed mycorrhizal network in the soil after harvest (e.g. zero-till agriculture) increases the nutrient uptake of the subsequent crop (Evans and Miller 1990). Establishment of native plants may be more successful on undisturbed soil. Indirect negative impacts from manual control could be attributed to soil disturbance and opening of the canopy (understory or depending on the species). This could cause minor and transient shifts in microsite conditions such as reduction in soil moisture, disruption of mychorrhizal associations, and cause an increase in surface temperatures. As the treatment areas associated with this project are generally in previously disturbed sites, treatment would improve the condition of the site by allowing reestablishment of native vegetation.

Physical treatments may slightly increase the potential for delivery of fine sediment to streams the year after treatment. Removal of surface cover could cause minor localized erosion trapped by surrounding vegetation for approximately one season until vegetation becomes reestablished.

Using weedeaters would not create any additional soil impacts. The use of truck-mounted pressurized sprayers (See Figure 2-2, Chap. 2, pg 48, Modoc Noxious Weed FEIS) off-road has the potential to compact soil. Soil compaction eliminates soil pores and so reduces water infiltration, aeration, and the ability of plants to root effectively. While the relative amounts of physical treatments vary between the alternatives, the treatments are similar; therefore differences in terms of intensity or duration of effects from such treatments have no substantive differences.

General Effects of Cultural Treatments

Cultural treatments can include grazing, mulching, tarping, fertilizing and reseeding. Grazing can be effective in reducing a large infestation or eliminating a smaller infestation (Tu et al. 2003). By treating the invasives with grazing first, the intent is to lower impacts on the site from subsequent treatments.

Tarping would shade or heat the soil to kill undesirable plants. This would only be used in small treatment areas as this method is most effective in damp soils (Tu et al. 2003). The dry conditions found on the Modoc are not conducive to widespread use of this method (Table 2-1 Modoc Invasive Weed EIS). Mulching would also be used only on small areas. It is not used on larger areas to avoid impacts to desirable vegetation. Fertilizing and reseeding would help encourage the growth of desirable vegetation.

General Effects of Herbicides on Soils

The effect of chemical treatments may affect soils directly by having short-term adverse impacts on certain soil microbes and indirect impacts from losses in vegetative cover. Most of the proposed chemicals are decayed primarily by soil microbes. Only Chlorsulfuron is mainly degraded through hydrolysis (Table 14). Results from field and laboratory testing are mixed since soil conditions are highly variable. In general, herbicides decay over time; therefore, effects are reduced when microbial metabolic rates are highest (such as during spring when adequate warmth, moisture, and microbial substrate are abundant).

The effect of a chemical treatment on the soil depends on the particular characteristics of the chemical used, how it is applied, and the physical, chemical, and biological condition of the soil medium. In general, primary herbicide routes in soil are leaching, hydrolysis, and adsorption/desorption onto soil particles, and biological degradation. Appendix E of the Modoc Noxious Weed EIS, contains a summary of the factors limiting herbicide treatments, including soil-related factors, such as drainage and permeability. Soil characteristics affect the herbicide residency time through drainage and adsorptive capacities. Highly drained soils have greater propensity to transfer herbicides to groundwater stores. Organic rich soils and finer texture soils have higher adsorption potential for holding herbicides. Herbicides will vary in the degradation potential based on their chemical structure and the biologic potential of the soil.

Overall, the proposed herbicide types and application rates are low enough to facilitate decay by soil microbes. The proposed herbicide usage would have a low risk for soils since the bulk of treatments focus along roads where soils are unproductive and soil communities are uniform. Adverse effects may occur where diverse native grasslands are treated with unselective herbicides and broadcast methods. These impacts are related to the short-term loss of non-target broadleaf forbs that support diverse soil communities. Soil attributes at greatest risk from chemicals include damage to soil organisms and erosion from removal of ground cover. A more extensive discussion of the individual herbicide properties can be found in Appendix E of the Noxious Weed EIS.

Below is a brief summary, for each chemical proposed for use detailing each chemical's behavior in soils, including permeability and drainage:

2,4-D: 2,4-D is degraded in soils primarily by microbes. Studies indicate that the size of the microbial population, the concentration of 2,4-D and the ratio of the two factors determine the 2,4-D degradation rates (Hemmett and Faust 1969). Soil conditions that enhance microbial populations (i.e. warm and moist) facilitate 2,4-D degradation rates (Foster & McKercher 1973).

Wilson et al. (1997) found that adequate soil moisture was the most influential parameter affecting the degradation rates.

Lag times of up to eight weeks during which 2,4-D degradation is slow, have been reported following the first application of 2,4-D to soil (Audus 1960). Most formulations of 2,4-D do not bind tightly with soils and have the potential to move down into the soil column. 2,4-D is considered to be highly mobile and is prone to move off site in surface runoff and subsurface flow (Tu et al. 2003). The EPA reports that 2,4-D is broken down into inert particles by soil microbial activity and that within 7 days following application, 2,4-D has low soil persistence (Tu,M, Hurd, C & J.M. Randall 2001). The half-life in soil is less than 7 days. Soil microbes are primarily responsible for its disappearance. Despite its short half-life in soil and in aquatic environments, the compound has been detected in groundwater supplies in at least five states and in Canada. Very low concentrations have also been detected in surface waters throughout the U.S (Weed Control Methods, The Nature Conservancy, April 2001).

Chlorsulfron: Chlorsulfron should not be applied to soils when they are saturated or when they are subject to periods of intense rainfall, as this chemical is degraded mainly through hydrolysis Drift potential is high during a surface inversion (Source- Specimen Label Telar DF (EPA Reg. No. 352-522).

Tank mix of 2,4-D and chlorsulfron should not be applied to saturated or coarse textured soils or when intense rainfall (summer thunderstorm) is likely to occur within 7 days of application. Both of these chemicals are highly mobile and can be transported by surface runoff into the streams and lakes.

Clopyralid: Clopyralid is relatively persistent in soil and is degraded by soil microbes. It is not susceptible to photo or chemical degradation. Clopyralid does not bind strongly with soil particles. Once it has been applied, it rapidly disassociates, becoming extremely soluble in water and does not bind strongly with soil particles (Shang and Arshad 1998). This means that Clopyralid has the potential to be mobile, and could contaminate ground and surface waters via leaching. The average half-life of Clopyralid is one to two months but can range from one week to one year depending on the soil type, temperature, and rates of application. Clopyralid should not be applied to areas where soils are very permeable and the water table is shallow. Because Clopyralid is highly soluble in water, there is a potential for it to move off site during summer thunderstorm activity where there are high-intensity and short-duration precipitation events (Tu et al. 2003). From the specimen label for Transline, Clopyralid should not be applied where soils have a rapid to very rapid permeability or the depth to ground water is shallow (EPA Reg. No. 62719-259 revised 07-26-99).

Dicamba: Dicamba is not adsorbed by most soils. It is highly mobile and is moderately persistent in most soils. Dicamba has a half-life of 1 to 6 weeks in soil with degradation due to soil microbial activity. The rate of degradation of Dicamba is slower at low temperature and low soil moisture (Pesticide Fact Sheet prepared by Information Ventures, Inc.). Dicamba can be introduced to groundwater and surface water during application or in combination with 2,4-D on sensitive or shallows soils, which can introduce the active ingredient into the ground water table.

Glyphosate: Glyphosate is highly water-soluble but unlike most water-soluble herbicides has a very high adsorption capacity. Once Glyphosate contacts soil it is rapidly bound to soil particles rendering it essentially immobile (Roy et al. 1989*a*, Feng 1990).

Unbound or free Glyphosate molecules are degraded at a steady and relatively rapid rate by soil microbes. Because glyphosate binds strongly to soils, it is unlikely to enter waters through surface or subsurface runoff except when the soil itself is washed away by runoff, and even then, it remains bound to soil particles and unavailable to plants (Rueppel et al. 1977, Malik et al. 1989).

Most glyphosate found in waters likely results from runoff from vegetation surfaces, spray drift and direct overspray. Feng et al (1990) found that 10-meter (32.8-foot) buffer zones limited unintentional effects (Tu et al. 2003).

Triclopyr: Microbial metabolism accounts for a significant percentage of Triclopyr degradation in soils. In general, warm moist soils with a high percentage of soil organic matter will support the largest microbial populations and the highest rate of metabolism. The reported half-life of Triclopyr in soil varies from 3.7 to 314 days depending on specific soil and environmental conditions (Newton et al. 1990). Coarse textured soils that are highly permeable may therefore retain Triclopyr but most studies have found that Triclopyr does not tend to move in significant quantities below the top 15 cm (0.5 inches) of soil (Norris et al. 1987, Newton et al. 1990, Stephenson 1990, and Johnson et al. 1995a).

From the specimen label for Garlon 3A (EPA Reg. No. 6271937) treatment of aquatic weeds can result in oxygen depletion or loss due to the decomposition of dead plants. To minimize this hazard, do not treat more then one-third to one-half of the water area in a single operation.

Garlon 4 includes kerosene as an inert ingredient. Triclopyr is active in the soil and adsorbed by clay particles and organic matter in the soil. Microorganisms degrade Triclopyr and it has a relatively short half-life of 46 days under ideal conditions (warm moist soil conditions). It is highly mobile and is moderately persistent in most soils. The rate of degradation of Dicamba is slower at low temperature and low soil moisture (Pesticide Fact Sheet prepared by Information Ventures, Inc.).

Tank Mixes: 2,4-D is proposed to be applied in combination with Chlorsulfron as **Tank Mix #1** or in combination with Dicamba as **Tank Mix #2**. 2,4-D is identified by the EPA as having characteristics that make it an herbicide with a high leaching potential and very water-soluble thereby making it subject to movement by runoff when applied adjacent to or near water.

Chlorsulfron should not be applied to soils when they are saturated or when they are subject to periods of intense rainfall. Tank Mix #1 is highly mobile and is moderately persistent in most soils.

Application of Banvel (dicamba) or in combination with 2,4-D on sensitive or shallows soils can introduce the active ingredient into the ground water table. Tank Mix #2 should not be applied to saturated or coarse textured soils or when intense rainfall (summer thunderstorm) is likely to occur within 7 days of application. Both of these chemicals are highly mobile and can be transported by surface runoff into the streams and lakes. 2,4-D is proposed to be applied within the RCAs either alone or in combination with Dicamba as a Tank Mix#1 or in combination with chlorsulfuron as Tank Mix #2.

Chlorsulfuron should not be applied to soils when they are saturated or when they are subject to periods of intense rainfall. Tank mix of 2,4-D and chlorsulfuron should not be applied to saturated or coarse textured soils or when intense rainfall (summer thunderstorm) is likely to occur within 7 days of application. Both of these chemicals are highly mobile and can be transported by surface runoff into the streams and lakes (SERA. 2004 and 1999).

Dicamba is not adsorbed by most soils. It is highly mobile and is moderately persistent in most soils. Application of Dicamba or in combination with 2,4-D on sensitive or shallows soils can introduce the active ingredient into the ground water table. Clopyralid has been identified as extremely water-soluble and has a high potential for mobility and leaching into the soil profile. It is not approved for application on or near water.

Clopyralid should not be applied to areas where soils are very permeable and the water table is shallow. The usage of this herbicide in areas where soils are considered to be sensitive, shallow depth or where the water table is shallow may result in groundwater contamination. Because Clopyralid is highly soluble in water, there is a potential for surface waters to be contaminated if Clopyralid is applied directly to bodies of water or wetlands (Tu et al. 2003).

Triclopyr (Garlon 3A) has been identified for treatment of aquatic weeds associated with impounded waters (i.e. lakes, ponds and reservoirs) but not free flowing streams. This herbicide has properties and characteristics associated with chemicals detected in groundwater. The usage of this herbicide in areas where soils are considered to be sensitive, shallow depth or where the water table is shallow may result in groundwater contamination. Triclopyr binds to clay (fine textured soils) and organic matter and is highly mobile (SERA 2003f).

Herbicide Effects to Soil Organisms

The low application rates and type of herbicides proposed in general have a low impact on soil organisms. At high rates, Triclopyr (Garlon, Access) can affect soil microbes and may adversely affect some fungi and algae. Effects are short term and transitory since effects decrease with time as the herbicides degrade. Dicamba and 2,4-D may also affect mycorrhizal fungi at high rates. Functional groups of microbes that have similar metabolic pathways as the target weeds would be most sensitive to the herbicides. However, collective adverse effects of the proposed herbicides on soil microbes are hard to predict, given the diversity of the soil community and varying resistance to the particular herbicides. For example, some laboratory studies found glyphosate adversely impacted several types of microbes, although populations rebounded quickly (Tu et al. 2003). Similarly, Busse et al. (2001) found no long-term impact on microbial communities when using glyphosate on ponderosa pine plantations.

Ultimately, soil microbes facilitate the degradation of the herbicides by using the herbicides as growth substrate, co-metabolizing, polymerizating, accumulating, or altering the chemical structure by influencing the pH of the soil environment (Bollag and Liu 1998). The residency times shown in Table 14 are a gross collective function of average soil types, application timing and frequency, and finally the unique chemical structure.

Soil Cover

The treatment of sites with herbicides could also indirectly affect site productivity in the short term through changes in total organic production on site and annual input into the soil. Chemically treated plants would die and become incorporated into the soil as organic matter during the first years following treatment. Annual input in subsequent years would be limited by the number of non-target species interspersed between invasive plants or the rate at which vegetation returned to the site.

Physical Properties of Herbicides

Factors that determine the fate of herbicides in soil include mobility and degradation. Herbicide degradation over time is a result of physical and chemical processes in soil and water. Herbicide fate in soil is determined by herbicide characteristics such as adsorption, solubility, degradation,

and volatility. Soil characteristics such as organic matter, pH, temperature, moisture content, clay content, and microbial degradation can modify certain properties of herbicides such as mobility in soils and half-life (time it takes for half the amount of chemical present to breakdown). General characteristics for the proposed herbicides are displayed in Table 14. Many of the proposed herbicides are highly soluble in water (Table 14). In general, this is often taken as an indicator of the mobility of the chemical in soils. There are exceptions, however. Glyphosate, while having a high solubility, also binds tightly with soil particles, and because of this it has low mobility. Herbicides with high mobility potential and long half-lives have a greater potential for leaching into near-surface ground water.

Water

Streams are complex and dynamic systems that reflect the balance between stream flow, sediment input and substrate/bank composition. As stated on page 12, riparian condition and water quality are the two elements potentially affected by invasive plant treatments.

General Effects of Non-herbicide Treatment

Physical treatments generally consist of grubbing, digging or pulling weeds. If weed seeds are present, the weeds would be bagged and taken off site. Removal of soil cover would be very small under these circumstances. However, there could be small localized areas of erosion and subsequent sediment input to the stream. Such effects would be transitory and too small to measure.

Pulling weeds along stream banks could also destabilize the banks in highly localized areas. In general, weeds provide very little stabilization for stream channels. Any localized effects would be expected to last only a season until vegetation becomes reestablished at these sites. Other physical treatments within riparian areas could accelerate sediment delivery to streams through ground disturbance. Most of the treatment areas are previously disturbed roadways and trails so additional ground disturbance would not be a significant change from the existing condition. Modification of surface ground cover can change the timing of runoff, but given the small areas of treatment, any changes would be transitory and too small to measure.

General Effects of Herbicide Treatments

None of the alternatives have the potential to influence stream flow and channel morphology due to the small portion of any watershed that would be treated. Treating invasive plants would improve riparian stability where invasive plants have colonized along stream channels and out-competed native species. All invasive plant treatments carry some risk that removing invasive plants could exacerbate stream instability; however, the restoration plan accounts for these areas and prescribes mulching, seeding and planting as needed to revegetated riparian and other treated areas.

Table 14. Herbicide properties compiled from the Region 6 Invasive Plant FEIS (USDA Forest Service 2005b), SERA risk assessments and The Nature Conservancy Weed Manual (Tu et al. 2003)

Herbicide	Toxicity to Soil Microbes	Potential Mobility[1]	Water Solubility[1]	Degradation path and half life[2]	Activation Mechanism[2]
2,4-D	Effect to 3 species of ectomychorrhizal fungi in laboratory experiments (Estok et al., 1989) Inhibits growth of some soil algae at 1 mg/L. Mycorrhizal fungi less sensitive; little effect at 10 ppm, substantial inhibition at 1000 ppm. (SERA, 1998, 2,4-D)	Highly mobile	High to low depending on form	Soil microbes 7 days reported by EPA 1-30 days in SERA risk assessments	Plant growth regulator
Chlorsulfuron	Low	High Very high in clay soils	Very High	Hydrolysis 37-168 days	Acetolactate synthesis inhibitor (Selective: controls broadleaves and some grasses)
Clopyralid	Low	Very high especially in sandy soils	High	Soil microbes 14 to 29 days	Plant growth regulator (Very selective to broadleaves; post emergent)
Dicamba	Transitory effects at high concentrations	High	High	Soil microbes 1-30 days	Plant growth regulator
Glyphosate	Low	Low	Very High	Soil microbes 30 to 60 days	Inhibits 3 amino acids and protein synthesis (Non-selective; quickly absorbed by leaves with rapid movement through plant; no root absorption)
Triclopyr	Inhibits algae at low rates Toxic to fungi at high rates.	Very High	Medium	Soil microbes 46 days	Plant growth regulator (Absorbed thru roots, foliage and green bark)

1 Mobility and water solubility categories from Shauwna Bautista R6 invasive plant specialist and are general breakdowns not a definitive classification.
2 Deschutes Ochoco Invasive Plant EIS Soils Report, 2006.

A primary issue for this analysis is the potential for herbicides to enter streams and impact aquatic organisms. This section describes how project design standards minimize the possibility that herbicides would enter water and impact water quality.

Drift, Runoff and Leaching

The routes for herbicide to contaminate water are direct application, drift into streams from spraying, runoff from a large rain storm soon after application, and leaching through soil into shallow ground water or into a stream. This section addresses each of these delivery routes.

No direct application of herbicide to water is intended in any alternative. No emergent plants would be treated under any alternative.

Effects from drift, runoff, and leaching were considered in the herbicide risk assessments, assuming broadcast treatments occurring directly adjacent to streams. The Groundwater Loading Effects of Agricultural Management Systems (GLEAMS) model was used to estimate the amount of herbicide that may potentially reach a reference stream via runoff, drift and leaching in a 96-hour period, assuming broadcast treatments on a 50-foot strip along about 1.6 miles of perennial stream. SERA risk assessments evaluated the hazards associated with each herbicide based on the concentrations of herbicide predicted by the GLEAMS model using these parameters. The risk assessment worksheets used in this project (SERA worksheets) overestimate the herbicide concentrations that would plausibly enter most streams from this project for three reasons: 1) The worksheets don't take into account a "no herbicide use" area within a Riparian Conservation Area; 2) The estimate for the rainfall is generic and is not adjusted to the dry conditions found on most of the Forest; 3) The model assumes broadcast treatments along the stream versus the wicking and targeted spray treatments proposed under this project. The results from the SERA worksheet are found below in Table 15.

Wicking and targeted spray treatments allowed with this project are inherently far less likely to deliver herbicide to water than broadcast treatments because the herbicide is applied to individual plants, so drift, runoff, and leaching are greatly minimized. Small amounts of some herbicides can trans-locate from the plant to the soil or an adjacent plant, but the concentrations of herbicide that may be delivered to streams from this mechanism is much less than GLEAMS predictions (P. Adams 2007), which models broadcast spraying of herbicide next to the stream with no buffer between the spraying and the stream.

Monitoring Studies

Berg's (2004) compilation of monitoring studies on herbicide treatments with various buffer widths showed that any buffer helps lower the concentration of herbicide in streams adjacent to treatment areas. In California, buffers between 25 and 200 feet generally had no detectable concentrations of herbicide in monitored streams with detection limits of 1-3 mg/m^3 (ibid).

The USGS, in partnership with the Oregon Department of Transportation, studied runoff of herbicides along roads (Wood 2001). The study was conducted on runoff associated with several herbicides (including glyphosate) along a road in western Oregon simulating rainfall at 1/3 inch an hour at 1, 7 and 14 days after treatment. Samples were collected at the shoulder of the road and found concentrations of nearly 1,000 parts per billion (ppb) of glyphosate on the road shoulder that could potentially leave the road shoulder. In the fall, the road was again sprayed and the ditch line of the road was checked during natural rainstorms for three months. Glyphosate was not found at the shoulder, ditch line, or stream. This study indicates that the greatest risk of herbicides moving off site is from large storms soon after herbicide application.

Table 15. Herbicide and application rates with peak water concentrations generated in SERA worksheets (worksheets can be found in the project record)

Herbicide	Range of Application Rates (per acre)	Range of water concentration rates (per pound per acre)	Range of Water concentrations (mg/l)	Average water concentration (mg/l)
Chlorsulfuron	0.56-1 ounce	0.01-0.2	0.007-0.0125	0.0047
Clopyralid	0.13-.25 pound	0.005-0.07	0.00065-0.0175	0.005
2,4-D	0.5 to 2 pounds	0.13-0.42	0.065-0.84	0.22
Dicamba	0.25 to 2 pounds	0.00006-0.01	0.000015-0.02	0.003
Glyphosate	0.75 to 3.75 pounds	0.001-0.4	0.001-1.5	0.05
Triclopyr	0.5 to 1.5 pounds	0.001-0.4	0.0005-0.6	0.09

Berg (2004) reported that herbicide applied in or along dry ephemeral or intermittent stream channels may enter streams through runoff if a large rainstorm occurred soon after treatment. This risk is minimized if intermittent and ephemeral channels are buffered as would occur under the action alternatives (ibid.). If a large rainstorm occurs after herbicide application, sediment contaminated by herbicide could be carried into streams. As most herbicide application occurs in the late spring through the early fall, which is the driest time of the year, the probability of a large rainstorm soon after application of herbicides is low at any particular site.

Region 5 Monitoring

Water quality monitoring in R5 from 1991 to 1999 occurred on multiple projects in the Regional Forests. Most projects were for control of non-conifers in conifer plantations. The Angeles monitoring included an invasive weed project within riparian areas (USDA Forest Service 2001).

Glyphosate was used in four Forests on eight projects. With buffers as small as 10 feet, Glyphosate was found to be non-detectable in collected samples with levels of detection between 9 and 24 parts per billion (ppb; some samples gave no level of detection). On the Angeles National Forest, Aquatic Glyphosate was used within the channel for control of aquatic plants. In this instance, one out of 12 samples had a concentration above the level of detection of 9 ppb. This sample had 15 ppb a quarter of a mile downstream of the treatment site (USDA Forest Service 2001).

Triclopyr was used on five projects on three Forests. Where Triclopyr was used with buffers of 10-15 feet, there were 3 projects where detections occurred. The levels of detection ranged between 0.1 to 1 ppb where specified. One detection of 82 ppb was determined to be from not establishing a buffer on an ephemeral channel. The other detection was on a project with buffers of 10 feet; it had detection during winter storms of 0.63 ppm (parts per million) and 0.6-0.7 ppm. Another project with buffers of 15 feet had a single detection of 1 ppb (USDA Forest Service 2001).

Accidental Spill

Concentrations of herbicides in the water as a result of an accidental spill depend on the rate of application and the stream ratio of surface area to volume. The persistence of the herbicide in water depends on the length of stream where the accidental spill took place, velocity of stream flow, and hydrologic characteristics of the stream channel. The concentration of herbicides would decrease rapidly downstream because of dilution and interactions with physical and biological properties of the stream system (Norris et al.1991).

Accidental spills are not considered within the scope of the project. Project design standards would reduce the potential for spills to occur, and if an accident were to occur, minimizes the magnitude and intensity of impacts. An herbicide transportation and handling plan is a project requirement. This plan would address spill prevention and containment.

Lakes, Wetlands and Floodplains

Herbicides affect lakes and wetlands differently than streams. Dilution by flow or tributary inflow is generally less effective in lakes. Dilution is partially a function of lake size, but dilution could be rapid in small lakes with large water contributing areas. Decreases in herbicide concentration in lakes, ponds, and other lentic water bodies are a function of chemical and biological degradation processes or preferential adsorption of the herbicide into the lake sediments rather than from dilution. As no emergent treatments are proposed, the primary pathways for herbicide to enter lakes would be from drift or runoff.

Some invasive plants may grow in wetlands or near lakes and reservoirs. A large rain event after treatment could carry herbicide into water resulting in minor amounts of herbicide contacting surface water.

Emergent Vegetation

There is no treatment of emergent vegetation proposed under any alternative.

Municipal Watersheds

There are no municipal watersheds within 13 miles downstream of the project area. However, the Fort Bidwell Indian Community water source would be protected under an agreement between the Forest and the Tribe. Design standard 19b requires that no herbicide be used for noxious weed treatments in the area above the water source. A map of this area of concern is found in Appendix N of the Modoc Noxious Weed EIS.

Comparison of Alternatives

Alternative 1 – No Action

Direct and Indirect Effects to Soils

There could be a short-term (1 to 2 years) reduction in soil cover for the areas treated. This localized reduction in cover would increase treated areas vulnerability to soil erosion. The effects would be minimal given the poor quality of groundcover provided by the invasive species proposed for treatment, the scattered nature of the treatments and the small amount of land treated.

Adverse impacts to soils may occur where some noxious weeds are left to populate. Alternative 1 would only treat 20 to 30 acres per year. Specific changes to soil nutrient regimes are associated with large spotted knapweed infestations (Lejeune and Seastedt 2001), allelopathic influences

(Bais et al. 2003), in addition to changes in surface hydrology where the plant communities are moved from bunchgrass-dominated to taproot-forb-dominated (Lacey 1989). Similarly, the influx of cheatgrass (*Bromus tectorum*) can alter soil dynamics with changes in structure, nutrient pulses and soil moisture status (Norton et al. 2003). These changes may be coincident with the long-term shifts from perennial grasslands to annual grasslands as documented in California (D'Antonio and Vitousek 1992). Other noxious weed species may have similar impacts as demonstrated by Vinton and Burke (1994) where fertilization caused long time shifts to favor weedy forb species.

Adverse tradeoffs with Alternative 1, in this case the risk of no treatment, would be highest for *Centaurea spp.* and others that can spread into relatively undisturbed grasslands (see Tyser and Key 1988). These tradeoffs are weighed by addressing spread rate versus the impact from treatment (D'Antonio et al. 2004), especially in regards to affecting non-target plant species (see Ortega 2005b).

Cumulative Effects

This alternative is covered under other NEPA projects. Treatments would occur on an extremely small percentage of any watersheds in the Project Area. Direct and indirect effects are so insignificant and temporary that treatment under No Action could not plausibly contribute to significant cumulative effects.

Alternative 2

Direct and Indirect Effects to Soils

Thirty-one acres are proposed for physical treatment only. Effects of physical treatments on small scattered treatment sites would be similar to those discussed under general effects and are expected to be minor and transitory as the treatment sites are small and dispersed across the Forest.

Herbicide treatments only are proposed for 907 of the total 6,908 acres inhabited by invasive plants (Table 13). Up to 5,961 acres would be treated with either physical or herbicide methods. Approximately 300 to1,500 acres of treatment are expected to occur in any one year do to budget constraints.

One risk from herbicide use is from herbicide contact with soil affecting soil productivity by inhibiting the growth of soil organisms. Dicamba, Triclopyr and 2,4-D all have potential to inhibit soil organisms at high rates, with less inhibition at normal application rates. These changes are temporary as the organisms rebound and the herbicides degrade.

This risk would be minimized by design standard 29, which requires direct spray to the plant or patch of plants or to wick the herbicide directly onto the plant. This would minimize drift off site as well as minimize the amount of herbicide in contact with soil. This target spray technique also avoids spraying desirable vegetation, leaving it as a seed source to reseed treated areas.

Approximately 90 percent of the sites are within a quarter mile of roads. Soil communities along roads are largely uniform and disturbance oriented; therefore, impacts to soil organisms are not anticipated.

DS-01 and DS-22 requires that the annual treatment plan be provided to the Forest soil scientist to review and field verify sites to protect soils. The design standards use properties of the soils to control movement of herbicides off-site. Design standard 23 requires that herbicides with a high

leaching potential not be used on sensitive or shallow soils (see Appendix A). (Appendix A is part of the Watershed and Soils specialist report, found in Appendix T, Watershed and Soils, of this final EIS.) This would also protect groundwater from herbicide contamination. If possible, treatments would occur during times of the year when soils are driest.

Cumulative Effects

Most of the five herbicides used under this alternative do not negatively affect soil organisms at typical application rates and would not affect soil productivity. Cumulative soil productivity is protected due to the fact that the application methods proposed under design standard 29 requires a targeted spray or wicking directly onto the plant to minimize herbicide contact with soil protecting soil organisms and therefore soil productivity. Soil cover is protected by design standard 20 rehabilitation activities. Design standard 14 requires that physical disturbance or herbicide treatments are limited to no more than 15 percent of any 6th-field watershed to minimize cumulative effects from treatments.

Alternative 2 is unlikely to have significant effects to soil and therefore is unlikely to approach a threshold of concern, so would not contribute to significant cumulative effects. No adverse cumulative effects are expected from implementation of this alternative.

Alternative 3

Direct and Indirect Effects to Soils

This alternative includes only the physical methods of controlling invasive plants discussed above under general effects of physical treatment. As rhizomatous species are not effectively treated without herbicides, 47 sites occupying 916 acres would be dropped and not treated allowing for the further spread of these invasive plants.

Up to 494 sites (5,993 acres) would be treated with physical methods over a 5-year time period. There would be more soil disturbance under this alternative than under Alternative 2 as the primary methods are pulling, digging, grubbing and hoeing to remove invasive species. This is still a small amount of disturbance in any one area as 94 percent of the sites are less than 1 acre in size (Table 2). The sites are generally not a solid infestation of invasive plants but are often a mixture of invasives and more desirable plants. Only the invasive weeds would be removed, leaving the desirable vegetation for soil cover to protect the site from erosion, as well as for a seed source. The effects of treatment at any site are expected to be short-term, lasting only a year or so until the site is revegetated.

Cumulative Effects

Treatments are primarily pulling noxious weeds, which is a fairly low impact activity. Treatments would take place on between 300 and 1,500 acres a year. Given the cost of treating by pulling weeds, probably the number treated would be closer to 300 acres a year. These acres would be scattered across the Forest. Design standard 14 requires that physical disturbance or herbicide treatments are limited to no more than 15 percent of any 6th-field watershed to minimize cumulative effects from treatments.

Alternative 4

Direct and Indirect Effects to Soils

The effect of this alternative would be the same as for Alternative 2 except this alternative would be implemented over a 10-year timeframe and would include Early Detection –Rapid Response.

This would allow for a longer time period to control the weed infestations and would give the Forest the flexibility to treat 100 acres of new infestations a year with a cap of 200 acres of new infestations treated for the life of the project.

Cumulative Effects

Cumulative effects would be the same as discussed under Alternative 2.

Alternative 5

Direct and Indirect Effects to Soils

Overall, there would be fewer disturbances with Alternative 5 than for Alternative 3 because fewer acres would be treated. A total of 480 acres would be treated out of the 6,908 acres of inventoried weeds. All the sites would receive some treatment. Nine sites would receive only limited treatment. These sites are the dyer's woad site (5,658 acres) of the larger common crupina site (159 acres), the Dalmatian toadflax site (850 acres) and seven smaller sites of rhizomatous noxious weeds (913 acres).

Most of the treatment effects are the same as discussed under general effects of physical treatments and those discussed under Alternative 3. However, this alternative has more physical treatments available than Alternative 3. These treatments are generally not soil-disturbing activities and they include mulching/tarping and cutting the plant, including using a weedeater.

This alternative includes potentially using goat grazing for five sites totaling 41 acres. The sites range in size from 4 to 25 acres and are occupied by musk thistle or scotch thistle. By itself, it will not eradicate weeds but when combined with other treatments can be effective at controlling invasive species. Grazing can be effective in reducing a large infestation or eliminating a smaller infestation (Tu 2003). Potentially, goats would be used on the site first and herbicide could be used for follow-up on the smaller number of remaining plants.

Early Detection-Rapid Response (for 100 acres a year with a project cap of 200 acres total) is allowed for sites similar to those presently included for treatment under this alternative. Design standard 22 requires that the Forest soil scientist or hydrologist annually verify treatment locations to ensure proper design standards are used for each site.

Cumulative Effects

Cumulative effects are similar to those discussed under Alternative 3. As no significant direct or indirect effects are expected under this alternative, no significant contribution to cumulative effects is expected.

Alternative 6

Direct and Indirect Effects to Soils

Alternative 6 treats only 541 acres, far fewer acres than proposed for Alternatives 2 and 4. Therefore, there would be less overall disturbance under this alternative. Up to 541 acres would be treated under this alternative. As with the previous alternative, the three largest sites would have only the perimeter of the sites treated. The physical treatments would be the same as discussed above under Alternative 5. One hundred and sixteen sites totaling 19 acres would be treated with physical methods with 371 sites totaling 116 acres treated with either physical methods or herbicide.

This alternative allows use of chlorsulfuron. This herbicide has low potential to affect soil organisms. This herbicide targets broadleaf vegetation leaving grasses unaffected. This alternative also allows the use of two mixtures of herbicides. As noted under General Herbicide Effects dicamba, Triclopyr and 2,4-D have temporary effects on soil organisms. Herbicide only is proposed for 46 sites on 65 acres. DS-22 require the Forest Soil Scientist field verify treatment locations. DS-24a restricts use of herbicides (except glyphosate) to 1 acre per 6th field a year on sensitive or shallow soils. This could allow minor amounts of herbicide to leach into shallow aquifers. This effect is likely to be small given the dry climate and the small acreage of this type of soils proposed for treatment.

This alternative treats fewer acres with both herbicides and with physical treatment than the other alternatives that allow herbicide use. All treatment sites would be evaluated for rehabilitation on a site-by-site basis. Given the few acres treated, the scattered nature of the treatments, and the use of design standards, this alternative is unlikely to have noticeable effects.

Cumulative Effects

Cumulative effects are similar but more limited than those discussed under Alternative 2.

Effects to Water Resources

Alternative 1

Direct and Indirect Effects

Under this alternative, no Forest wide management of invasive plants would occur. Under this alternative, 20 to 30 acres would be treated by physical means each year.

Invasive plants would continue to grow on sites where their treatment is currently not authorized by NEPA analysis. Invasive plants are often less effective for stream bank stabilization than deeper rooted native plant species. Most invasive plants also provide less stream shading than native hardwoods and conifers.

Alternative 2

Direct and Indirect Effects

Up to 150 acres of treatment, including chemical treatment, could take place in stream RCAs. In reality, most of these areas have only discontinuous infestations of invasive plants, but, as acres of infestations change year to year; analysis is done as if all the land within a treatment area is infested.

None of the treatments are extensive enough under any alternative to affect peak flows, low flows, or water yield. Methods used for treatment would have negligible effect on water infiltration into soil and associated surface runoff as discussed in the general effects section and the soils section above. No 5th-field watershed has more than 2.5 percent proposed for treatment and most have well under 1 percent (Table 6). This amount is much too small an area to show effects to flows from treatment.

The sites identified below in Table 16 are the larger invasive plant sites on the Forest. All the sites identified are listed in Appendix B of the Modoc Noxious Weed EIS.

Table 16. Larger invasive sites on the Forest

Species	ID Number	Town-ship	Range	Section	Site Acres	Acres Within RCAs	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Canada Thistle	WM009CIAR4	T47N	R15E	27	9.99	9	PT-H	NT	PT-H	LT	H
Crupina	BV001CRVU2	T40N	R10E	36	158.65	35	P	P	P	LT	LT
Dalmatian Toadflax	WM003LIDA	T46N	R14E	13	44.57	27.2	PT-H	NT	PT-H	LT	H
Dalmatian Toadflax	BV006LIDA	T42N	R6E	28	850.82	98.4	PT-H	NT	PT-H	LT	LT
Dyer's woad	DH013ISTI	T43N	R7E	7	5657.75	1.4	P or H	P	P or H	LT	LT
Dyer's woad	WM002ISTI	T46N	R15E	5	12.65	5.1	P	P	P	P+	P+ or H
Dyer's woad	WM004ISTI	T47N	R15E	32	12.27	2.4	P	P	P	P+	P+ or H
Scotch Thistle	BV284ONAC	T39N	R10E	8	16.3	15.9	P	P	P	G or P+	G or P+ or H
Scotch Thistle	WM004ONAC	T45N	R15E	14	9.72	0	P or H	P	P or H	G or P+	G or P+ or H

P - Physical: hand pulling, hoeing, grubbing
P+ - Physical+: hand pulling, hoeing, grubbing, clipping seed head or plant, trimming with weedeater, mulching/tarping
H - Herbicide
NT - No Treatment
LT - Limited Treatment: perimeter treatment only to contain infestation
G - Goat Grazing
PT-H - Partial Treatment of site with herbicides

Generally, small areas would be treated along streams. Thirty-one acres of physical treatment are proposed within 10 feet of streams in RCAs scattered across 161 sites. Treatment would be discontinuous and limited at any one site. As most invasive plants provide little shade, removal of these plants is unlikely to have any measurable effect to stream temperature. Where manual methods remove invasive plants near streams, there could be minor loss of ground cover and soil disturbance leading to erosion and a minor localized increase in fine sediments particularly if

vegetation is removed from stream banks. This increase is not considered significant as it would only last a season or two until vegetation became reestablished. Many treatment sites are small and would reseed naturally with existing native vegetation. Restoration would occur on sites greater than ¼ acre lacking native vegetation seed source to ensure revegetation occurs and erosion is controlled.

No herbicide would be used within 10 feet of streams. Aquatic glyphosate, licensed for use in water, would be used within RCAs of 150 feet for intermittent streams and 300 feet for perennial streams. Glyphosate tends to bind strongly to soils and would move only if the soil particle was carried into water. The spray methods used would be targeted spray or hand application of herbicides to the target plants. Drift would be minimal under these circumstances and risk to native riparian vegetation is small. Spot treatments would also remove less vegetation than broadcast treatments so there is less potential for erosion. There are approximately 40 acres of treatment within 10 feet of water scattered across the Forest. Under this alternative, only the nonrhizomatous acres would be treated with manual methods.

The other herbicides would not be used within RCAs. Buffers of 150 feet on intermittent streams and 300 feet on perennial streams would protect water quality. These buffers are considered adequate to minimize herbicide concentrations in water because, buffer studies in forested areas (Berg 2005, USDA Forest Service 2001) show that buffers greater than 25 feet commonly lower herbicide concentrations below any threshold of concern and often below detectable limits. For 2,4-D, a 1,000 foot buffer from streams is required under design standard 17.

Project design standards also minimize the chance of herbicides reaching streams or wetlands through drift, runoff, or leaching into soils. Design standard 23 prohibits use of the more mobile herbicides on shallow or sensitive soils. This would protect groundwater, particularly in areas of the Forest where shallow soils cover fractured bedrock.

Where physical methods remove invasive plants near streams, there could be minor loss of ground cover and soil disturbance leading to localized erosion, and a minor localized increase in fine sediments, particularly if vegetation is removed from stream banks. This increase is not considered significant as it would only last a season until vegetation became reestablished. Many treatment sites are small and would reseed naturally with existing native vegetation. Where more than a ¼ acre site has bare soil from treating invasives, design standard 20 requires the site be assessed for rehabilitation. Rehabilitation would allow sites lacking a native vegetation seed source to be revegetate to control erosion.

Specific Sites

Some of the larger sites were looked at more closely for effects. These sites are listed in Table 16. Alternative 2 allows only aquatic glyphosate within RCAs and gives a 10-foot, no-herbicide-use buffer to both perennial and intermittent streams. Under Alternative 2, three of the nine treatment areas shown in Table 16 would be treated with aquatic glyphosate outside the 10-foot buffer. Glyphosate adheres well to soil and is the least mobile of the herbicides proposed under this project. The large Common Crupina site, the Scotch Thistle site with almost 16 acres in RCAs and two Dyer's Woad sites of approximately 12 acres apiece would all be treated with physical treatments.

Site WM009Ciar4 is infested with Canada Thistle. This site is in section 27 just south of Mill Creek. The site is almost entirely within either a lake or spring RCA or an intermittent stream RCA. The entire polygon is approximately 10 acres with 9 acres within the RCA of a lake, spring,

or seasonal stream RCA. This site is within the Lahonton Regional Waterboard, which allows only aquatic glyphosate application by wicking directly to the plant at least 10 feet from the stream or water feature. Given these tight constraints, it is unlikely that adverse effects would occur from this treatment.

The large dyer's woad site (DH013ISTI) would be treated either physically or with chemicals. This site has an intermittent drainage to the south side of the treatment area. This treatment is unlikely to affect water quality because only 1.4 acres of the site is within the seasonal stream RCA.

For the large Dalmatian toadflax site,(BV006LIDA) the 850 acre site has a series of small ponds, wetlands and meadows scattered around the site. The individual RCAs range in size from the approximately 35-acre meadow to a 1-acre lake. This area has 64 acres within RCAs with a set of small lakes and 34 acres within a meadow. Approximately 14 acres are in the inner 100 feet of the RCAs. This site receives an average of 20 inches of precipitation a year. Outside the RCA, any of the other herbicides can be used with 2,4-D having an additional buffer of 1,000 feet from the high water mark.

Given that only aquatic glyphosate would be used in RCAs and 2,4-D has a 1,000 foot buffer from use near water, it is impossible for the concentrations to approach those calculated in Table 15 for any herbicide except glyphosate. Glyphosate application was modeled with the GLEAMS-Driver model with site-specific parameters for a small lake and a small stream (Table 17).

The parameter changes for this model included a yearly rainfall of 21 inches a year and a 16-acre treatment site. This is a conservative model because it models as if broadcast spray occurred up to the edge of the stream and the highest possible application rate was assumed. In reality, there is a 10-foot, no-herbicide buffer, and no broadcast spraying occurs. Instead, the herbicide is applied directly to the plant by wicking it onto the plant. This would keep herbicide from contacting either desirable plants or contacting soil. Modeling results in Table 17 show water concentrations below any level of concern. Given these results and the conservative use of herbicides with this alternative, adverse effects from herbicide use are unlikely under this alternative.

Table 17. GLEAMS-driver model results with site-specific climate and acre data

Herbicide	Acres treated	Yearly Average Rainfall (inches)	Low Herbicide Concentration in Water (mg/l)	Median Herbicide Concentration in Water (mg/l)	High Herbicide Concentration in Water (mg/l)	EPA Drinking Water Maximum Contaminant level (mg/l)	Modeled Feature
glyphosate	16	21	0.014	0.015	0.025	0.7	stream
glyphosate	16	21	0.0091	0.011	0.012	0.7	pond

Roads

There are 26.6 miles of road within treatment areas. Of these, only 3 miles (11 percent) are within RCAs. There is an additional 0.8 miles of road within RCAs associated with ponds, lakes and wetlands within treatment areas. Roads and their associated ditch lines are often connected to streams and during storm events can carry herbicide to streams. However, as only targeted spray

techniques would be used, very little herbicide applied to the soil would be available for transport to streams.

Lakes, Wetlands and Floodplains

There are approximately 128 acres of treatment proposed within RCAs of wetlands, lakes, ponds, or reservoirs on the Forest. The main invasive plants found at these sites are Dalmatian toadflax (98.4 acres), Canada thistle (10 acres) and Scotch thistle (8.3 acres).

Most of these treatment acres are near the High Reef area just south of Lava Lake in the largest treatment area for Dalmatian toadflax. There are 98 acres of noxious weeds in eight polygons ranging in size from 0.3 acres to 34 acres. These are all part of a large 851-acre treatment area of Dalmatian toadflax. Under this alternative most of this site would be treated with herbicides except for the infestations within 10 feet of the high water mark. Because Dalmatian toadflax is a rhizomatous species, these acres would not be treated. This leaves plants for reinfestation of the site. The infested areas 10 feet away from water would be treated with aquatic glyphosate within the RCA and potentially other herbicides outside the RCA. Glyphosate is the herbicide that most strongly adheres to soil and is unlikely to move into water in any significant amounts. Even where soil particles move into water the glyphosate preferentially stays on the soil particle (SERA 2003b). As only aquatic glyphosate can be used with the RCAs, it is unlikely that the other herbicides would be of concern for water resources.

While the design standards make it highly unlikely that herbicide concentration in water would reach a level of concern, high rainfall soon after application could deliver herbicide to a lake or pond. To model this scenario, the risk assessment worksheet (SERA worksheet) was run for specific rainfall for glyphosate (only herbicide that is allowed within RCAs). No concentrations of concern were reached for any herbicide Table 17. Use of design standards discussed above further lowers potential for higher concentrations of herbicides near the lakes. Therefore, treatments are unlikely to affect functioning of wetlands or water bodies or to contribute to significant adverse effect on beneficial uses.

To control the infestation, the treatments would continue over several years, with fewer acres needing treatment each year. Wetlands would be treated using non-herbicide methods where such treatments are likely to be effective.

Alternative 3

Alternative 3 uses only physical treatments. Under this alternative rhizomatous species would not be treated because physical methods are not effective on these species. There would be more ground disturbance under this alternative than under Alternative 2.

Direct and Indirect Effects

Under this alternative, up to 494 sites totaling 5,993 acres could be treated over 5 years. The 47 sites (916 acres) of rhizomatous infestations would not be treated. The primary treatments would be pulling, hoeing, and grubbing weeds. Within 10 feet of water, there are 31 acres at 161 sites of potential physical treatment. Physical treatment close to water is more likely to lead to additional sediment input to streams that treatment farther from the streams.

Alternative 3 increases the risk of trampling and instability of stream banks due to its reliance on non-herbicide treatments, particularly in areas where invasives grow directly along stream banks. This would be a short-term effect until revegetation occurred. The risk of long-term adverse effects from these treatments is low. Invasive plants provide little shade; therefore, removing

them would not lead to a measurable change in temperature. In the long term, temperature would be improved on streams currently impacted by invasive plants. The treatments proposed are unlikely to result in significant amounts of decaying plants or nutrients entering a stream at one time, and therefore, no measurable effect to oxygen levels is anticipated.

Alternative 4

Direct and Indirect Effects

The effects from treatment under this alternative are the same as for Alternative 2 except that EDRR could take place under this alternative and treatments would occur over a 10 year timeframe.

Alternative 5

The effects of this alternative are the same as for alternative 3 except that this alternative includes additional physical treatments, use of grazing and Early Detection-Rapid Response. The additional physical treatments include cutting weeds, mulching, and tarping. These are not considered ground disturbing and would have minimal effects to treated sites.

Grazing is proposed for 5 sites including two Scotch thistle sites shown in Table 16. These sites are approximately 10 and 16 acres in size. The 10-acre site is dry but the 16-acre site is within the RCA of a seasonal stream. As long as the goats are moved in a timely manner, using goats for grazing noxious weeds can be an effective way to weaken or kill plants to make the site smaller for further treatment with other methods (Tu et al. 2003).

Alternative 6

Alternative 6 allows the most flexible use of herbicides. It includes the use of chlorsulfuron and herbicide mixtures. Mix 1 is Dicamba and 2,4-D and Mix 2 is Chlorsulfuron and 2,4-D. Alternative 6 proposes smaller stream buffers than alternatives 2 and 4 (Table 12).

Glyphosate is the only herbicide proposed for use when spraying within 10 feet of bankfull along stream channels. Glyphosate is highly water-soluble but because it adheres tightly to soils is unlikely to be carried into a stream unless the soil particle is carried into the stream. This is unlikely to happen during the late spring or summer when herbicides would be applied because there is less rain in the summer and more vegetation growth to hold soil particles in place. However, large thunderstorms capable of moving sediment occasionally occur in the summer. It is impossible to predict where these would occur. If glyphosate is carried into a stream by runoff, it would preferentially bound with the soil particle over partitioning into water (SERA 2003b).

Herbicides entering surface water through surface runoff are also expected to be minimal, since targeted spraying techniques would be used to apply herbicide. This would minimize the amount of herbicide reaching the ground surface as well as minimize the potential for herbicide drift.

Site-specific Analysis

The three largest sites listed in Table 16 would get limited treatment under this alternative. The crupina site, a Dalmatian toadflax site, the large dyer’s woad site, and six smaller sites (not listed in Table 16) would get limited treatment around the edges of the sites and along major roads, to keep the invasive weeds from spreading. The total estimated treatment for these sites is 100 acres. The Dalmatian toadflax site has an additional mitigation allowing treatment of only 10 percent of the acreage within the inner 100 feet of RCAs to occur annually to protect water quality. Where

treatment may occur, wicking the herbicide directly onto the plant is the required application type.

The two smaller dyer's woad sites, as well as the 44-acre Dalmatian toadflax site shown in Table 16, are within the Goose Lake CAR. To protect TES aquatic species, only aquatic glyphosate is allowed within 100 feet the high water mark of streams (design standard 11). Given these requirements, adverse effects from treatments are unlikely.

The 10-acre Canada thistle site is within the Lahonton Regional Water Board (LRWB) plan area. Within the LRWB area, all sites have a 10-foot, no-treatment buffer from herbicide use along streams. Outside this buffer, aquatic glyphostate can be used by wicking it directly onto plants. This would allow the project to meet the LRWB Basin Water Quality Standard for zero detection of herbicide in streams. The 9.7-acre Scotch thistle site is not near water and therefore treatment of this site would have no impact on water quality.

Two of the sites with larger treatment acres in RCAs were modeled using the GLEAMS-Driver model. The 16.3-acre Scotch thistle site is located along Messenger Creek, which is a seasonal stream. The site was modeled with the GLEAMS-Driver with a rainfall of approximately 21 inches a year and 16 acres of treatment. The other site modeled was the Canada thistle site with 33 inches of rain and 10 acres of treatment to match the treatment site. The herbicides that could potentially be used at these sites were modeled. Even when modeled at the highest allowed application rate, using broadcast application up to the edge of a stream (no buffer), no concentrations were over a level of concern. In reality, 2,4-D is not allowed on sites over 2 acres in size and would not be used at either of these sites.

Table 18. GLEAMS-Driver model parameters and results

Herbicide	Acres	Rainfall	Soil Type	Soil Depth	Lower concentration (mg/l)	Median Concentratio n (mg/l)	Upper Concentration (mg/l)	EPA Drinking Water Maximum Contaminant level (mg/l)
glyphosate	16	21	loam	24	0.014	0.015	0.025	0.7
dicamba	16	21	loam	24	0.0074	0.0083	0.009	-
2,4-D	16	21	loam	24	0.0075	0.008	0.013	0.07
glyphosate	10	33	loam	24	0.023	0.024	0.058	0.7
dicamba	10	33	loam	24	0.012	0.013	0.060	-
clopyralid	10	33	loam	24	0.0016	0.003	0.026	-
chlorsulfuron	10	33	loam	24	0.00038	0.00041	0.00057	-
Triclopyr	10	33	loam	24	0.0094	0.011	0.031	-

When all the acres of infestations within the inner 100 feet of RCAs were totaled by watershed, there were less than 15 acres infested within 10 feet of any RCA and only 116 acres total within the inner 100 feet of the RCA (Table 19). This is a small amount of disturbance given the scattered nature of the treatments.

Table 19. Acres of infestations within 100 feet of streams, lakes, springs or meadows by 6th-field watershed

Watershed Hydrologic Unit Code	Watershed Name	Infested Acres within 10 feet of streams, lakes, springs and meadows	Infested Acres within 25 feet of streams lakes, springs and meadows	Infested Acres within 50 feet of streams lakes, springs and meadows	Infested Acres with 100 feet of streams lakes, springs and meadows
180102040103	Mosquito Creek	0.29	0.49	0.81	1.38
180102040106	Fairchild Swamp	0.11	0.23	0.34	0.47
180102040204	Lower North Fork Willow Creek	0	0	0.03	0.19
180102041102	Spaulding Butte	0	0	0	0.25
180102041105	Knobcone Butte	0.01	0.03	0.07	0.10
180102041106	Double Head Mountain	0.03	0.06	0.08	0.08
Subtotal	North Coast RWB	0.44	0.81	1.33	2.47
180200010303	North Fork Cottonwood Creek	0.65	1.64	3.26	6.55
180200010304	Willow Creek	0.27	1.31	2.70	5.78
180200010305	Lassen Creek	1.87	4.63	9.23	18.83
180200010306	Ross Creek	0.06	0.16	0.24	0.30
180200010307	Davis Creek	0.02	0.05	0.14	0.28
180200010403	Corral Creek	0.01	0.03	0.07	0.10
180200020103	Southern Jess Valley	0.09	0.23	0.44	0.76
180200020202	Parsnip Creek	0.06	0.16	0.18	0.18
180200020203	Warm Creek	0.11	0.25	0.46	0.87
180200020207	Crooks Canyon	0.03	0.08	0.10	0.10
180200020303	Fitzhugh Creek	0	0	0.10	0.08
180200020401	Headwaters North Fork of Pit River	0	0	0.02	0.09
180200020402	Joseph Creek	0.09	0.22	0.42	0.64
180200020403	Thoms Creek	0	0	0.01	0.19
180200020504	Baker and Thomas Reservoir	0	0	0.02	0.11
180200020903	Canby-Pit River	0.48	1.03	1.98	4.66
180200020904	Stone Coal Creek	0.47	1.03	1.90	4.08
180200020906	Roberts Reservoir-Pit River	0.02	0.04	0.09	0.10
180200021001	Washington Creek	0.03	0.06	0.10	0.10
180200021002	Upper Turner Creek	0.05	0.06	0.12	0.19
180200021003	Hulbert-Turner Creek	0	0	0.03	0.10
180200021101	Kephart Creek	0	0	0	0.01

Watershed Hydrologic Unit Code	Watershed Name	Infested Acres within 10 feet of streams, lakes, springs and meadows	Infested Acres within 25 feet of streams lakes, springs and meadows	Infested Acres within 50 feet of streams lakes, springs and meadows	Infested Acres with 100 feet of streams lakes, springs and meadows
180200021103	Frog Waterhole	2.80	4.55	7.53	13.69
180200021203	Upper Ash Valley	0	0.05	0.14	0.29
180200021204	Cottonwood Creek	0.36	0.63	1.07	1.37
180200021205	Lower Ash Valley	0.10	0.21	0.41	0.53
180200021301	Rush Creek	2.35	5.94	11.96	23.85
180200021302	Messenger Gulch	1.72	4.01	7.39	13.35
180200021303	Upper Dutch Flat Creek	0	0	0.28	0.30
180200021304	Lower Dutch Flat Creek	0	0	0.05	0.10
180200021401	Upper Willow Creek	0	0	0	0.04
180200021401	Lower Willow Creek	0.10	0.10	0.10	0.10
180200021501	Butte Creek	0.07	0.09	0.10	0.17
180200021503	South Big Swamp	0	0	0	0.01
180200021601	East Fork Juniper Creek	0.05	0.13	0.25	0.35
180200021602	South Fork Juniper Creek	0.38	0.87	1.56	2.69
180200021603	Lower Juniper Creek	0	0	0	0.03
180200021704	Lower Big Valley	0.03	0.08	0.10	0.10
180200030101	Van Sickle Lake	0.01	0.04	0.08	0.10
180200030105	Wagontire Creek	1.00	1.16	1.34	1.92
180200030106	Clarkes Valley	0.04	0.10	0.16	0.20
Subtotal	Central Valley RWB	13.32	25.94	54.13	103.29
180800010102	Bidwell Creek	1.00	2.51	5.08	10.36
180800010201	Northwest Shore Middle Alkali Lake	0.01	0.03	0.14	0.43
180800010202	West Shore Middle Alkali Lake	0	0.01	0.05	0.11
Subtotal	Lahontan RWB	1.01	2.55	5.27	10.90
Totals		14.77	29.3	60.73	116.66

Critical Aquatic Refuges (CARs)

Where aquatic TES species are present more conservative buffers would be used as shown in Table 5. No herbicides would be used within 10 feet of a stream's high water mark and only aquatic glyphosate would be used within 100 feet of the stream. This additional protection makes it exceedingly unlikely that herbicides would reach any threshold of concern in these areas.

For the treatments within the Lahonton Water Board area, no herbicide treatment would take place within 10 feet of a stream. Only aquatic glyphosate could be used within the RCA using wicking to apply the herbicide directly to the plant.

Table 20 Noxious weed sites and infested acres within RCAs of the Lahonton Water Board

Weed ID	Weed Name	Acres	SMZ Type
WM001CIAR4	Canada Thistle	0.10	Seasonal Stream
WM002ONAC	Scotch Thistle	0.10	Seasonal Stream
WM003CIAR4	Canada Thistle	0.06	Seasonal Stream
WM003CIAR4	Canada Thistle	0.10	Perennial Stream
WM003CIAR4	Canada Thistle	0.09	Meadow
WM006CIAR4	Canada Thistle	0.10	Seasonal Stream
WM007ISTI	Dyer's woad	0.45	Seasonal Stream
WM009CIAR4	Canada Thistle	8.04	Lake
WM009CIAR4	Canada Thistle	6.16	Spring
WM009CIAR4	Canada Thistle	8.42	Seasonal Stream
WM009ISTI	Dyer's woad	1.21	Perennial Stream
WM010ISTI	Dyer's woad	0.83	Perennial Stream
WM014ISTI	Dyer's woad	0.75	Seasonal Stream
WM017ONAC	Scotch Thistle	0.10	Seasonal Stream
WM017ISTI	Dyer's woad	0.10	Seasonal Stream
WM018ISTI	Dyer's woad	1.13	Perennial Stream
WM018ISTI	Dyer's woad	1.12	Seasonal Stream
WM019ISTI	Dyer's woad	0.10	Perennial Stream
WM022ONAC	Scotch Thistle	0.15	Perennial Stream
WM025ONAC	Scotch Thistle	0.10	Perennial Stream
WM025ONAC	Scotch Thistle	0.10	Seasonal Stream
WM027ONAC	Scotch Thistle	0.10	Perennial Stream
WM027ONAC	Scotch Thistle	0.08	Seasonal Stream
WM036ONAC	Scotch Thistle	0.10	Perennial Stream
WM037ONAC	Scotch Thistle	0.14	Perennial Stream
TOTALS		29.73	

Early Detection-Rapid Response

Early Detection-Rapid Response is part of this alternative. Under this approach, new or currently unknown infestations may be treated using the range of methods analyzed in the Modoc Invasive Weed FEIS 2008, on sites similar to those presently proposed for treatment. Design standards limit types of treatments and types of herbicides by aquatic risk within RCAs and would minimize the risk of treating these new or undiscovered infestations.

Cumulative Watershed Effects

A watershed cumulative impact can be defined as the total impact, positive or negative, on runoff, erosion, water yield, floods, and/or water quality that result from the incremental impact of a proposed action, when added to other past, present and reasonably foreseeable future actions occurring within the same natural drainage basin, or watershed (CEQ 1997).

The cumulative effects analysis area for this project is comprised of the 29 5th-field watersheds that are either totally or partially found within the Forest's administrative boundary. Cumulative

effects information for this report is primarily derived from Chapter 3 of the EIS. Additional sources of information are referenced accordingly.

Past, Present and Foreseeable Actions

For a complete list of all past, present, and reasonably foreseeable actions, please refer to Chapter 3 of the EIS.

Past Noxious Weed Treatments and Adjacent Treatments

Prior to 2002, Modoc County Department of Agriculture treated weeds on the Forest through a Memorandum of Understanding. Billing records and correspondence between the Forest and Modoc County indicate treatments were done for about 30 years.

The Modoc National Forest contains Modoc, Lassen and Siskiyou counties. Pesticide application data is summarized annually by the California Department of Pesticide. The Department produces a report each year summarizing pesticide use by category, total pounds of pesticide applied, number of treatments, acres and treatment type. The annual reports put out by the California Department of Pesticide do not contain information as to where the pesticides are applied geographically. Herbicide application data for the categories of forestry, rangeland and right-of-way (ROW) is summarized in Appendix B in Table 24 for the years 2002-2006.[4] (Appendix B is part of the Watershed and Soils specialist report, found in Appendix T, Watershed and Soils, of this final EIS.)

The table summarizes the amount of chlorsulfuron, clopyralid, 2,4-D, dicamba, glyphosate and triclopyr applied, for the years 2002-2006. These are the herbicides proposed for use under the proposed action. The table also determines what percentage these herbicides comprised in terms of the total amount applied in each county for 2002-2006, as well as pounds per acre. The use of herbicides on road rights-of-way is assumed to be primarily for noxious weed treatments. However, the acreage associated with right-of-way treatments is inconsistently reported. As a result, the average rates of application have been calculated only for forestry and rangelands.

The Forest has not been extensively involved in herbicide application in the last 5 years. However, in 2002 there was minor use of clopyralid, 2,4-D, dicamba, glyphosate, and hexazinone, all of which were used for noxious weed control. From 2003 through 2007, no herbicides were applied on the Forest outside of existing permits. As a result, it is assumed that the majority of the herbicide applications summarized in Table 24 have been applied to lands other than national forest.

In 2006, no herbicides were applied in Modoc County for forestry. In the same year, no herbicides were applied for rangelands in both Lassen and Modoc counties. This is also the case for both Lassen and Modoc counties in 2004. However, in 2003 rangelands in Modoc County received herbicide application while Lassen County did not. In 2002, herbicide applications were not reported for rangelands in both counties. It is assumed that from 2003-2006 that the herbicide use in the forestry category was on lands owned or administered by other entities than the Forest Service.

Herbicide use for each of these categories appears to have widely varied from 2002-2006. The total amount of chlorsulfuron, clopyralid, 2,4-D, dicamba, glyphosate and tricoplyr, for the forestry category, ranged from a low of 1,569.4 in 2002 to a high of 11,108.6 in 2006 for Siskiyou

[4] http://www.cdpr.ca.gov/docs/pur/purmain.htm

County. For rangelands, the maximum reported amount of herbicides applied from 2002-2006 occurred in 2003 in Siskiyou County where 928.4 pounds were applied. Right-of-way applications have ranged from a low of 139.9 in Lassen County in 2004 to a high of 6, 463.6 lbs in Siskiyou County during 2004.

At no time during the period of 2002-2006 did the total amount of chlorsulfuron, clopyralid, 2,4-D, dicamba, glyphosate and triclopyr exceed 0.1 percent of the total amount of herbicides applied in Lassen, Modoc and Siskiyou counties.

Table 21. Previous treatments of noxious weeds using herbicides, Modoc National Forest

Weed	Control agent	Scope of program
Scotch thistle	Herbicide & Physical	Over 500 Locations
Knapweeds	Herbicide	25 Locations
Leafy spurge	Herbicide	2 Locations
Yellow starthistle	Herbicide	25 Locations
Yellows pine thistle	Herbicide	3 Locations
Dalmatian toadflax	Herbicide	15 Locations
Musk thistle	Herbicide	2 Locations
Crupina	Herbicide	1 Location
Russian knapweed	Herbicide	4 Locations
Perennial pepperweed	Herbicide	12 Locations

Past activities also include:

- Mechanical treatment of less than 1 acre on the Goosenest District of the Klamath National Forest.
- Control of noxious weeds in areas adjacent to the Modoc by the Hat Creek District of the Lassen National Forest. Targeted species include dyer's woad, Scotch thistle, and squarrose knapweed. Ten acres of noxious weeds located on the Shasta Trinity National Forest have been treated by the Lassen N.F. as these acres are administered by the Lassen.
- Various noxious weeds (425 acres) have occurred on BLM land in Modoc and Lassen Counties that have been treated with physical methods, including prescribed fire, or with chemicals between 1997 and 2002. Of these acres, 410 were populated by Medusahead.
- Noxious weed eradication was performed by the Pit River Indian tribe, using a combination of herbicide and mechanical methods, on Tribal lands. Details on which herbicides have been used were not available. Eleven acres were treated on the Fort Bidwell Reservation for Mediterranean sage, Scotch thistle and dyer's woad using mechanical methods.
- Approximately 10,000 acres a year have been treated with herbicides on private, commercial farm ground and private forests within Modoc County. Approximately 1,000 acres per year of regulatory noxious weed control occurs. Additional detail on these activities was unavailable when this report was written.

Relevant Present Activities

Fuel treatments, fire, range management, dam construction and maintenance, recreation, timber harvest, and vegetation treatments, reforestation projects, road and right-of-way management

(including state and county easements and railroads), and special uses are all ongoing activities on the Forest. Each of these management activities in some way tie in to the dispersal and propagation of weeds, typically through transporting seeds or providing seed bed opportunities. For a complete discussion of all these present activities, and how they relate to the spread and propagation of noxious weeds, Chapter 3 of the EIS.

Present activities related specifically to the inventory and treatments of noxious weeds are listed below. These activities may belong to other agencies and the lands they administer, but occur within the boundaries of the 29 5th-field watersheds that are either wholly or partially located within the boundary of the Modoc National Forest.

- Klamath National Forest, Goosenest District: noxious weed inventory
- Ongoing noxious weed control on the Klamath and Lassen National Forest's mentioned above under relevant past activities
- Modoc National Wildlife Refuge that treats 200 acres annually to control Scotch thistle. Rodeo, Roundup, 2-4D, and other chemicals are applied by hand, ATV and truck. In addition, a limited amount of hand grubbing occurs.
- BLM-Alturas and Surprise Valley Offices: Approximately 50 acres in Modoc County are treated annually primarily for the control of Scotch thistle and Mediterranean sage. Both Telar and 2-4D are applied using trucks and helicopters. The treatment of 3,500 acres of exotic invasive plant species are treated annually by a combination of manual, mechanical, chemical (both aerial and ground applications, grazing, biological and prescribed fire methods.
- Ongoing weed eradication on Pit River tribal lands (see past activities for more detail)
- 10,000 acres a year on private, commercial farm ground and private forests are treated. 1,000 acres a year of regulator weed control occurs each year. Details regarding these treatments were not available at the time this report was written.

Relevant Foreseeable Activities

- Ongoing noxious weed control on the Klamath and Lassen National Forest's mentioned above under relevant past activities
- Modoc National Wildlife Refuge that treats 200 acres annually to control Scotch thistle. Rodeo, Roundup, 2-4D, and other chemicals are applied by hand, ATV and truck. In addition, a limited amount of hand grubbing occurs.
- Ongoing weed eradication on Pit River tribal lands (see past activities) for more detail
- 10,000 acres a year on private, commercial farm ground and private forests are treated. 1,000 acres a year of regulator weed control occurs each year. Details regarding these treatments were not available at the time this report was written.
- The Western Area Power Administration is proposing to vegetation and other types of maintenance along 1,400 miles of 69-500 kV transmission lines, of which approximately 456.2 of these miles are located within the Forest's boundary. The purpose of the right-of-way project is to maintain existing transmission lines and legal access road rights-of-way in order to ensure maintenance crews have safe and all-weather access to transmission line structures (Western Area Power Administration 2007). By implementing the project, the threat of vegetation to interfere with power lines and towers would be eliminated, vegetation would be controlled in a cost effective and environmentally sensitive manner, and year-round access would be facilitated.

The preferred alternative proposes using a combination of manual, mechanical, and herbicide methods to create favorable conditions for the establishment of low-growing plant communities. Seeding or planting may occur. Spot and broadcast herbicide applications would be used. Aerial applications would not occur. These methods would be applied to areas underneath and adjacent to the power lines and substations.

Under their proposed action, Western Area Power Administration may expand their use of herbicides for vegetation management. In Appendix G of their environmental assessment, Western proposes to use up to 25 herbicides, all of which have been approved and had human health and ecological risk assessments prepared (Western Area Power Administration 2007). At the time this report was written, information as to how much of each herbicide would be used, and when, and associated application method was not available. In addition, information as to how much herbicide would be applied on a watershed basis was also not available. The herbicides proposed for use by Western are listed below in Table 22.

Discussion of Cumulative Effects

Only the land and roads within the National Forest System would be treated in the action alternatives proposed by this EIS. The Forest, however, is intermingled with other federal, state, county, and private ownerships. Management activities and actions on neighboring lands may contribute to spread or containment of invasive plants on National Forest system lands, and vice versa.

Alternative 1 – Cumulative Effects

This alternative is covered under other NEPA projects. Existing levels of pesticide treatments would continue, by Tribes, the County, and on other private and public lands. No new treatments would be associated with this project. Treatments on the Forest would occur on an extremely small percentage (<0.1%) of any watersheds in the project area. Direct and indirect effects from treatment are so insignificant and temporary that treatment under the no action alternative does not contribute to significant cumulative effects. Lack of treatment would allow the continued spread of invasive plants and the associated changes in ecosystems.

Alternative 2 - Cumulative Effects

Only the land and roads within the National Forest System would be treated in the action alternatives proposed by this EIS. The Forest, however, is intermingled with other federal, state, county, and private ownerships. Management activities and actions on neighboring lands may contribute to spread or containment of invasive plants on National Forest System lands, and vice versa. The treatments described above by county would probably continue at similar levels in the future.

Very little vegetation would be removed in any watershed therefore none of the treatments are extensive enough under any alternative to effect peak flows, low flows or water yield in any watershed. No mechanical ground-disturbing activity is proposed for this project; therefore, methods used for treatment would have negligible effects on water infiltration into soil and associated surface runoff. No 5th-field watershed has more than 2.5 percent proposed for treatment and most have less than 1 percent (Table 6). This amount is much too small an area to show effects to flows from treatment.

The three 5th-field watersheds with the largest treatment acres were looked at closely. These all have one large treatment site for each watershed.

Table 22. Herbicides proposed for use in the Western Area Power Administration project

Herbicide	Use
Bromacil and Diuron	Substations and non sensitive areas only
Chlorsulfuron	Right of Way
Clopyralid	Noxious Weed Control
2,4-D	Substations, Right of Way
Clopyralid and 2,4-D	Substations, ROW and Noxious Weed Control
Dicamba	Right of Way (stump treatment) and Substations
Dithiopur	Landscaped Areas
Diuron	Substations
Flumioxazin	Bare-ground – Substations and Kochia (Mexican burning bush) control
Fosamine Ammonium	Right of Way
Glyphosate	Substations and areas near water and wetlands
Imazapyr	Substations, Right of Way and Stump Treatment
Oxyfluorfen	Landscaped Sites and Bare-ground control
Sulfometuron Methyl	Storage yards and Substations
Sulfometuron Methyl and Chlorsulfuron	Bare-ground and substations
Tebuthiuron and Diuron	Substations
Mefluidide	Buffers and around Substations (on grass)
Imazapyr and Diuron	Substations and Right of Way
Tebuthiuron	Substations
Triclopyr	Right of Way and Stump Treatments
Pendamethalin	Substations
Oryzalin	Substations
Fluroxypyr	Right of Way, Substations especially for Kochia (Mexican burning bush)
Paclobutrazol	Right of Way (sensitive areas)
Trifluralin	Substations and yards

Coptic Bay has the largest number of acres of invasive plants identified; 5,676 with 2.3 percent of the watershed proposed for treatment (Table 6). This is due to the single large treatment area for dyer's woad (5,658 acres) which has only 1.4 acres of treatment in a seasonal RCA. As there is little water present, treating this site is unlikely to effects water resources. All other sites within

the watershed are less than 1 acre in size. There are 5 acres proposed for physical treatments. Only 12 percent of the treatments are proposed are within riparian areas.

Round Valley has one large site of common crupina that is on both national forest and private land. This infestation is about 159 acres on national forest land and 586 acres on adjacent private land. On Forest land this site would be treated with physical means under Alternative 2. There is a 16-acre treatment site for scotch thistle which would also be treated with physical means. All the other sites within the watershed are less than 1 acre in size.

Taylor Lake has an 851-acre treatment site for Dalmatian toadflax, which includes treatment within RCAs of ponds, springs and wetlands. This site was modeled in Table 17 and was below any threshold of concern.

Alternative 2 allows only the use of aquatic glyphosate in RCAs with a 10 foot no treat buffer. This protects water resources from direct and indirect effects of herbicide use at each site. Chemical treatments are scattered in small patches across the watersheds, making it unlikely that herbicide concentrations would be additive with similar treatments at the watershed scale. The potential for cumulative effects is negligible due to the implementation of design standards that limit direct and indirect effects, the scattered nature of the treatments, and the dilution over time and space by mixing and addition of inflow downstream.

Alternative 2 is unlikely to have significant effects on water resources and therefore is unlikely to approach a threshold of concern or contribute to significant cumulative effects. No adverse cumulative effects are expected from implementation of this alternative.

Alternative 3 - Cumulative Effects

Alternative 3 allows only physical treatments. Small acreages are being treated within each 6th-field watershed. As these treatments are primarily pulling weeds in sites scattered across the Forest, it is unlikely that these treatments would have significant direct and indirect effects, and are therefore unlikely to add significantly to cumulative effects. Design standards 14, 16 and 25 protect the watersheds from cumulative effects.

Alternative 4 - Cumulative Effects

The cumulative effects are the same as those discussed under Alternative 2.

Alternative 5 - Cumulative Effects

This alternative treats only 480 acres scattered across the Forest primarily with physical means. Given the minor effects at any site, and the scattered nature of the proposed treatments, cumulative effects from this alternative are unlikely.

Alternative 6 - Cumulative Effects

This alternative treats only 541 acres scattered across 527 sites. Design standard 14 requires that no more than 15 percent of any 6th-field watershed can be treated in one year under this project. Design standard 18b protects specific watersheds with high amounts of treatment in RCAs by limiting acres treated within RCAs. Given these and other design standards, it is unlikely that this alternative would contribute significantly to cumulative effects.

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Appendix A – Summary of Sensitive and Shallow Soils, Acreage and Herbicide Treatment Limitations, by Soil Map Unit, Modoc National Forest

Table 23. Summary of Sensitive and Shallow Soils, Acreage and Herbicide Treatment Limitations, by Soil Map Unit, Modoc National Forest

Soil Map Unit	Soil Map Unit Acres within MDF	Comments	Limiting Factors for Herbicide Treatment
104	4176	Map unit is composed of sensitive soils due to soil drainage is somewhat excessively drained.	Soil permeability and drainage
105	3617	Soil permeability is rapid and soil drainage is somewhat excessively drained.	Soil permeability and drainage
106	6228	Soil permeability is rapid in the pumice overburden to moderately rapid and soil drainage is somewhat excessively drained for 50% of the map unit	Soil permeability and drainage
107	8026	Soil permeability moderately rapid and soil drainage is somewhat excessively drained for 45% of the map unit	Soil permeability and drainage
108	3020	Soil permeability is rapid in the pumice overburden to moderately rapid below and soil drainage is somewhat excessively drained for 45% of the map unit.	Soil permeability and drainage
110	12505	15% of the map unit is composed of rock outcrop	Rock outcrop
111	6399	60% of the unit is shallow depth to bedrock	Soil depth
112	7676	65% of the unit is shallow depth to bedrock	Soil depth
113	1728	65% of the unit is shallow depth to bedrock and 20% of unit is composed of rock outcrop	Soil depth and Rock outcrop
114	796	40% of the unit is shallow depth to bedrock and 20% of unit is composed of rubbleland	Soil depth and Rubbleland
115	4560	45% of the unit is shallow depth to bedrock	Soil depth
116	7409	45% of the unit is shallow depth to bedrock	Soil depth
117	18377	45% of the unit is shallow depth to bedrock and 15% of map unit is composed of rock outcrop	Soil depth and Rock outcrop
118	35782	Soil permeability is moderately rapid, soil drainage is somewhat excessively drained for the map unit, shallow depth to bedrock and lava flows.	Soil permeability, drainage, depth and lava flows
120	4595	Soil permeability is moderately rapid and soil drainage is somewhat excessively drained for 45% of the map unit and 35% of the map unit is composed of rock out crop.	Soil permeability, soil drainage and rock outcrop
121	2631	Soil permeability is moderately rapid, soil drainage is somewhat excessively drained and shallow depth to bedrock for 40% of the map unit and 25% of the map unit is composed of rock out crop.	Soil permeability, soil drainage, soil depth and rock outcrop
122	6734	Soil permeability is moderately rapid for 35% of the map unit and 65% of the map unit is shallow depth to bedrock and 20% of the map unit is composed of lava flows.	Soil permeability, depth and lava flows
123	3270	25% of the map unit is shallow depth to bedrock	Soil depth

Soil Map Unit	Soil Map Unit Acres within MDF	Comments	Limiting Factors for Herbicide Treatment
124	2328	30% of the map unit is shallow depth to bedrock	Soil depth
127	2893	20% of the map unit is shallow depth to bedrock	Soil depth
132	48822	30% of the map unit is shallow depth to bedrock	Soil depth
137	546	25% of the map unit is shallow depth to bedrock.	Soil depth
139	2150	Soil permeability is moderately rapid for 35% of the unit and 25% of the map unit is shallow depth to unweathered bedrock.	Soil permeability and soil depth
140	3861	35% of the map unit is shallow to unweathered bedrock.	Soil depth
142	2465	15% of the map unit is rock outcrop and 40% of the map unit is shallow depth to bedrock.	Soil depth and rock outcrop
145	2667	30% of the map unit is shallow depth to bedrock and 15% of the map unit is composed of rock outcrop.	Soil depth and rock outcrop
147	14407	30% of the map unit is shallow depth to bedrock	Soil depth
150	2872	80% of the map unit is shallow depth to bedrock	Soil depth
151	51941	45% of the map unit is shallow depth to bedrock	Soil depth
152	4375	40% of the map unit is shallow depth to bedrock	Soil depth
153	51753	60% of the map unit is shallow depth to bedrock	Soil depth
154	49425	80% of the map unit is shallow depth to bedrock	Soil depth
155	7413	65% of the map unit is shallow depth to bedrock	Soil depth
156	19246	65% of the map unit is shallow depth to bedrock	Soil depth
157	8781	60% of the map unit is shallow depth to bedrock	Soil depth
158	17776	50% of the map unit is shallow depth to bedrock	Soil depth
159	9600	65% of the map unit is shallow depth to bedrock and 15% of the map unit is composed of rock outcrop.	Soil depth and rock out crop
161	6017	Soil permeability is rapid in the overburden and moderately rapid to rapid and soil drainage is somewhat excessively drained (65%).	Soil permeability and drainage
162	3749	Soil permeability is moderately rapid to rapid for the map unit and soil drainage is somewhat excessively drained (65%).	Soil permeability and drainage
163	1300	Soil permeability is rapid in the overburden and moderately rapid to rapid and soil drainage is somewhat excessively drained for the map unit. 15% of the map unit is rock outcrop.	Soil permeability, drainage and rock out crop
166	12730	30% of the map unit is shallow depth to bedrock	Soil depth
169	1644	25% of the map unit is composed of lava flows and is considered to sensitive landforms as it is composed of fractured vesicular basalt with minor accumulation of aeolian soil deposited in some fractures.	Lava flows
170	3133	25% of the map unit is shallow depth to bedrock	Soil depth
171	3025	30% of the map unit is shallow depth to bedrock	Soil depth
173	2786	Soil permeability is moderately rapid for the map unit	Soil permeability
174	56077	Soil permeability is moderately rapid for the map unit. 25% of the map unit is shallow depth to bedrock and 20% of the map unit is composed of lava flows and is considered to sensitive	Soil permeability, soil depth and lava flows

Soil Map Unit	Soil Map Unit Acres within MDF	Comments	Limiting Factors for Herbicide Treatment
		landforms as it is composed of fractured vesicular basalt with minor accumulation of aeolian soil deposited in some fractures.	
175	3235	Soil drainage is somewhat excessively drained for 15% of the map unit. The entire soil map unit is shallow depth to bedrock	Soil drainage and soil depth
176	7722	Soil drainage is somewhat excessively drained for 15% of the map unit and the entire map unit is shallow depth to bedrock	Soil drainage and soil depth
177	6171	20% of the map unit has soil drainage that is somewhat excessively drained and the entire map unit is shallow depth to bedrock	Soil drainage and soil depth
178	2626	65% of the map unit is considered to be shallow soils and 20% percent of the map unit is composed of rock outcrop.	Soil depth and rock outcrop
179	5830	20% of the map unit is considered to be shallow soils.	Soil depth
180	8024	25% of the map unit is considered to be shallow soils	Soil depth
181	5889	35% of the map unit is considered to be shallow soils	Soil depth to bedrock
182	3483	65% of the map unit has a soil permeability of rapid in the overburden	Soil permeability in the pumice overburden.
183	6265	Soil permeability is rapid in the overburden (80% of the map unit).	Soil permeability in the pumice overburden.
186	4764	Soil permeability is rapid in the overburden (75% of the map unit) and moderately rapid below (55% of the map unit).	Soil permeability in the pumice overburden.
187	9622	30% of the map unit is shallow depth to bedrock	Soil depth
188	22624	30% of the map unit is shallow depth to bedrock	Soil depth
189	3351	30% of the map unit is shallow depth to bedrock	Soil depth
191	16161	35% of the map unit is shallow depth to bedrock	Soil depth
192	2720	35% of the map unit is shallow depth to bedrock	Soil depth
193	4589	Soil permeability is moderately rapid to rapid for the entire map unit and soil drainage is somewhat excessively drained (45%)	Soil permeability and soil drainage
197	886	Soil permeability is rapid in the overburden moderately rapid to rapid below for 20% of the map unit and soil drainage is somewhat excessively drained (80%)	Soil permeability and soil drainage
198	1640	Soil permeability is rapid in the overburden moderately rapid to rapid below and soil drainage is somewhat excessively drained for the map unit.	Soil permeability and soil drainage
199	2194	Soil permeability is moderately rapid to rapid and soil drainage is somewhat excessively drained for the map unit.	Soil permeability and soil drainage
204	50975	15% of map unit is shallow depth to bedrock.	Soil depth
205	23943	15% of map unit is shallow depth to bedrock	Soil depth
206	3416	15% of map unit is considered shallow soils.	Soil depth
207	757	80% of map unit is considered shallow soils.	Soil depth
208	2044	45% of the map unit has soil drainage of somewhat excessively drained and 80% of map	Soil depth and soil drainage

Soil Map Unit	Soil Map Unit Acres within MDF	Comments	Limiting Factors for Herbicide Treatment
		unit is shallow depth to bedrock.	
209	493	Soil permeability is moderately rapid and soil drainage is somewhat excessively drained for the map unit. 45% of map unit shallow depth to bedrock	Soil permeability, drainage and soil depth.
210	7797	Soil drainage is somewhat excessively drained and shallow depth to bedrock for 35% of the map unit.	Soil depth and drainage
211	2015	20% of the map unit is shallow depth to bedrock	Soil depth
212	7348	45% of the map unit is shallow depth to bedrock	Soil depth
213	5077	45% of the map unit is shallow depth to bedrock	Soil depth
214	805	75% of the map unit is shallow depth to bedrock	Soil depth
215	1555	35% of the map unit has soil permeability of moderately rapid , 20% of the map unit shallow depth to bedrock and 20% of the map unit is composed of rubble land.	Soil depth, soil permeability and Rubbleland
216		60% of the map unit has soil permeability of moderately rapid	Soil permeability
219	26619	15% of map unit is composed of rock out crop	Rock out crop
221	2768	80% of the map unit is shallow depth to bedrock	Soil depth
222	33951	40% of the map unit is shallow depth to bedrock and 15% of the map unit is composed of lava flows.	Soil depth and lava flows
223	11519	40% of the map unit is considered to be shallow soils	Soil depth
224	28237	55% of the map unit is considered to be shallow soils.	Soil depth
225	29728	55% of the map unit is considered to be shallow soils.	Soil depth
226	8916	65% of the map unit is considered to be shallow soils.	Soil depth
227	3447	Soil drainage is somewhat excessively drained (35%) and 80% is of the map unit is shallow depth to bedrock	Soil drainage and soil depth
228	33561	45% of the map unit shallow depth to bedrock	Soil depth
229	6601	60% of the map unit is shallow depth to bedrock	Soil depth
230	5858	Soil permeability is moderately rapid for 30% of the map unit.	Soil permeability
233	1534	20% of the map unit is shallow depth to bedrock	Soil depth
236		15% of the map unit is shallow depth to bedrock	Soil depth
237	9883	20% of the map unit is shallow depth to bedrock	Soil depth
238	1602	30% of the map unit is shallow depth to bedrock	Soil depth
239	3976	30% of the map unit has soil permeability and shallow depth to bedrock and 40% of the map unit is composed of rock outcrop.	Soil depth and rock outcrop
240	5088	20% of the map unit has soil permeability and shallow depth to bedrock and 65% of the map unit is composed of rock outcrop and rubbleland.	Soil depth, rock outcrop and rubble lands
241	7095	25% of the map unit has soil permeability and shallow depth to bedrock and 65% of the map unit is composed of rock outcrop and rubbleland.	Soil depth, rock outcrop and rubble lands
242	3881	35% of the map unit is shallow soil	Soil depth

Soil Map Unit	Soil Map Unit Acres within MDF	Comments	Limiting Factors for Herbicide Treatment
243	36276	40% of the map unit is shallow soil	Soil depth
244	4877	45% of the map unit is shallow soil	Soil depth
245	2022	65% of the map unit is shallow soil over basalt and 20% of map unit is composed of rock outcrop.	Soil depth and rock out crop
246	2010	Soil permeability is rapid in the pumice overburden and moderately rapid to moderately slow below the overburden for the map unit.	Soil permeability and drainage
247	6654	25% of the map unit is shallow soil over basalt and 20% of the map unit consists of lava flows.	Soil depth and lava flows
251	14216	25% of the map unit is shallow soil	Soil depth
257	7414	30% of the map unit is shallow soils.	Soil depth
258	8481	25% of the map unit is shallow soils.	Soil depth
259	15981	30% of the map unit is composed of shallow soils.	Soil depth
260	7104	Soil permeability is rapid and soil drainage is somewhat excessively drained for the map unit.	Soil permeability and soil drainage
261	3449	Soil permeability is rapid in the pumice overburden and moderately rapid below the overburden and soil drainage is somewhat excessively drained for 50% of the map unit.	Soil permeability, and soil drainage
262	4889	Soil permeability is moderately rapid and soil drainage is somewhat excessively drained to well drained for 50% of the map unit	Soil permeability, and soil drainage
263	3867	Soil permeability is moderately rapid and soil drainage is somewhat excessively drained to well drained for 55% and shallow soil for 15% of the map unit	Soil permeability, drainage and soil depth
264	3203	Soil permeability is moderately rapid for the map unit, and soil drainage is somewhat excessively (40%).	Soil permeability, and soil drainage
265	2093	Soil permeability is moderately rapid for the map unit and soil drainage is somewhat excessively drained (45%).	Soil permeability, and soil drainage
266	6164	55% of the map unit is shallow soils and 20% of the map unit is composed of lava flows.	Soil depth and lava flows
267	10836	55% of the map unit is considered to be shallow soils due to soil depth.	Soil depth
268	48857	20% of the map unit is shallow soils.	Soil depth
269	5700	20% of the map unit is shallow soils and 20% of the map unit is composed of rock outcrop	Soil depth and rock out crop
270	6113	25% of the map unit is shallow soils and 20% of the map unit is composed of rock outcrop	Soil depth and rock out crop
271	1180	30% of the map unit is shallow soils due to soil depth and 25% of the map unit is composed of rock outcrop.	Soil depth and rock out crop
272	11120	Soil drainage is somewhat excessively drained and shallow soils and 45% of the map unit is composed of rock outcrop.	Soil drainage, soil depth and rock outcrop
273	4855	20% of the map unit is shallow soils	Soil depth
274	5636	70% of the map unit has high water table.	Water Table at or near surface
276	5309	Soil permeability is moderately rapid and shallow	Soil permeability and soil

Soil Map Unit	Soil Map Unit Acres within MDF	Comments	Limiting Factors for Herbicide Treatment
		soils for 20% of map unit.	depth
277	3469	Soil permeability is moderately rapid for 60% of map unit.	Soil permeability
278	3493	Soil permeability is rapid in the pumice overburden to moderately rapid below the overburden for the map unit.	Soil permeability
279	1302	Soil permeability is moderately rapid for the map unit and soil drainage is somewhat excessively drained 30% of the map unit.	Soil permeability and soil drainage
280	839	Soil permeability is moderately rapid and somewhat excessively drained for 40% of the map unit and 25% of the map unit is shallow soils.	Soil permeability, soil drainage and soil depth
281	2849	Soil permeability is moderately rapid and soil drainage is somewhat excessively drained for 55% of the map unit.	Soil permeability and soil drainage
282	6734	Soil permeability is moderately rapid and soil drainage is somewhat excessively drained for 65% of the map unit. 20% of the map unit is shallow soils.	Soil permeability, soil drainage and soil depth

Appendix B – Forestry, Rangeland and ROW Herbicide Applications within Modoc National Forest Counties from 2002-2006

Table 24 Total forestry, rangeland and ROW herbicide applications (total pounds applied) within Modoc National Forest Counties for 2006

2006 Lassen, Modoc and Siskiyou Counties												
Pounds Applied				**# Acres Treated**	Lassen	Modoc	Siskiyou	**Average Rate per Acres (lbs/acre)**		Lassen	Modoc	Siskiyou
Forestry												
	Lassen	Modoc	Siskiyou									
chlorsulfuron	0.0	0.0	0.0	chlorsulfuron	0.0	0.0	0.0		chlorsulfuron	0.0	0.0	0.0
clopyralid	0.0	0.0	2.5	clopyralid	0.0	0.0	4.0		clopyralid	0.0	0.0	0.6
2,4-D	0.0	0.0	3231.9	2,4-D	0.0	0.0	2285.7		2,4-D	0.0	0.0	1.4
Dicamba	0.0	0.0	0.0	Dicamba	0.0	0.0	0.0		Dicamba	0.0	0.0	0.0
glyphosate	5919.0	0.0	5689.9	glyphosate	1680.0	0.0	3709.6		glyphosate	3.5	0.0	1.5
Triclopyr	0.0	0.0	2184.3	Triclopyr	0.0	0.0	1696.5		Triclopyr	0.0	0.0	1.3
total	**5919.0**	**0.0**	**11108.6**	**total**	**1680.0**	**0.0**	**7695.8**		**total**	**3.5**	**0.0**	**4.9**
Rangeland												
	Lassen	Modoc	Siskiyou									
chlorsulfuron	0.0	0.0	4.9	chlorsulfuron	0.0	0.0	184.0		chlorsulfuron	0.0	0.0	0.0
clopyralid	0.0	0.0	29.5	clopyralid	0.0	0.0	205.5		clopyralid	0.0	0.0	0.1
2,4-D	0.0	0.0	123.5	2,4-D	0.0	0.0	188.0		2,4-D	0.0	0.0	0.7
Dicamba	0.0	0.0	4.2	Dicamba	0.0	0.0	7.0		Dicamba	0.0	0.0	0.0
glyphosate	0.0	0.0	50.5	glyphosate	0.0	0.0	20.0		glyphosate	0.0	0.0	2.5
Triclopyr	0.0	0.0	0.0	Triclopyr	0.0	0.0	0.0		Triclopyr	0.0	0.0	0.0
total	**0.0**	**0.0**	**212.6**	**total**	**0.0**	**0.0**	**604.5**		**total**	**0.0**	**0.0**	**3.3**

2006 Lassen, Modoc and Siskiyou Counties												
Pounds Applied				**# Acres Treated**	Lassen	Modoc	Siskiyou	**Average Rate per Acres (lbs/acre)**		Lassen	Modoc	Siskiyou
Right of Way												
	Lassen	Modoc	Siskiyou									
chlorsulfuron	0.8	0.0	41.1	chlorsulfuron	**NR***	NR	NR		chlorsulfuron	**NA****	NA	NA
clopyralid	1.0	31.5	25.4	clopyralid	NR	NR	NR		clopyralid	NA	NA	NA
2,4-D	125.0	622.2	2785.5	2,4-D	NR	NR	NR		2,4-D	NA	NA	NA
Dicamba	5.5	56.5	296.4	Dicamba	NR	NR	NR		Dicamba	NA	NA	NA
glyphosate	50.5	429.4	2605.4	glyphosate	NR	NR	NR		glyphosate	NA	NA	NA
Triclopyr	1.5	0.0	259.9	Triclopyr	NR	NR	NR		Triclopyr	NA	NA	NA
total	**184.3**	**1139.6**	**6013.7**	**total**	**0.0**	**0.0**	**0.0**		**total**			
Forestry, Range and ROW Use (lbs) as % of Total Use (lbs) in the county												
	Lassen	Modoc	Siskiyou									
chlorsulfuron	0.0	0.0	0.0									
clopyralid	0.0	0.0	0.0									
2,4-D	0.0	0.0	0.1									
Dicamba	0.0	0.0	0.0									
glyphosate	0.1	0.0	0.1									
Triclopyr	0.0	0.0	0.0									

*NR=not reported **NA=not applicable

Table 25. Total forestry, rangeland and ROW herbicide applications (total pounds applied) within Modoc National Forest Counties for 2005

2005 Lassen, Modoc and Siskiyou Counties												
Pounds Applied				**# Acres Treated**	Lassen	Modoc	Siskiyou	**Average Rate per Acres (lbs/acre)**		Lassen	Modoc	Siskiyou
Forestry												
	Lassen	Modoc	Siskiyou									
chlorsulfuron	0.0	0.0	0.0	chlorsulfuron	0.0	0.0	0.0		chlorsulfuron	0.0	0.0	0.0
clopyralid	0.0	0.0	0.0	clopyralid	0.0	0.0			clopyralid	0.0	0.0	0.0
2,4-D	241.2	542.6	620.0	2,4-D	267.0	192.0	188.0		2,4-D	0.0	0.0	3.3
Dicamba	0.0	0.0	0.0	Dicamba	0.0	0.0	0.0		Dicamba	0.0	0.0	0.0
glyphosate	3849.2	571.4	1452.1	glyphosate	1474.6	399.0	1567.0		glyphosate	2.6	0.0	0.9
Triclopyr	220.3	0.0	735.2	Triclopyr	247.0	0.0	593.0		Triclopyr	0.0	0.0	1.2
total	**4310.7**	**1114.0**	**2807.3**	**total**	**1988.6**	**591.0**	**2348.0**		**total**	**2.6**	**0.0**	**5.5**
Rangeland												
	Lassen	Modoc	Siskiyou									
chlorsulfuron	0.0	0.0	1.0	chlorsulfuron	0.0	0.0	43.0		chlorsulfuron	0.0	0.0	0.0
clopyralid	0.0	1.6	6.8	clopyralid	0.0	25.0	46.0		clopyralid	0.0	0.0	0.1
2,4-D	1.4	1.1	0.0	2,4-D	1.0	25.0	0.0		2,4-D	0.0	0.0	0.0
Dicamba	0.0	0.0	0.0	Dicamba	0.0	0.0	0.0		Dicamba	0.0	0.0	0.0
glyphosate	0.0	2.0	6.3	glyphosate	0.0	25.0	2.5		glyphosate	0.0	0.0	2.5
Triclopyr	0.0	0.0	0.0	Triclopyr	0.0	0.0	0.0		Triclopyr	0.0	0.0	0.0
total	**1.4**	**4.7**	**14.1**	**total**	**0.0**	**0.0**	**91.5**		**total**	**0.0**	**0.0**	**2.7**

2005 Lassen, Modoc and Siskiyou Counties												
Pounds Applied				**# Acres Treated**	Lassen	Modoc	Siskiyou	**Average Rate per Acres (lbs/acre)**		Lassen	Modoc	Siskiyou
Right of Way												
	Lassen	Modoc	Siskiyou									
chlorsulfuron	1.1	0.3	20.6	chlorsulfuron	NR	NR	NR		chlorsulfuron	NA	NA	NA
clopyralid	1.0	40.3	25.3	clopyralid	NR	NR	NR		clopyralid	NA	NA	NA
2,4-D	193.5	318.2	1288.8	2,4-D	NR	NR	NR		2,4-D	NA	NA	NA
Dicamba	0.8	68.0	79.5	Dicamba	NR	NR	NR		Dicamba	NA	NA	NA
glyphosate	26.7	953.0	1980.6	glyphosate	NR	NR	NR		glyphosate	NA	NA	NA
Triclopyr	1.8	0.0	31.5	Triclopyr	NR	NR	NR		Triclopyr	NA	NA	NA
total	**224.9**	**1379.8**	**3426.3**	**total**	**0.0**	**0.0**	**0.0**		**total**	**0.0**	**0.0**	**0.0**
Forestry, Range and ROW Use (lbs) as % of Total Use (lbs) in the county												
	Lassen	Modoc	Siskiyou									
chlorsulfuron	0.0	0.0	0.0									
clopyralid	0.0	0.0	0.0									
2,4-D	0.0	0.0	0.0									
Dicamba	0.0	0.0	0.0									
glyphosate	0.0	0.0	0.0									
Triclopyr	0.0	0.0	0.0									

Table 26. Total forestry, rangeland and ROW herbicide applications (total pounds applied) within Modoc National Forest Counties for 2004

2004 Lassen, Modoc and Siskiyou Counties											
Pounds Applied				**# Acres Treated**	Lassen	Modoc	Siskiyou	**Average Rate per Acres (lbs/acre)**	Lassen	Modoc	Siskiyou
Forestry											
	Lassen	Modoc	Siskiyou								
chlorsulfuron	0.0	0.0	0.0	chlorsulfuron	0.0	0.0	0.0	chlorsulfuron	0.0	0.0	0.0
clopyralid	0.0	0.0	0.7	clopyralid	0.0	0.0	6.0	clopyralid	0.0	0.0	0.1
2,4-D	1668.7	0.0	1127.9	2,4-D	580.5	0.0	1875.6	2,4-D	0.0	0.0	0.6
Dicamba	0.0	0.0	0.0	Dicamba	0.0	0.0	0.0	Dicamba	0.0	0.0	0.0
glyphosate	776.4	48.9	1881.4	glyphosate	273.0	72.0	1293.1	glyphosate	2.8	0.0	1.5
Triclopyr	42.2	0.0	1025.1	Triclopyr	75.5	0.0	760.2	Triclopyr	0.0	0.0	1.3
total	**2487.3**	**48.9**	**4035.1**	**total**	**929.0**	**72.0**	**3934.9**	**total**	**2.8**	**0.0**	**3.5**
Rangeland											
	Lassen	Modoc	Siskiyou								
chlorsulfuron	0.0	0.0	0.0	chlorsulfuron	0.0	0.0	0.0	chlorsulfuron	0.0	0.0	0.0
clopyralid	0.0	0.0	91.6	clopyralid	0.0	0.0	494.0	clopyralid	0.0	0.0	0.2
2,4-D	0.0	0.0	134.8	2,4-D	0.0	0.0	148.0	2,4-D	0.0	0.0	0.9
Dicamba	0.0	0.0	14.6	Dicamba	0.0	0.0	98.0	Dicamba	0.0	0.0	0.0
glyphosate	0.0	0.0	0.0	glyphosate	0.0	0.0	0.0	glyphosate	0.0	0.0	0.0
Triclopyr	0.0	0.0	0.0	Triclopyr	0.0	0.0		Triclopyr	0.0	0.0	0.0
total	**0.0**	**0.0**	**241.0**	**total**	**0.0**	**0.0**	**740.0**	**total**	**0.0**	**0.0**	**1.1**

2004 Lassen, Modoc and Siskiyou Counties												
Pounds Applied				**# Acres Treated**	Lassen	Modoc	Siskiyou	**Average Rate per Acres (lbs/acre)**		Lassen	Modoc	Siskiyou
Right of Way												
	Lassen	Modoc	Siskiyou									
chlorsulfuron	0.5	10.7	25.3	chlorsulfuron	NR	NR	NR		chlorsulfuron	NA	NA	NA
clopyralid	2.6	124.9	14.9	clopyralid	11.0	NR	NR		clopyralid	4.2	NA	NA
2,4-D	94.2	1160.3	1767.9	2,4-D	NR	NR	NR		2,4-D	NA	NA	NA
Dicamba	0.0	393.2	171.8	Dicamba	0.0	NR	NR		Dicamba	NA	NA	NA
glyphosate	41.6	1764.0	3530.3	glyphosate	42.0	NR	NR		glyphosate	1.0	NA	NA
Triclopyr	1.0	17.0	953.4	Triclopyr	NR	NR	NR		Triclopyr	NA	NA	NA
total	**139.9**	**3470.1**	**6463.6**	**total**	**0.0**	**0.0**	**0.0**		**total**	**0.0**	**0.0**	**0.0**
Forestry, Range and ROW Use (lbs) as % of Total Use (lbs) in the county												
	Lassen	Modoc	Siskiyou									
chlorsulfuron	0.0	0.0	0.0									
clopyralid	0.0	0.0	0.0									
2,4-D	0.0	0.0	0.0									
Dicamba	0.0	0.0	0.0									
glyphosate	0.0	0.0	0.0									
Triclopyr	0.0	0.0	0.0									

Table 27. Total forestry, rangeland and ROW herbicide applications (total pounds applied) within Modoc National Forest Counties for 2003

2003 Lassen, Modoc and Siskiyou Counties												
Pounds Applied				**# Acres Treated**	Lassen	Modoc	Siskiyou	**Average Rate per Acres (lbs/acre)**		Lassen	Modoc	Siskiyou
Forestry												
	Lassen	Modoc	Siskiyou									
chlorsulfuron	0.0	0.0	0.0	chlorsulfuron	0.0	0.0	0.0		chlorsulfuron	0.0	0.0	0.0
clopyralid	0.0	0.0	3.3	clopyralid	0.0	0.0	14.0		clopyralid	0.0	0.0	0.2
2,4-D	344.8	0.0	382.6	2,4-D	239.0	0.0	944.0		2,4-D	0.0	0.0	0.4
Dicamba	0.0	0.0	0.0	Dicamba	0.0	0.0	0.0		Dicamba	0.0	0.0	0.0
glyphosate	1102.3	376.3	6041.7	glyphosate	389.0	403.2	4369.9		glyphosate	2.8	0.0	1.4
Triclopyr	110.8	0.0	723.2	Triclopyr	40.0	0.0	1032.0		Triclopyr	0.0	0.0	0.7
total	**1557.9**	**376.3**	**7150.8**	**total**	**668.0**	**403.2**	**6359.9**		**total**	**2.8**	**0.0**	**2.7**
Rangeland												
	Lassen	Modoc	Siskiyou									
chlorsulfuron	0.0	0.0	0.0	chlorsulfuron	0.0	0.0	0.0		chlorsulfuron	0.0	0.0	0.0
clopyralid	0.0	0.0	47.1	clopyralid	0.0	0.0	237.0		clopyralid	0.0	0.0	0.2
2,4-D	0.0	286.6	811.7	2,4-D	0.0	100.0	656.0		2,4-D	0.0	0.0	1.2
Dicamba	0.0	0.0	69.6	Dicamba	0.0	0.0	91.0		Dicamba	0.0	0.0	0.0
glyphosate	0.0	0.0	0.0	glyphosate	0.0	0.0	0.0		glyphosate	0.0	0.0	0.0
Triclopyr	0.0	0.0	0.0	Triclopyr	0.0	0.0	0.0		Triclopyr	0.0	0.0	0.0
total	**0.0**	**286.6**	**928.4**	**total**	**0.0**	**0.0**	**984.0**		**total**	**0.0**	**0.0**	**1.4**

2003 Lassen, Modoc and Siskiyou Counties												
Pounds Applied				**# Acres Treated**	Lassen	Modoc	Siskiyou	**Average Rate per Acres (lbs/acre)**		Lassen	Modoc	Siskiyou
Right of Way												
	Lassen	Modoc	Siskiyou									
chlorsulfuron	1.3	2.9	7.0	chlorsulfuron	NR	NR	NR		chlorsulfuron	NA	NA	NA
clopyralid	11.9	12.7	10.0	clopyralid	15.0	NR	NR		clopyralid	0.8	NA	NA
2,4-D	119.2	675.7	481.5	2,4-D	40.0	NR	NR		2,4-D	3.0	NA	NA
Dicamba	9.6	138.6	741.4	Dicamba	NR	NR	NR		Dicamba	NA	NA	NA
glyphosate	557.8	1140.8	2101.2	glyphosate	20.0	NR	NR		glyphosate	27.9	NA	NA
Triclopyr	2.3	4.2	89.4	Triclopyr	NR	NR	NR		Triclopyr	NA	NA	NA
total	**702.1**	**1974.9**	**3430.5**	**total**	**0.0**	**0.0**	**0.0**		**total**	**0.0**	**0.0**	**0.0**
Forestry, Range and ROW Use (lbs) as % of Total Use (lbs) in the county												
	Lassen	Modoc	Siskiyou									
chlorsulfuron	0.0	0.0	0.0									
clopyralid	0.0	0.0	0.0									
2,4-D	0.0	0.0	0.0									
Dicamba	0.0	0.0	0.0									
glyphosate	0.0	0.0	0.0									
Triclopyr	0.0	0.0	0.0									

Table 28. Total forestry, rangeland and ROW herbicide applications (total pounds applied) within Modoc National Forest Counties for 2002

2002 Lassen, Modoc and Siskiyou Counties												
Pounds Applied				**# Acres Treated**	Lassen	Modoc	Siskiyou	**Average Rate per Acres (lbs/acre)**		Lassen	Modoc	Siskiyou
Forestry												
	Lassen	Modoc	Siskiyou									
chlorsulfuron	0.0	0.0	0.0	chlorsulfuron	0.0	0.0	0.0		chlorsulfuron	0.0	0.0	0.0
clopyralid	0.0	0.0	0.0	clopyralid	0.0	0.0	0.0		clopyralid	0.0	0.0	0.0
2,4-D	827.0	1017.4	3072.5	2,4-D	622.0	360.0	3482.0		2,4-D	0.0	0.0	0.9
Dicamba	0.0	0.0	0.0	Dicamba	0.0	0.0	0.0		Dicamba	0.0	0.0	0.0
glyphosate	351.4	3.1	2002.8	glyphosate	322.0	111.0	4605.0		glyphosate	1.1	0.0	0.4
Triclopyr	391.0	0.0	1096.0	Triclopyr	206.0	0.0	768.0		Triclopyr	0.0	0.0	1.4
total	**1569.4**	**1020.5**	**6171.3**	**total**	**1150.0**	**471.0**	**8855.0**		**total**	**1.1**	**0.0**	**2.7**
Rangeland												
	Lassen	Modoc	Siskiyou									
chlorsulfuron	0.0	0.0	0.0	chlorsulfuron	0.0	0.0	0.0		chlorsulfuron	0.0	0.0	0.0
clopyralid	0.0	0.0	32.0	clopyralid	0.0	0.0	106.2		clopyralid	0.0	0.0	0.3
2,4-D	0.0	0.0	21.1	2,4-D	0.0	0.0	55.0		2,4-D	0.0	0.0	0.4
Dicamba	0.0	0.0	2.2	Dicamba	0.0	0.0	15.0		Dicamba	0.0	0.0	0.0
glyphosate	0.6	0.0	0.0	glyphosate	1.0	0.0	0.0		glyphosate	0.0	0.0	0.0
Triclopyr	0.0	0.0	0.0	Triclopyr	0.0	0.0	0.0		Triclopyr	0.0	0.0	0.0
total	**0.6**	**0.0**	**55.3**	**total**	**0.0**	**0.0**	**176.2**		**total**	**0.0**	**0.0**	**0.7**

2002 Lassen, Modoc and Siskiyou Counties												
Pounds Applied				**# Acres Treated**	Lassen	Modoc	Siskiyou	**Average Rate per Acres (lbs/acre)**		Lassen	Modoc	Siskiyou
Right of Way												
	Lassen	Modoc	Siskiyou									
chlorsulfuron	12.2	6.3	21.7	chlorsulfuron	NR	NR	NR		chlorsulfuron	NA	NA	NA
clopyralid	132.5	473.2	60.3	clopyralid	NR	NR	NR		clopyralid	NA	NA	NA
2,4-D	930.7	1594.8	1057.6	2,4-D	57.0	NR	NR		2,4-D	16.3	NA	NA
Dicamba	1352.0	294.4	652.5	Dicamba	NR	NR	NR		Dicamba	NA	NA	NA
glyphosate	204.8	933.9	2457.4	glyphosate	4.0	NR	NR		glyphosate	51.2	NA	NA
Triclopyr	6.0	7.9	116.8	Triclopyr	NR	NR	NR		Triclopyr	NA	NA	NA
total	**2638.2**	**3310.5**	**4366.3**	**total**	**0.0**	**0.0**	**0.0**		**total**	**0.0**	**0.0**	**0.0**
Forestry, Range and ROW Use (lbs) as % of Total Use (lbs) in the county												
	Lassen	Modoc	Siskiyou									
chlorsulfuron	0.0	0.0	0.0									
clopyralid	0.0	0.0	0.0									
2,4-D	0.0	0.0	0.0									
Dicamba	0.0	0.0	0.0									
glyphosate	0.0	0.0	0.0									
Triclopyr	0.0	0.0	0.0									

Appendix U:

Aquatic Wildlife Species Specialist Reports

Appendix U: Fish and Aquatic Wildlife Species Specialist Reports

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Appendix U: Fish and Aquatic Wildlife Biological Assessment

Biological Assessment

Noxious Weed Treatment Project

Modoc National Forest

Prepared by: /s/ MARTY YAMAGIWA Date: February 28, 2007
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Forest Wildlife and Fisheries Program Manager

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Appendix U1: Fish and Aquatic Wildlife Biological Assessment

I. Introduction

This Biological Assessment (BA) evaluates the effects of the proposed actions documented in the Final Environmental Impact Statement (FEIS) titled, "Modoc National Forest Noxious Weed Treatment Project", on federally listed aquatic species found on the Modoc National Forest. A letter was received from the Fish and Wildlife Service on April 8, 2003, (ref 1-10-03-I-082), concurring with the Forest's determination that the action "may affect, but is not likely to adversely affect the Modoc, Lost River, and shortnose suckers" for this project, previously named, "Noxious Weed Strategy Implementation Project". This BA addresses the effects of the alternatives as presented in the Final Environmental Impact Statement which include data changes due to public input, changes in acres to be treated, changes in treatment methods, and additional alternatives. THIS BA SUPERCEDES the BA previously submitted on February 28, 2003 to the Fish and Wildlife Service (ref. 1-10-03-I-082) and only addresses the 4 T&E fish species found on the Forest.

Noxious weeds are spreading on public and private lands throughout the west at an alarming rate. USFS lands in the west have about 6-7 million acres of infestation with an annual rate of growth of about 8-12% per year (USDA 1998). This planning effort was initiated in 1994 to stem the onslaught. Implementation of the activities discussed within this document would begin in the spring and summer following the decision and extend for a period of at least 5 years.

The analysis area for this document includes the entire Modoc National Forest. This area encompasses about 1.6 million acres of Forest System lands as well as 337,000 acres of lands administered by other agencies or private landowners. The Forest has an incredibly diverse series of habitats ranging from sagebrush at the lowest elevations to white bark pine at the highest elevations. Tables 1 documents the threatened, endangered, and proposed fish species that are present on the Forest. The USDI Fish and Wildlife Service species list dated February 2007 was used to determine the species that should be included in this analysis.

Table 1. Federally listed aquatic species that occur on or downstream of the Modoc National Forest.

Common Name	Scientific Name	Status
Shortnose sucker	*Chasmistes brevirostris*	Endangered
Lost River sucker	*Deltistes luxatus*	Endangered
Modoc sucker	*Catostomus microps*	Endangered
Warner sucker	*Catostomus warnerensis*	Threatened
Shasta crayfish	*Pacifastacus fortis*	Endangered

This BA is written in accordance with the requirements set forth under Section 7 of the Endangered Species Act (19 U S C 1536 (c)) and follows standards established in Forest Service Manual direction (FSM 2672.42).

II. Consultation to Date

Forest and FWS personnel have been in continual contact during the course of the planning effort. A letter was received from the Fish and Wildlife Service on April 8, 2003, (ref 1-10-03-I-082), concurring with the Forest's determination that the action "may affect, but is not likely to adversely affect the Modoc, Lost River, and shortnose suckers" for this project, previously named, "Noxious Weed Strategy Implementation Project". The most current consultation with the Klamath Falls office occurred on January 31, 2007, when Rick Hardy was contacted regarding this document that would address specific changes that were included in the FEIS.

III. Current Management Direction:

Management for the Forest is detailed in the Modoc National Forest Land and Resource Management Plan (LRMP)(1991), Lost River and Shortnose Sucker Recovery Plan (1993), Final Rule of Endangered Status and Critical Habitat for Modoc Sucker (1985), and other documents, which are referenced in the LRMP. Numerous pieces of legislation including Carson-Foley Act of 1968, Noxious Weed Act of 1974, as amended, Federal Land policy and Management Act, 1976 and Public Rangelands Improvement Act, 1978, all require the USFS to deal with the issue of noxious weeds on public lands.

IV. Description of the Proposed Action:

Purpose of Project

The purpose of the project is to aggressively and efficiently eradicate, or control and contain 14 specific noxious weed species (Table 2) on the Modoc NF utilizing manual, chemical, or manual and/or chemical treatments. Please see the FEIS, Chapter 1, for more information on the purpose.

This action will help preserve the native biodiversity of the Forest and promote the ecosystem health of forested and rangeland habitats by maintaining or improving native forbs and grass communities.

Description of the Alternatives

Detailed descriptions of the alternatives can be found in the FEIS. Appendix A summarizes and provides a comparison of the alternatives.

Alternative 1 – No Action.....

Under the No Action alternative, current management plans would continue to guide management of the project area. No aggressive treatment activities would be implemented to accomplish the purpose and need. The alternative provides a baseline for comparison of effects and analysis of effects.

Alternative 2 - Proposed Alternative

The Modoc NF proposes to treat 14 species of noxious weeds on 520 sites comprising approximately 5,995 acres to eradicate, control, or contain the occurrences;

treating between 300 to 1,500 acres annually for the next five years; herbicides to be applied by directed spray treatments and backpack application utilizing the treatment methods of physical (hand-pulling), individual plant herbicide treatment, or physical and/or individual herbicide treatment.

Table 2. Targeted Noxious Weeds

Canada thistle	Mediterranean sage
Common crupina or bearded creeper	Musk thistle
Dalmatian toadflax	Plumeless thistle
Diffuse knapweed	Perennnial pepperweed or tall whitetop
Spotted knapweed	Scotch thistle
Squarose knapweed	Klamathweed or St. Johnswort
Dyers woad or Marlahan mustard	Yellow starthistle

Alternative 3

Alternative 3 was developed in response to scoping comments to provide an alternative that did not include herbicides. It does not completely meet the purpose and need because some weed species may be spread as a result of ground disturbance or incomplete removal. The Alternative consists of treating between 300 to 1,500 acres annually for the next five years utilizing physical (hand-pulling) methods.

Alternative 4 – Preferred Alternative

This alternative was developed to reflect scoping comments on the need to provide flexibility in treatment methods to eradicate, control, or contain the current occurrences and expanding or new infestations of the selected noxious weeds over a 10 year time period. In this alternative, the Modoc NF proposes to authorize annual treatments of weed infestations ranging from an estimated 300 to 3000 acres. Treatment includes physical (hand-pulling, digging, grubbing), individual plant herbicide treatment (directed spray treatment by backpack sprayer or wick applications of herbicides), physical and/or individual plant herbicide treatment, and Early Detection – Rapid Response. Herbicides proposed in Alternative 4 include clopyralid, dicamba, glyphosate, triclopyr and 2,4-D.

Adaptive management, defined as "…the process of continually adjusting management in response to new information, knowledge, or technologies," will provide the opportunity to treat sites of the identified species that have developed or expanded using the same treatments as outlined in the EIS. This strategy recognizes that unknowns and uncertainty exist in the course of achieving any natural resource management goals. Early Detection – Rapid Response, as a part of adaptive management, is used in this project.

Early Detection – Rapid Response in Alternatives 4, 5, and 6 consists of treating the same or expanded sites, new sites, and the same and new species of weeds, using the same treatments as outlined in that alternative.

Alternative 5

Alternative 5 was developed in response to public comments. This alternative is a no-herbicide alternative utilizing a range of manual and cultural methods to eradicate, control, or contain approximately 280 acres of known sites by treating between 300 to 1,500 acres annually for the next 10 years.

Early Detection – Rapid Response would allow eradication of new infestations of the identified species along with adapting the methods outlined in this alternative, while utilizing the Design Standards, to remove infestations of new noxious weed species which have been proven to be eradicated, controlled, or contained by the methods evaluated. Early Detection – Rapid Response may be used on an additional 200 acres above the currently known locations annually.

Alternative 6

Alternative 6 was also developed in response to public comments. This alternative utilizes non-herbicide and herbicide treatment methods, adding a new herbicide and two mixes. It proposes to treat approximately 341 inventoried acres and treatments may include use of surfactants and dyes, as in all alternatives that use herbicides. Surfactants increase the absorption of herbicide by the weeds, and dyes assist the applicator in efficiently treating target weeds.

Early Detection – Rapid Response would allow treating new occurrences of the 14 identified weed species utilizing adaptive management within the identified Design Standards and the full range of treatment methods listed for this alternative in the FEIS.

Description of Treatments

Physical/manual treatment – This includes hand pulling, grubbing, and excavation of plants with a shovel at or just below the soil surface. All alternatives except the No Action Alternative include physical/manual treatments.

Herbicide treatment – Alternatives 2, 4, and 6 permit use of certain herbicides. Table 3 compares the herbicides proposed in each of Alternatives. Table 4 displays trade names and typical application rates of those herbicides.

Table 3. Herbicides Proposed In The Alternatives

	Herbicides	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	Herbicides	X		X		X
1	Clopyralid	X		X		X
2	Dicamba	X		X		X
3	Glyphosate	X		X		X
4	Triclopyr	X		X		X
5	2-4-D	X		X		X
6	Chlorsulfuron					X
7	Chlorsulfuron and 2,4-D (Mix 1)					X
8	Dicamba and 2,4-D (Mix 2)					X

Table 4. Herbicides and Typical Application Rates Proposed For Use in the Noxious Weed Treatment Project

	Chlorsulfuron	Clopyralid	Dicamba	Glyphosate	Triclopyr	2,4-D	Mix 1	Mix 2
Trade Name(s)	Telar	Transline	Banvel, Vanquish	Round-up Ultra RT, Round-up Original, Rodeo, Accord, others	Garlon 3A, Pathfinder II, Remedy RTU	20 formulations approved	Chlorsulfuron and 2,4-D	Dicamba and 2,4-D
Typical Application Rates	0.75-1.0 oz/ai/ac[1]	0.10 to 0.25 lbs/ae/ac	0.25 – 2 lbs/ae/ac	0.50 – 3.75 lbs/ae/ac	0.5 – 1.5 lbs/ae/ac	0.5 – 2 lbs/ae/ac	Chlorsulfuron 0.75 – 1.0 + 2,4-D 0.5 1.5 lbs/ae/ac	Dicamba 0.25 – 1.0 + 2,4-D 0.5 – 1.5 lbs/ae/ac

[1] ae = acid equivalent, ai = active ingredient

There will be a 100’ buffer from live water on all streams that have Threatened, Endangered, and Sensitive aquatic species. Formulations of riparian approved formulations of gyphosate can be used up to 10’ of live water.

Combination treatment – Some sites can or will be treated with a combination of treatments. Since this is a long-term strategy for treatment, increases or reductions of numbers of plants or size of a site may move it from one treatment method to another. For example, after several applications of herbicides a site may have few enough plants to effectively treat it using physical/manual treatment.

The annual combination of treatment methods would vary depending on specific conditions. There will be no applications of herbicides on aquatic species; aquatic species control will be addressed in a separate NEPA analysis. However, riparian invasive weeds could be treated using non-chemical means within 10 feet of the stream, and utilizing spot applications of riparian approved formulations of glyphosate up to 10' of live water. No herbicide use will be allowed within 100' of any live water where threatened, endangered, or sensitive aquatic species are present. Hand pulling and grubbing where appropriate would be the primary treatment within riparian areas. Infestation sites planned for treatment range in size from: single plants on <0.1 acre, occupancy of the species covering the entire acre, and occupancy of multiple acres comprising the site at various levels of infestation. High treatment priority is placed on known sites and pathways of spread from those sites. Areas adjacent to stream courses and road and trail systems have moderate incidences of weed infestations and great potential for spread. Noxious weed locations within administrative sites (campgrounds, parking lots, trail heads, river accesses) are at risk of infestation and are included in the treatment analysis.

The project will not include aerial spraying of herbicides, treatment of aquatic species, or applications of herbicides within 10 feet of live water.

There are a total of 12 occurrences of noxious weeds within 100' of live water covering a total of 2.29 acres that are adjacent to T&E fish habitat. Each of occurrence is less than 1 acre in size (See Volume 4, pages 55-59).

V. Existing Environment:

Modoc National Forest is located in northeastern corner of California. It is split into the Warner Mountain, Devil's Garden, Big Valley and Doublehead Ranger Districts. Elevations range from about 4,000 feet to over 10,000 feet. The Warner Mountain and western Big Valley Districts are steep, with perennial streams, while the Devil's Garden and Doublehead Districts are relatively flat with many ephemeral drainages and few perennial streams. The Forest supplies water to the Pit and the Klamath Rivers. The Forest has about 35,000 acres of developed wetlands, primarily on Devil's Garden.

Common vegetation types on the forest include: various sagebrush communities, Jeffrey and ponderosa pine, western juniper, mixed conifer, lodge pole pine, as well as white and red firs. Aspen stands are common on Warner Mountains and less common elsewhere. Dry grassy meadows are scattered throughout the landbase, and are frequent the Devil's Garden and Doublehead Districts. Although noxious weed occurrences exist in all habitat types, they are focused primarily in sage/juniper and disturbed coniferous sites (i.e. landings, plantations, barrow pits, roadsides).

VI. Species Accounts:

The following section provides a very brief account of the distribution and types of habitat utilized for each species analyzed within this document. Detailed species accounts for the Lost River sucker, shortnose sucker, and Modoc sucker can be found in previous Biological Consultations #1-1-96-F-57 and 1-10-96-F-35, Modoc National Forest Long Term Grazing Program. **Shortnose and Lost River sucker –** These species are found within the Lost River drainage on Devil's Garden and Double head Districts; these fish are known to be widespread in Willow, Boles, and Fletcher Creeks as well as in pools and wetlands. Primarily lake residents, the fish have been documented to successfully spawn, and live year round on the Forest. Radio-telemetry studies on these fish are on-going by National Biological Survey (NBS) and Bureau of Reclamation (BOR) personnel.

Habitat for these species consists of open water in lakes and streams, except when they move upstream to spawn. Fish begin making short migrations up into streams when discharge increases

at any time from early February through early April, although March is probably the most frequent month of movement. It appears that the spawning requirements for Lost River sucker are somewhat narrower than the shortnose sucker. In Willow Creek radio-tagged suckers were found to migrate only 3-6 km and remain on spawning grounds for 2-3 weeks (Perkins and Scoppetone 1996). The Lost River sucker requires well graveled riffles (>50%), although they will occasionally utilize well oxygenated spawning substrates upwelling springs. According to Perkins et. al. (1995) they have evolved different feeding strategies. Apparently Lost River suckers are bottom feeders, while shortnose suckers feed on smaller food items within the water column.

Modoc sucker - The Modoc sucker historically occurred in small tributaries of the Upper Pit River in Lassen and Modoc Counties, California, but is now found only in portions of two small drainage systems in Modoc County. Preferred habitat of the species consists of small streams characterized by large shallow pools with cover, soft sediments, and clear water. Food of the Modoc sucker consists of benthic invertebrates, algae, and detritus. During spring spawning runs, the species ascends creeks or tributaries that may be dry during summer months.

A 1978 California Department of Fish and Game survey reported the species from eight creeks: Washington, Hulbert, Turner, Willow, Ash, Dutch Flat, Johnson, and Rush. Additional streams were inhabited by the species historically, but its small, often intermittent stream habitat indicates that Modoc suckers may have never been common. Habitat degredation has removed natural barriers and allowed hybridization with the related Sacramento sucker (Catostomus occidentalis) , threatening the genetic integrity of the Modoc sucker.

On June 11, 1985, the Fish and Wildlife Service determined the Modoc sucker to be an endangered species. Critical habitat was also designated for the Modoc sucker. A designation of critical habitat does not create a management plan for a listed species. Designation does not automatically prohibit certain actions, establish numerical population goals, or prescribe specific management actions (inside or outside of critical habitat). However, critical habitat may provide added protection for areas designated and thus assist in achieving recovery. Areas designated as critical habitat receive protection under Section 7 of the Endangered Species Act with regard to actions carried out, funded, or authorized by Federal Agencies.

Warner sucker - The Warner sucker is endemic to the streams and lakes of the Warner Basin in south-central Oregon. Early residents of the area recalled when the suckers and other fishes were very abundant and would ascend the creeks in the spring to spawn. The Warner sucker is currently known to occur in portions of Crump and Hart Lakes, the spillway canal north of Hart Lake, and portions of Snyder, Honey, Twenty mile, and Twelve mile Creeks. Suitable habitat includes large, shallow natural lakes, although fish would spread into sloughs and ephemeral lakes during wet year; some resident fish are found in low gradient streams as well (Williams et.al. 1989). Warner suckers use low to moderate gradient streams for spawning and rearing. In streams, larvae drift feed on zooplankton near the surface and as they get older then switch to foraging on algae and associated benthic food items (Kennendy).

No treatments are being proposed within 5 miles of this species or its habitat. Therefore, there will be no direct, indirect, or cumulative effects to this species or its habitat.

Shasta Crayfish - The range of the Shasta crayfish is very limited occurring only within the mid section of the Pit River drainage system of Shasta County. It is grouped into eight geographically isolated populations. One of these populations, the Fall River/Fall River Mill population, is considered to be extirpated. The total population in 1978 was estimated to be fewer than 6,000 individuals (Daniels 1980). Subsequent loss of habitat points to a 1988 population that probably numbered fewer than 3,000 individuals. They have a low abundance and their distribution is highly fragmented. Migration and genetic exchange between populations is limited by hydroelectric development, natural barriers, and loss of habitat (USFWS 1998).

Shasta crayfish are found in cool, clear springs, lakes, and streams, frequently at or near a spring source, in areas with abundant volcanic rubble or boulders for escape cover from predators (Light and Clarke 1991). They prefer boulder/cobble substrate, but will also use silty substrate as long as rocks are not embedded. They have been observed using aquatic vegetation for cover, but use of vegetation is uncommon. The species prefers areas of water movement as in locations with distinct flow from a spring source. They are found in all habitat types, such as pools, riffles, and runs, but prefer runs.

Hydroelectric developments have resulted in habitat loss and fragmentation. The introduction of nonnative crayfish species, particularly the signal crayfish, introduction of nonnative game fish species, pathogens from introduced species, hatchery management, trout habitat restoration, and crayfishing have also contributed to a population decline. Sedimentation of lava substrate preferred by Shasta crayfish has been brought about through channelization, dredging, logging, forest fires, culverts and bridges, agriculture, grazing, and muskrat activity.

This species was listed as a Federal endangered species in 1988. Critical habitat has not been designated.

There is no habitat for Shasta Crayfish on the Modoc National Forest. This species only occurs about 25 miles west of the Modoc National Forest primarily in the Fall River and Hat Creek subdrainages of the Pit River in Shasta County. Therefore, there will be no direct, indirect, or cumulative effects to this species or its habitat.

VII. Effects of the Proposed Action

No Action Alternative (Alt 1)

Lost River sucker, shortnose sucker, and Modoc sucker

Direct Effects: Potential adverse effects to the aquatic environment from not controlling the spread of noxious weeds include but are not limited to, an increase in sedimentation, reduction in streambank stability, elevated water temperature with the lack of canopy cover, and a potential decrease in the amount of organic matter available to enter affected streams.

Indirect Effects: Without treatment, noxious weeds would likely become widely established across the Forest. This could lead to an increase in soil erosion (sediment deposition) and surface water runoff. Studies indicate a nearly three-fold increase in sediment yield from knapweed sites compared to an uninfested bunchgrass site.

Cumulative Effects: Weeds will continue to invade and spread on the Forest. As this process occurs, weed control options become narrower. Loss of native vegetation could lead to changes in channel morphology as channel stability decreases.

B. Action Alternatives (Alt's 2-6):

1) Physical/Manual

Lost River sucker, shortnose sucker, and Modoc sucker

Direct Effects/Indirect Effects: Physical/manual treatment as proposed is not expected to have any direct or indirect effects on the Lost River sucker, shortnose sucker, and Modoc sucker or habitat of the species.

Cumulative Effects: The physical/manual treatment of weed sites could result in some localized soil disturbance and possibly increased sedimentation of nearby drainages. These effects would be expected to be minor and temporary in duration because of the comparatively few acres of soil disturbance followed by the reclamation and restoration (where appropriate) of treated areas**.** Treatment would result better riparian condition, in turn providing more stable and useful aquatic

habitat.

2) Chemical Treatments

Lost River sucker, shortnose sucker, and Modoc sucker

Direct effects: Direct effects to the Lost River sucker, shortnose sucker, and Modoc sucker would be primarily associated with herbicide application near streams and associated riparian areas, lakes, or wetlands. A total of 0.36 acres (4 sites) of noxious weeds are found adjacent to Lost River sucker and shortnose sucker habitat. A total of 1.93 acres (8 sites) of noxious weeds are found adjacent to Modoc sucker habitat

Herbicides are applied in liquid formulations and are sprayed on foliage of the target vegetation. In some cases soil may be a major receptor and contamination can occur by chemicals leaching through the soil to the groundwater and ultimately reaching the aquatic environment. This method of introduction usually poses the least amount of risk to the aquatic environment because chemicals typically disappear from the ground surface by either plant uptake of the chemical, volatilization, and natural decomposition of the active ingredients or adsorption of the herbicide by soil particles. Mitigation measures proposed to address this are included in all alternatives utilizing chemical treatments.

Surfactants are used in herbicide formulations to increase the absorption of the herbicide by lowering the surface tension of the targeted plants. Since herbicides are used to kill plants, using a surfactant to make it more effective is a moot point. Inerts are used to improve the performance of a pesticide, and are ‘confidential business information’ of the chemical companies, and analysis of these herbicides is therefore impossible. Dyes will be used in herbicide treatments to show where the herbicide has been administered. Its effect on non-target terrestrial and aquatic species is unknown; however, its use has not resulted in any known problems. Using dyes can be an aid to making sure that only the target species is treated, and it has been recommended that dyes be used in the administering of herbicides. A synergistic effect is any effect of two herbicides acting together which is greater than the simple sum of their effects when acting alone: such herbicides are said to show synergism. The synergistic effect of the two mixes has been covered in Dave Bakke’s Specialist Report in support of the FEIS.

Leaks, spills, and improper storage and handling of containers are the source of most pesticide related groundwater contamination. These impacts can easily be mitigated with proper training of personnel and proper storage and disposal of chemicals. Risk from an accidental spill of herbicide into a water body on the Forest is considered low.

Another mode of pesticide entry to the aquatic system includes overland flow from precipitation events. Risk varies depending on soil composition and timing and intensity of precipitation events after application. Risk tends to be lower on well-vegetated forests and rangeland where soil infiltration is typically greater than precipitation. Overland flow occurs infrequently on most forest land because the infiltration capacity of the forest floor and soil is usually far greater than the rate of precipitation. Aquatic organisms are more at risk of negative impacts from herbicides in small perennial streams, or during late season when flow is reduced, due to their limited capability for dilution. Mitigation measures proposed to address precipitation events are included in the Proposed Action.

Specific buffer zones of 100’ are used that will reduce herbicide application within riparian areas. A reduction of noxious weeds in riparian areas and other aquatic habitats would benefit native plant species and result in better streambank and riparian condition, in turn providing more stable and useful aquatic environments.

Indirect effects: Not all noxious weeds would be chemically treated. Even under the integrated

weed management approach, not all weed populations would be eradicated, leaving an available seed source for continued propagation or the unlikely option of weeds being out-competed by native or desirable plant species.

Cumulative Effects: No adverse downstream cumulative effects would be expected from situations involving herbicide runoff or leaching because of the method of application, BMP's and mitigation measures designed to prevent these types of impacts from occurring.

C. Early Detection – Rapid Response Strategy:

Alternatives 4, 5, and 6 include treatment of up to 200 acres (100 ac max/year) under this strategy. Only methods approved for use under this NEPA decision are approved for use, therefore the direct, indirect, and cumulative effects for the Early Detection – Rapid Response Strategy will be the same as listed above for the action alternatives.

VIII. Cumulative Effects:

Timber/Silvicultural Activities: On average 2,500 acres are logged for saw logs with an additional 3,000 treated for wood fiber annually on the Modoc National Forest. Harvest prescriptions vary from clear cut to understory thinning. The various timber sales may have had effects on the species discussed in this document that would have been disclosed within their individual National Environmental Policy Act dictated documentation; discussing the potential effects of those projects is beyond the scope of this document. .

The amplitude of effect future timber and silvicultural activities is expected to significantly decrease due to the institution of noxious weed prevention measures. Timber sales and other cultural treatments will need to have changes in planning and implementation. Noxious weed locations will be presented as part of the ID team process so that activities in these areas can be avoided or mitigated (timing projects outside of high risk seasons). Logging systems design should maintain ground cover by minimizing ground disturbance and avoid opening up the overstory adjacent to noxious weed populations. Logging equipment will be washed to stem the transfer of noxious weeds (timber sale clause CT 6.343). Timber sale contract clauses C5.12 (Use of Road Purchaser), C5.4 (General and Special Maintenance Requirements), and C6.315 (Sale Operation Schedule) will be used to keep vehicles and equipment out of high-risk areas during weed seed production periods. Although cumulatively, 80% of noxious weed occurrences have been caused by past timber operations, the new regulations are anticipated to minimize this type weed spread.

Timber harvest and silvicultural treatments will continue to be regulated so any potential adverse effects would be mitigated for during the project phase for all federally listed species. Therefore, between the measures to decrease noxious weeds and the mitigations of future timber harvest activities, there are no anticipated significant cumulative effects on T&E fish.

Grazing: Grazing allotments occur on every acre of the Modoc National Forest, however, roughly 10% of these allotments are vacant and about 2% are in non-use. Approximately, 122,500 animal unit months of grazing occurs annually. There is also one wild horse territory with approximately 425 head.

The greatest potential for livestock to spread noxious weeds is transportation in the animals' hair. A secondary, but smaller concern could be the concentrated use of areas causing bare patches. If weed occurrences were adjacent, they could provide a seed bed. Livestock may be used as a tool to control of noxious weeds in the future, depending on the species and the estimated effectiveness of domestic animals.

The integration of the new guidelines are hoped to minimize the potential spread of weed occurrences as well as new infestations. The following standards and guidelines will be utilized.

Annual operating plans would provide information to the permittees regarding noxious weed identification, methods of spread and prevention measures.

The exclusion of livestock (and wildlife where feasible) from high priority noxious weed sites should be considered where the animals are likely to cause spread of the weed off site

Potential cumulative effects of livestock grazing are fairly minimal.

Fire: Fire management activities that have the potential to spread noxious weeds can be separated into two categories: fuels management and suppression. Approximately 17,000 acres are proposed for fuels treatment per year across the Forest: 5,000 acres of prescribed burns and 12,000 acres of mechanical fuels manipulation.

Areas that have mechanical treatments such as brush mowing and coniferous tree understory thinning are less likely to have potential to spread noxious weeds. Activities associated with mowing are not likely to leave bare spaces upon completion of the project. Plus, areas will be mowed when there is less of a chance of equipment spreading seed. Understory thinning will have the guidelines stated in the Timber/Silviculture section.

Prescribed burns have a potential to increase the amount of noxious weed occurrences on the Forest. Areas that are left bare post fire will be considered for seeding with appropriate seed mixes. Other mitigations to minimize the potential for noxious weed spread will be implemented during prescribed burning activities.

Timing of fire in relation to specific weed species in proposed burn area will be considered; if possible, time burning to control weeds. If burning must be during a high-risk period when weed populations are likely to be favored, NEPA documents will discuss the monitoring and prompt treatment immediately upon observing a weed problem. Monitor burned areas intensively the first year after burning, preferably for 3 years.

Fire management treatments will continue to be regulated so any potential adverse effects would be mitigated during the project phase for all federally listed species. Therefore, between the measures to decrease noxious weeds and the mitigations of future fire management activities, the 3.42 acres that could be treated in Lost River sucker, shortnose sucker, and Modoc sucker, there are no expected cumulative effect on these three species.

Wildfire and associated suppression and rehabilitation measures on the other hand certainly may provide both an excellent seed source and seed bed. Although there is little control of the location of wildfire, the following standards and guidelines will be implemented during the course of wildfire suppression.

The use of high-priority sites for fire camps and staging areas will be avoided whenever any reasonable alternative exists. Noxious weed prevention will be addressed in fire rehabilitation and restoration plans.

There is no way of quantifying the location and extent of future wildlife fires, therefore a determination of the cumulative effects of fire on T&E fish is not possible.

Recreation: Although there is a myriad of recreation associated activities that occur on the Modoc National Forest, the two past-times that have the greatest potential to cause the spread of noxious weeds are stock use and equestrian related events such as the Modoc tribe ride. Stock use on Modoc NF is estimated as 6,650 Recreation Visitor Days (RVD) annually with the vast majority within the South Warner Wilderness. Typically there is only one equestrian special use a year, however, there are a few other rides once every five years. Special event horse use averages roughly 50 horses for three days. In summary, there is a rather minor amount of stock and horse use on the Forest as a whole.

In order to decrease the potential for weed introduction via these means, the following Operating

Guides have been instituted.

Special emphasis will be placed on inventory and management of noxious weeds at trailheads.

Special Use Permits for equestrian groups would recommend pelletized feed be used rather than hay or straw.

> Facilities and high-visibility travel ways would be maintained as weed free zones. Weeds at administration sites, visitor centers, and trailheads would be controlled. Information informing the public and forest service employees that these are "zero tolerance" areas will be posted. This will also be used as opportunities for education. Working cooperatively with the State of California, State of Nevada and the County Weed Boards we will strive to prevent the introduction and establishment of noxious weed infestations as a result of roads, recreation facilities, special use permits, timber harvest, and fuels treatment (see FSM 2081.2),

Given the rather small and mostly localized use of stock and equestrians, plus the implementation of the above guidelines it is not anticipated that recreational activities will significantly contribute to noxious weed spread on this Forest.

The implementation of the weed control program discussed in this document coupled with recreational activities that occur on the Forest will have no cumulative effect on the T&E fish species.

Other Federal Lands in California:

The Modoc National Forest abuts the Klamath and Shasta-Trinity National Forests on the western flank. The Lassen National Forest administers some of these lands, and also has land that lie roughly 2 to 4 miles south of the Big Valley District.

Klamath National Forest-Goosenest District: Currently, their weed control activities have focused on survey, although they have done a small amount of mechanical treatments (less than 1 acre).

Lassen National Forest – Hat Creek District: There is roughly 40 acres on the areas adjacent to the Modoc National Forest that receive control for noxious weeds. The species targeted include dyer's woad, Scotch thistle, and squarrose knapweed.

Shasta-Trinity National Forest – Mc Cloud District: There is no noxious weed control occurring on the portion of the District administered by the Shasta-Trinity National Forest at this time. There are roughly 10 acres of noxious weeds controlled on the portion of the District administered by the Lassen.

Additional lands administered by the federal government outside of Forest Service jurisdiction include 2 wildlife refuges, 1 national park, and 2 BLM resource areas. All of these agencies have noxious weed management programs in place, which include the use of herbicides. An estimation of these agencies programs is as follows:

Klamath Basin National Wildlife Refuge: The Klamath Basin has weed treatments both as part of their noxious weed eradication program as well as farming that occurs within its jurisdiction. On the Tule Lake unit there is roughly 20-30 acres that are treated with rodeo in order to control purple loosestrife. In the Lower Klamath unit, there is another 50 acres of upland sites that are treated with Banvel and Round up to control pepperweed. There is no control occurring on the Clear Lake unit.

Modoc National Wildlife Refuge: Approximately 200 acres are treated annually to control scotch thistle. Rodeo, Roundup, 2_4D and other chemicals are applied by hand, ATV, and truck in addition to a limited amount of hand grubbing that occurs.

BLM-Alturas: About 50 acres in Modoc County are treated annually for the control of primarily Scotch thistle and Mediterranean Sage. Both Telar and 2,4D are applied using both trucks and helicopters.

BLM- Surprise Valley: There are approximately 425 acres of various weed occurrences on the BLM lands in Modoc and Lassen Counties that have been physically (which includes prescribed fire) or chemically controlled from 1997 to 2002; the vast majority is medusa head (410 acres out of 425 acres total).

Lava Beds National Park: Weed treatments on the Lava Beds National Park consist of a combination of mechanical and chemical treatment using Round Up. Weeds that can not be extracted by hand (using a pulaski) are sprayed by hand with the chemical. This occurs on approximately 170 acres. The main weed species of concern are: mullein, hoarhound mint, bull thistle, stinging nettle, and sweet clover.

Other Federal Lands Within Oregon:

Fremont National Forest: Currently, there are approximately 200 acres per year that are sprayed on the Fremont National Forest. Chemical control is focused on spotted knapweed, dalmation toadflax, and Canada thistle. The Forest also has a hand treatment program. The entire Forest encompasses 1.2 million acres.

BLM-Lakeview: This Resource Area uses both physical and chemical means to treat various noxious weeds. There are approximately 250 acres of chemical treatments that occur per year using picloram, glyphosate, and 2,4 – D (amine). These chemicals are used to treat the following weed species: Russian knapweed, hoary cress, Mediterranean sage, Canada thistle, and medusa head. There is an additional 40 acres per year treated by physical means to control musk thistle and Mediterranean sage. There are 3.2 million acres within the boundaries of this Resource Area.

State and Private Lands:

There is roughly 10,000 acres a year that are treated with herbicides on private, commercial farm ground, and private forests for noxious weed treatment within Modoc County as a whole (Joseph Moreo, pers.comm.). In addition, 1,000 acres of regulatory noxious weed control occurs. Roughly 11 acres have been treated on the Ft. Bidwell Reservation; Mediterranean sage, scotch thistle, and Dyer's woad were controlled using mechanical means.

CUMULATIVE EFFECTS SUMMARY:

Of the roughly 2.5 million acres of federal lands encompassed by our Modoc National Forest Map only 6,913 acres will receive treatment on the Modoc National Forest for noxious weeds or about 0.0028%. Of the roughly 4 million acres of state, private and federal lands encompassed by the Forest map, about 14,000 acres or .0056% are treated annually for noxious weed eradication (including the acres proposed by the Modoc National Forest). As stated previously, a maximum of 3.42 acres would be treated in areas that have any potential to effect Lost River sucker, shortnose sucker and Modoc sucker. Due to the location of most of the weed infestations in areas outside of live water occupied by T&E fish, the short duration of management activities, , and other mitigations specific within the Project Design Standards, there are no significant cumulative effects expected with implementation of mechanical, physical and chemical control activities associated with the Noxious Weed Treatment Project.

IX. Determination:

Based on the analysis of effects of the project, it is my determination that this project:

Will have "No Effect" on the Lost River sucker, shortnose sucker, Modoc sucker, Warner sucker, and Shasta Crayfish or their habitat with the implementation of the Action Alternatives.

This determination is based on the distance (over 5 miles) of the proposed treatment area from the Warner sucker and distance (25 miles) of the proposed treatment area from the Shasta crayfish.

For the Lost River sucker, shortnose sucker, and Modoc sucker, this determination is based on the fact that buffer zones (100') of no chemical use have been established for these species and the limited number of sites to be treated (2.29 acres, 12 sites). The only chemical proposed for use within 10' of live water is a riparian approved formulation of glyphosate. Vegetative or channel morphology change are not anticipated to be significant enough to affect the species.

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Appendix A: Summary Comparison of Alternatives for the Noxious Weed Treatment Project

Alternatives / Alternative Features	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Treatment Timeframe	**Ongoing**	**5 years**	**5 years**	**10 years**	**10 years**	**10 years**
Treatment Sites and Acres	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**
Total Inventoried Weeds (2004)	541/6908	541 / 6908	541 / 6908	541 / 6908	541 / 6908	541 / 6908
Inventoried Weeds Fully Treated	**20-30** ac/yr[1]	520 / **5,995**	494 / **5,993**	520 / **5,995**	520 / **180**	538/ **241**
Inventoried Weed Sites Receiving Partial Treatment2	0/0	16/904[2]	0/0	16/904[2]	0/0	0/0
Inventoried Weeds Receiving Limited Treatment3	0/**0**	0/**0**	0/**0**	0/0	9/**100**[3]	3/**100**[3]
Inventoried Weeds Not Treated4	6,878[1]	5/9[4]	47/916[4]	5/9[4]	5 / 5515	0/6,567[4]
Proportion of Inventoried Weeds Treated	0.4%	n.a. / 87 %	91% / 87%	99 % / 99 %	100 % / 4 %	100 % / 5 %
Noxious Weeds Treated Through Early Detection – Rapid Response (acres)5		0 acres	0 acres	Up to **200** acres (100 ac max/yr)	Up to **200** acres (100 ac max/yr)	Up to **200** acres (100 ac max/yr)
Total Acres of Weeds Treated	20-30 ac/yr1	**6,899** acres	**5,993** acres	**7,099** acres	**480** acres	**541** acres
Treatment Methods for Inventoried Noxious Weeds (2004)	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**
Physical – hand pulling, hoeing, grubbing	0/0	161/31	494/5,993	161/31	0/0	0/0
Physical+ – Physical plus, clipping seed head or plant, weed eater, mulch/tarp	20-30 ac/yr1	0/0	0/0	0/0	527/139	116/19
Physical and/or Herbicide Treatments	0/**0**	333/5,961	0/**0**	333/5,961	0/**0**	371/**116**
Herbicide	0/**0**	42/**907**	0/**0**	32/9**07**	0/**0**	46/**65**
Limited Treatment3	0/0	0/0	0/0	0/0	9/100	3/100
Goat Grazing (potential) (physical/herbicide)	0/0	0/0	0/0	0/0	5/41 (no herbicide)	5/**41**
Total Acres Potentially Treated with Herbicides (includes ED-RR acres)6	0/**0**	355/6,868	0/**0**	355/7,068	0/**0**	425/**522**

[1]Under Current Management (Alt. 1), approximately 20 to 30 acres of noxious weeds are treated each year through other site specific NEPA decisions as part of other projects in accordance with the Modoc NF Integrated Weed Management Strategy (2005).

[2]These sites are rhizomotous species that occur within 10 feet of H2O. Those sites that are within 10 feet of H2O would not be treated. Sites with acreage ooutside of this 10 foot no treatment zone would receive partial treatment. The acreage within the 10 foot zone would not be treated, the acreage outside the 10 foot zone would be treated with herbicides.

[3]Includes treating along borders of infestations to prevent spread using the methods specific to each alternative. Treatment is estimated at 100 acres to be proportionally distributed based on the size of the individual infestations. These acres are included in the Inventoried Noxious Weeds Treated acreage.

[4]Excluded in Alt. 2 and Alt. 4: 5 sites of rhizamotous species that are within 10' of live water and partial acreage of 16 sites of rhizamotous species that are within 10' of live water. Rhizamotous species will not be treated by physical methods in these alternatives. Excluded in Alt. 3: 47 sites of rhizamotous species. Excluded in Alt. 5: 5,658 acre Dyer's woad, 850 acre Dalmatian toadflax, 159 acre crupina, and 6 sites of rhizamotous species. These sites will receive limited treatment around the perimeter estimated at 100 acres proportionally distributed based on the size of these sites. Excluded in Alt. 6: 5,658 acre Dyer's woad, 850 acre Dalmatian toadflax, 159 acre crupina. These sites will receive limited treatment around the perimeter estimated at 100 acres proportionally distributed based on the size of these sites.

[5]May use any of the methods approved for use in this NEPA decision.

[6]For Alt. 2 this includes the acres under the physical and/or herbicide method plus the herbicide treated acres. Alt. 4 adds the same categories as Alt. 2 plus adds in the potentially treated 200 acres through early detection rapid response. Alt. 6 includes the Physical and/or Herbicide acres, the herbicide acres, the acres under goat grazing, the acres under the limited treatment category, and the 200 acres under Early Detection-Rapid Response.

Appendix U: Fish and Aquatic Wildlife Species Biological Evaluation

Biological Evaluation
Aquatic Species

Noxious Weed Treatment Project

Modoc National Forest

Final Environmental Impact Statement

Reviewed by: /S/ MARTY YAMAGIWA Date: 3/2/2007
Marty Yamagiwa
Forest Wildlife and Fish Program Manager

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I. Introduction:

This Biological Evaluation (BE) evaluates the effects of the proposed actions documented in the Final Environmental Impact Statement titled Modoc National Forest Noxious Weed Treatment Project on USDA Forest Service Pacific Southwest Region (5) sensitive aquatic species found on the Modoc National Forest. It follows standards established in Forest Service Manual direction (FSM 2672.42). This BE supercedes any previous biological evaluations for aquatic species as it addresses changes made between the "Modoc National Forest Noxious Weed Treatment Project DEIS" and the "Modoc National Forest Noxious Weed Treatment Project FEIS". A separate BE was written for the sensitive terrestrial wildlife and plant species and Biological Assessments were written for federally listed species. Implementation of the activities is expected to begin in the spring following the decision.

The analysis area for this document includes the entire Modoc National Forest. This area encompasses about 1.6 million acres of Forest System lands as well as 337,000 acres of lands administered by other agencies or private landowners. The Forest has an incredibly diverse series of habitats ranging from sagebrush at the lowest elevations to white bark pine at the highest elevations. An analysis area of this size will allow a programmatic approach to noxious weed control as well as enable mitigations to be consistently applied to each District; there should be no effect to the species described within this document. The following tables document the fish and wildlife species that are present on the Forest. The Region 5 Regional Forester's Sensitive species list dated 8 June 1998 was used to determine the species that should be included in this analysis.

Table 1. USDA Forest Service Region 5 Sensitive Aquatic Species that occur or have habitat downstream from the Modoc National Forest.

Common Name	Scientific Name	Taxon
California floater	*Anodonta californiensis*	invertebrate
Scalloped juga	*Juga acutifilosa*	invertebrate
Cascade frog	*Rana cascade*	amphibian
Northern leopard frog	*Rana pipiens*	amphibian
Spotted frog	*Rana pretiosa*	amphibian
Northwestern pond turtle	*Clemmys marmorata marmorata*	reptile
Goose Lake sucker	*Catostomus occidentalis lacusanserinus*	fish
Goose Lake tui chub	*Gila bicolor thallassina*	fish
Goose Lake lamprey	*Lampetra tridentata ssp*.	fish
Goose Lake redband trout	*Oncorhynchus mykiss pop 6*	fish
Warner Valley redband trout	*Oncorhynchus mykiss pop 4*	fish

II. Current Management Direction:

Management for the Forest is detailed in the Modoc National Forest Land and Resource Management Plan (LRMP). Numerous pieces of legislation including Carson-Foley Act of 1968, Noxious Weed Act of 1974, as amended, Federal Land policy and Management Act, 1976 and Public Rangelands Improvement Act, 1978, all require the USFS to deal with the issue of noxious weeds on public lands.

III. Description of the Proposed Action:

Purpose of Project

The purpose of the project is to aggressively and efficiently eradicate, or control and contain 14 specific noxious weed species (Table 2) on the Modoc NF utilizing manual, chemical, or manual and/or chemical treatments. Please see the FEIS, Chapter 1, for more information on the purpose.

This action will help preserve the native biodiversity of the Forest and promote the ecosystem health of forested and rangeland habitats by maintaining or improving native forbs and grass communities.

Description of the Alternatives

Detailed descriptions of the alternatives can be found in the FEIS. Appendix A summarizes and provides a comparison of the alternatives.

Alternative 1 – No Action.....

Under the No Action alternative, current management plans would continue to guide management of the project area. No aggressive treatment activities would be implemented to accomplish the purpose and need. The alternative provides a baseline for comparison of effects and analysis of effects.

Alternative 2 - Proposed Alternative

The Modoc NF proposes to treat 14 species of noxious weeds on 520 sites comprising approximately 5,995 acres to eradicate, control, or contain the occurrences;

treating between 300 to 1,500 acres annually for the next five years; herbicides to be applied by directed spray treatments and backpack application utilizing the treatment methods of physical (hand-pulling), individual plant herbicide treatment, or physical and/or individual herbicide treatment.

Table 2. Targeted Noxious Weeds

Canada thistle	Mediterranean sage
Common crupina or bearded creeper	Musk thistle
Dalmatian toadflax	Plumeless thistle
Diffuse knapweed	Perennnial pepperweed or tall whitetop
Spotted knapweed	Scotch thistle
Squarose knapweed	Klamathweed or St. Johnswort
Dyers woad or Marlahan mustard	Yellow starthistle

Alternative 3

Alternative 3 was developed in response to scoping comments to provide an alternative that did not include herbicides. It does not completely meet the purpose and need because some weed species may be spread as a result of ground disturbance or incomplete removal. The Alternative consists of treating between 300 to 1,500 acres annually for the next five years utilizing physical (hand-pulling) methods.

Alternative 4

This alternative was developed to reflect scoping comments on the need to provide flexibility in treatment methods to eradicate, control, or contain the current occurrences and expanding or new infestations of the selected noxious weeds over a 10 year time period. In this alternative, the Modoc NF proposes to authorize annual treatments of weed infestations ranging from an estimated 300 to 3000 acres. Treatment includes physical (hand-pulling, digging, grubbing), individual plant herbicide treatment (directed spray treatment by backpack sprayer or wick applications of herbicides), physical and/or individual plant herbicide treatment, and Early Detection – Rapid Response. Herbicides proposed in Alternative 4 include clopyralid, dicamba, glyphosate, triclopyr and 2,4-D.

Adaptive management, defined as "…the process of continually adjusting management in response to new information, knowledge, or technologies," will provide the opportunity to treat sites of the identified species that have developed or expanded using the same treatments as outlined in the EIS. This strategy recognizes that unknowns and uncertainty exist in the course of achieving any natural resource management goals. Early Detection – Rapid Response, as a part of adaptive management, is used in this project.

Early Detection – Rapid Response in Alternatives 4, 5, and 6 consists of treating the same or expanded sites, new sites, and the same and new species of weeds, using the same treatments as outlined in that alternative.

Alternative 5

Alternative 5 was developed in response to public comments. This alternative is a no-herbicide alternative utilizing a range of manual and cultural methods to eradicate, control, or contain approximately 280 acres of known sites by treating between 300 to 1,500 acres annually for the next 10 years.

Early Detection – Rapid Response would allow eradication of new infestations of the identified species along with adapting the methods outlined in this alternative, while utilizing the Design Standards, to remove infestations of new noxious weed species which have been proven to be eradicated, controlled, or contained by the methods evaluated. Early Detection – Rapid Response may be used on an additional 200 acres above the currently known locations annually.

Alternative 6

Alternative 6 was also developed in response to public comments. This alternative utilizes non-herbicide and herbicide treatment methods, adding a new herbicide and two mixes. It proposes to treat approximately 341 inventoried acres, and treatments may include use of surfactants and dyes, as in all alternatives that use herbicides. Surfactants increase the absorption of herbicide by the weeds, and dyes assist the applicator in efficiently treating target weeds.

Early Detection – Rapid Response would allow treating new occurrences of the 14 identified weed species utilizing adaptive management within the identified Design Standards and the full range of treatment methods listed for this alternative in the FEIS.

Description of Treatments

Physical/manual treatment – This includes hand pulling, grubbing, and excavation of plants with a shovel at or just below the soil surface. All alternatives except the No Action Alternative include physical/manual treatments.

Herbicide treatment – Alternatives 2, 4, and 6 permit use of certain herbicides. Table 3 compares

the herbicides proposed in each of Alternatives. Table 4 displays trade names and typical application rates of those herbicides.

Table 3. Herbicides Proposed In The Alternatives

	Herbicides	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	Herbicides	X		X		X
1	Clopyralid	X		X		X
2	Dicamba	X		X		X
3	Glyphosate	X		X		X
4	Triclopyr	X		X		X
5	2-4-D	X		X		X
6	Chlorsulfuron					X
7	Chlorsulfuron and 2,4-D (Mix 1)					X
8	Dicamba and 2,4-D (Mix 2)					X

Table 4. Herbicides and Typical Application Rates Proposed For Use in the Noxious Weed Treatment Project

	Chlorsulfuron	Clopyralid	Dicamba	Glyphosate	Triclopyr	2,4-D	Mix 1	Mix 2
Trade Name(s)	Telar	Transline	Banvel, Vanquish	Round-up Ultra RT, Round-up Original, Rodeo, Accord, others	Garlon 3A, Pathfinder II, Remedy RTU	20 formulations approved	Chlorsulfuron and 2,4-D	Dicamba and 2,4-D
Typical Application Rates	0.75-1.0 oz/ai/ac[1]	0.10 to 0.25 lbs/ae/ac	0.25 – 2 lbs/ae/ac	0.50 – 3.75 lbs/ae/ac	0.5 – 1.5 lbs/ae/ac	0.5 – 2 lbs/ae/ac	Chlorsulfuron 0.75 – 1.0 + 2,4-D 0.5 1.5 lbs/ae/ac	Dicamba 0.25 – 1.0 + 2,4-D 0.5 – 1.5 lbs/ae/ac

[1] ae = acid equivalent, ai = active ingredient

There will be a 100’ buffer from live water on all streams that have Threatened, Endangered, and Sensitive aquatic species. Formulations of riparian approved formulations of gyphosate can be used up to 10’ of live water.

Combination treatment – Some sites can or will be treated with a combination of treatments. Since this is a long-term strategy for treatment, increases or reductions of numbers of plants or size of a site may move it from one treatment method to another. For example, after several applications of herbicides a site may have few enough plants to effectively treat it using physical/manual treatment.

The annual combination of treatment methods would vary depending on specific conditions. There will be no applications of herbicides on aquatic species; aquatic species control will be addressed in a separate NEPA analysis. However, riparian invasive weeds could be treated using non-chemical means within 10 feet of the stream, and utilizing spot applications of riparian approved formulations of glyphosate up to 10’ of live water. No herbicide use will be allowed

within 100' of any live water where threatened, endangered, or sensitive aquatic species are present. Hand pulling and grubbing where appropriate would be the primary treatment within riparian areas. Infestation sites planned for treatment range in size from: single plants on <0.1 acre, occupancy of the species covering the entire acre, and occupancy of multiple acres comprising the site at various levels of infestation. High treatment priority is placed on known sites and pathways of spread from those sites. Areas adjacent to stream courses and road and trail systems have moderate incidences of weed infestations and great potential for spread. Noxious weed locations within administrative sites (campgrounds, parking lots, trail heads, river accesses) are at risk of infestation and are included in the treatment analysis.

The project will not include aerial spraying of herbicides, treatment of aquatic species, or applications of herbicides within 10 feet of live water.

There are a total of 9 occurrences of noxious weeds within 100' of live water covering a total of 12.6 acres that are adjacent to sensitive aquatic species habitat. Each of occurrence is less than 1 acre in size (See Volume 4, Map Book, Page 63 for index to maps of with location of sensitive species.)

IV. Existing Environment:

Modoc National Forest is located in northeastern corner of California. It is split into the Warner Mountain, Devil's Garden, Big Valley and Doublehead Ranger Districts. Elevations range from about 4,000 feet to over 10,000 feet. The Warner Mountain and eastern Big Valley Districts are steep, with perennial streams, while the Devil's Garden and Doublehead Districts are relatively flat with many ephemeral drainages and few perennial streams. The Forest supplies water to the Pit and the Klamath Rivers. The Forest has about 35,000 acres of developed wetlands, primarily on Devil's Garden.

Common vegetation types on the forest include: various sagebrush communities, Jeffrey and ponderosa pine, western juniper, black oak, mixed conifer, lodge pole pine, as well as white and red firs. Aspen stands are common on Warner Mountains and less common elsewhere. Dry grassy meadows are scattered throughout the landbase, and are frequent the Devil's Garden and Doublehead Districts. Although noxious weed occurrences exist in all habitat types, they are focused primarily in sage/juniper and disturbed coniferous sites (i.e. landings, plantations, barrow pits, roadsides).

V. Species Accounts:

The following section provides a very brief account of the distribution and types of habitat utilized for each species analyzed within this document..

California floater - The California floater is a freshwater mussel with a historical distribution from southern British Columbia to northern Baja California (California Floater fact sheet). Its current range is the Fall and Pit Rivers, Shasta County (USDA Forest Service 1998). It occurs in lakes and slow rivers, generally on soft substrates (mud-sand) in fairly large streams and lakes only, in relatively slow current (USDA Forest Service 1998). Primary threats are eutrophication from agricultural runoff and urbanization, sedimentation that smothers mussel beds, water diversions that reduce instream flows, introduction of exotic species, grazing, water impoundments that reduce current velocities and allow for sediment deposition (USDA Forest Service 1998).

This species does not have suitable habitat that is directly, indirectly, or cumulatively affected by the proposed action and will not be carried forward for further analysis.

Scalloped juga - The scalloped juga is a large river form gastropod, restricted to swift

unpolluted, well-oxygenated areas with gravel/boulder substrate, generally at low elevations (USDA Forest Service 1998). This species still is found in a few widely separated sites in the Pit River, below the falls in Shasta County.

This species does not have suitable habitat that is directly, indirectly, or cumulatively affected by the proposed action and will not be carried forward for further analysis.

Goose Lake lamprey - The Goose Lake lamprey is an undescribed subspecies of the sea-run Pacific lamprey (*Lampetra tridentata*). It is likely that they migrate up suitable tributary streams in winter or spring to spawn. They have to move up far enough, possibly 12-19 miles upstream of the lake to find gravel for spawning and to have enough suitable soft-bottomed habitat downstream of the spawning area for survival of the ammocoetes. The ammocoetes probably spend 4 to 6 years in streams before metamorphosing into adults and moving out into the lake.

There is a need to develop an understanding of the taxonomy and life history of this form of landlocked population.

Goose Lake redband trout - The name redband trout is used to cover a confusing complex of distinctive trouts that occur in isolated headwater streams of the McCloud, Pit, Klamath, and Columbia river systems of California, Nevada, and Oregon. The Goose Lake redband trout is endemic to Goose Lake and its major tributaries (Lassen and Willow creeks in California and the extensive Thomas Creek system and Crane Creek in Oregon) as well as to smaller streams such as Cottonwood Creek in California and several small streams in Oregon. Berg (1987) reported that Joseph, Parker, and East creeks (tributaries of the upper Pit River in California) contained trout genetically similar to Goose Lake redband. This species has both lake and stream dwelling populations, which both rely on headwater streams for spawning. Riffles with clean gravels and suitable water temperatures are required.

The long-term persistence of this fish depends largely on the health of populations in the headwater streams flowing into Goose Lake in Oregon and California, even though much of the conservation attention has focused on large fish in the lake itself. The extirpation of the lake population during a drought and its subsequent partial recovery indicate the probable importance of downstream colonization of the lake from headwater populations. Because of the high level of concern over extirpation of Goose Lake redbands (and other native fishes) from Goose Lake when it dried up, conservation efforts have been under way in the watershed, by both agencies and private landowners, to restore streams (e.g., by changing grazing practices) and to remove or alter migration barriers (Moyle 2002). Populations are currently stable.

Goose Lake tui chub – In California tui chubs are native mostly to interior drainages, except the Central Valley, and absent from all coastal drainages, except where introduced. In the Sacramento-San Joaquin drainage tui chubs are native only to Pit river downstream at least as far as Hat Creek and lake Britton and to Goose Lake, although they have been introduced into some reservoirs and ponds in various locations.

The Goose Lake tui chub is considered by Snyder (1908) to be the native tui chub of the upper Pit River from Big Valley upstream to and including Goose Lake. Hubbs et. al. (1979) determined that the Pit River form and the Goose Lake form of tui chub were distinct and that the Goose Lake tui chub was a distinct subspecies with the *thalassina* name. Tui chubs in general are opportunistic omnivores and consume a wide variety of aquatic invertebrates (Moyle 1976). Tui chubs are abundant and widely distributed, and so are not in trouble as a species (Moyle 2002).

Goose Lake sucker - The Goose Lake sucker is a described subspecies of Sacramento sucker. The Goose Lake sucker was originally described in 1913 as a subspecies (Fowler 1913) and further studies indicated that the subspecies was distinct, but the differences minor. During their second year, Goose Lake suckers migrate in April or May, depending on water temperature, to

spawn in streams that are tributary to the lake (Martin 1967). Adults have been found in the lake, some of the streams, and some of the reservoirs throughout the year. During summer, young suckers are very abundant in shallow water among aquatic macrophytes. Goose Lake suckers feed primarily on algae and diatoms (Martin 1967).

Warner Valley redband trout - The Warner Valley redband trout are found in the Warner Valley drainage in south-central Oregon and small portions of northwestern Nevada and northeastern California. They are found in California in the upper Dismal and Twelve mile Creek drainages on the Modoc National Forest. Present abundance of Warner Valley redband trout in streams appears to be low. Population densities ranged from 11 to 456 redband trout per 1 mile in Honey and Twelve mile Creeks, respectively (Tait and Mulkey 1993). Warner Valley redband trout use all habitat types from the lake bottom dominated by rock and mud substrate, to the high gradient upper reaches dominated by pools and riffles with small boulder and cobble substrate.

No treatment is proposed within the watershed occupied by this species. This species does not have suitable habitat that is directly, indirectly, or cumulatively affected by the proposed action and will not be carried forward for further analysis.

Northwestern pond turtle - Northwestern pond turtles have been sighted in several locations on the Forest, including Willow Creek on Big Valley RD, Lost River on Doublehead RD, and along the Pit River near Alturas. Pond turtles utilize a variety of habitats in areas with permanent or relatively permanent water that have a slower current. They require basking sites (e.g. partially submerged logs, rocks, open mud banks) and are omnivorous.

Cascade frog - Historically the Cascade frog was continually distributed along the Cascade Mountain axis between northern Washington and northern California and extended to the extreme northern end of the Sierra Nevada. Currently, Cascade frogs are distributed from the Shasta-Trinity region eastward toward the Modoc Plateau and southward to the Lassen region and the upper Feather River system from elevations ranging from 3,000 to 9,000 feet. Cascade frogs are active during warm periods of late spring and summer. During the winter, individuals hibernate on the bottom of lakes and ponds or in saturated ground. This species is a mountain frog, closely restricted to water. Exclusively diurnal in its activity, it can be found frequenting small ponds, potholes in meadows, ponds and lakes usually in open coniferous forests.

There have been no historic or verified observations of this species in the project area (Jennings and Hayes 1994). This species does not have suitable habitat that is directly, indirectly, or cumulatively affected by the proposed action and will not be carried forward for further analysis.

Northern leopard frog - Historically, the northern leopard frog was widely distributed in North America, but uncommon and localized in California. Its known elevational range extends from 4,000 to 5,000 feet in California. In California, native populations of the northern leopard frog whose origin is largely unquestioned, are historically recorded from the Modoc and Lassen Counties. Recent surveys have indicate the species is nearly absent from these historical sites. No individuals of this taxon were encountered during field surveys by Jennings and Hayes (1994). The nearest recent siting was of a single adult at the Tule Lake National Wildlife Refuge in 1990. Depending on temperature and geography, northern leopard frogs enter hibernation during the fall and winter months and emerge from the bottom of aquatic habitats in the spring, as soon as ice melts. Northern leopard frogs require permanent aquatic habitat to breed, feed, and overwinter. Since this species is relatively susceptible to water loss, it is essential that a moist substrate occur in the vicinity of the aquatic habitat. As adults, they may take cover in grasslands, meadows, and pastures.

Most of the essential habitat is no longer present or so fragmented that the habitat can no longer support populations of this taxon. Moreover, bullfrogs have become well established along

riparian corridors where northern leopard frogs where historically present. Although the interaction between these two taxa is poorly understood, bullfrogs may have a negative effect on leopard frogs (Jennings and Hayes 1994).

Spotted frog - The spotted frog is one of the most widely distributed taxon in the western United States; however, in California historical records indicate this species was present on the Modoc Plateau, Pit River drainage, and in the Warner Mountains. Its known elevational range extends from 3,200 to 4,800 feet. The spotted frog is a highly aquatic species typically found in permanent water such as streams rivers, marshes, springs, pools, and small lakes. Spotted frogs do not seem to occur in stagnant water, which contain cattails. There is no specific data on feeding, however, the food eaten differs with age and size of the frog and includes many insects, arachnids, and mollusks.

No individuals of this taxon were found during a concerted field effort on the Modoc Plateau, Pit River drainage, and in the Warner Mountains at sites where this taxon was historically present (Jenning and Hayes 1994). A single subadult frog reported in Cedarville in 1989 has been classified as a misidentification of the species (Hayes pers. comm.).

VI. Effects of Proposed Actions:

No Action Alternative (Alt 1)

Direct Effects: Potential adverse effects to the aquatic environment from not controlling the spread of noxious weeds include but are not limited to, an increase in sedimentation, reduction in streambank stability, elevated water temperature with the lack of canopy cover, and a potential decrease in the amount of organic matter available to enter affected streams.

Indirect Effects: Without treatment, noxious weeds would likely become widely established across the Forest. This could lead to an increase in soil erosion (sediment deposition) and surface water runoff. Studies indicate a nearly three-fold increase in sediment yield from knapweed sites compared to an uninfested bunchgrass site.

Cumulative Effects: Weeds will continue to invade and spread on the Forest. As this process occurs, weed control options become narrower. Loss of native vegetation could lead to changes in channel morphology as channel stability decreases.

The no action alternative is not expected to have any direct, indirect, or cumulative adverse effects on the Goose Lake sucker, Goose Lake tui chub, Goose Lake lamprey, Goose Lake redband trout, Northwestern pond turtle, northern leopard frog, and spotted frog.

Action Alternatives (Alt's 2-6):

1) Physical/Manual

Direct Effects/Indirect Effects: Physical/manual treatment as proposed is not expected to have any direct or indirect effects on the Goose Lake sucker, Goose Lake tui chub, Goose Lake lamprey, Goose Lake redband trout, Northwestern pond turtle, Cascade frog, northern leopard frog, and spotted frog

Cumulative Effects: The physical/manual treatment of weed sites could result in some localized soil disturbance and possibly increased sedimentation of nearby drainages. These effects would be expected to be minor and temporary in duration because of the comparatively few acres of soil disturbance followed by the reclamation and restoration (where appropriate) of treated areas. Treatment would result better riparian condition, in turn providing more stable and useful aquatic habitat.

Physical/manual treatment as proposed is not expected to have any direct, indirect, or cumulative adverse effects on the Goose Lake sucker, Goose Lake tui chub, Goose Lake lamprey, Goose

Lake redband trout, Northwestern pond turtle, Cascade frog, northern leopard frog, and spotted frog

2) Chemical Treatments

Direct effects: Direct effects to the Goose Lake sucker, Goose Lake tui chub, Goose Lake lamprey, Goose Lake redband trout, Northwestern pond turtle, northern leopard frog, and spotted frog would be primarily associated with herbicide application near streams and associated riparian areas, lakes, or wetlands. A total of 12.6 acres of noxious weeds are found adjacent to the habitat of these species.

Herbicides are applied in liquid formulations and are sprayed on foliage of the target vegetation. In some cases soil may be a major receptor and contamination can occur by chemicals leaching through the soil to the groundwater and ultimately reaching the aquatic environment. This method of introduction usually poses the least amount of risk to the aquatic environment because chemicals typically disappear from the ground surface by either plant uptake of the chemical, volatilization, and natural decomposition of the active ingredients or adsorption of the herbicide by soil particles. Mitigation measures proposed to address this are included in all alternatives utilizing chemical treatments.

Leaks, spills, and improper storage and handling of containers are the source of most pesticide related groundwater contamination. These impacts can easily be mitigated with proper training of personnel and proper storage and disposal of chemicals. Risk from an accidental spill of herbicide into a water body on the Forest is considered low.

Another mode of pesticide entry to the aquatic system includes overland flow from precipitation events. Risk varies depending on soil composition and timing and intensity of precipitation events after application. Risk tends to be lower on well-vegetated forests and rangeland where soil infiltration is typically greater than precipitation. Overland flow occurs infrequently on most forest land because the infiltration capacity of the forest floor and soil is usually far greater than the rate of precipitation. Aquatic organisms are more at risk of negative impacts from herbicides in small perennial streams, or during late season when flow is reduced, due to their limited capability for dilution. Mitigation measures proposed to address precipitation events are included in the Proposed Action. Detailed herbicide information was published in the DEIS, Appendix E, and is incorporated into this document by this reference. Appendix E consisted of a copy of information available on the Internet and was not republished in the FEIS to reduce costs. Summary information is found in Chapter 2 of the FEIS.

Specific buffer zones of 100’ are used that will reduce herbicide application within riparian areas. A reduction of noxious weeds in riparian areas and other aquatic habitats would benefit native plant species and result in better streambank and riparian condition, in turn providing more stable and useful aquatic environments.

Indirect effects: Not all noxious weeds would be chemically treated. Even under the integrated weed management approach, not all weed populations would be eradicated, leaving an available seed source for continued propagation or the unlikely option of weeds being out-competed by native or desirable plant species.

Cumulative Effects: No adverse downstream cumulative effects would be expected from situations involving herbicide runoff or leaching because of the method of application, BMP’s and mitigation measures designed to prevent these types of impacts from occurring.

VII. Cumulative Effects:

Timber/Silvicultural Activities: On average 2,500 acres are logged for saw logs with an additional 3,000 treated for wood fiber annually on the Modoc National Forest. Harvest

prescriptions vary from clear cut to understory thinning. The various timber sales may have had effects on the species discussed in this document that would have been disclosed within their individual National Environmental Policy Act dictated documentation; discussing the potential effects of those projects is beyond the scope of this document. .

The amplitude of effect future timber and silvicultural activities is expected to significantly decrease due to the institution of noxious weed prevention measures. Timber sales and other cultural treatments will need to have changes in planning and implementation. Noxious weed locations will be presented as part of the ID team process so that activities in these areas can be avoided or mitigated (timing projects outside of high risk seasons). Logging systems design should maintain ground cover by minimizing ground disturbance and avoid opening up the overstory adjacent to noxious weed populations. Logging equipment will be washed to stem the transfer of noxious weeds (timber sale clause CT 6.343). Timber sale contract clauses C5.12 (Use of Road Purchaser), C5.4 (General and Special Maintenance Requirements), and C6.315 (Sale Operation Schedule) will be used to keep vehicles and equipment out of high-risk areas during weed seed production periods. Although cumulatively, 80% of noxious weed occurrences have been caused by past timber operations, the new regulations are anticipated to minimize this type weed spread.

Timber harvest and silvicultural treatments will continue to be regulated so any potential adverse effects would be mitigated for during the project phase for all sensitive species. Therefore, between the measures to decrease noxious weeds and the mitigations of future timber harvest activities, there are no anticipated significant cumulative effects on sensitive aquatic species.

Grazing: Grazing allotments occur on every acre of the Modoc National Forest, however, roughly 10% of these allotments are vacant and about 2% are in non-use. Approximately, 122,500 animal unit months of grazing occurs annually. There is also one wild horse territory with approximately 425 head.

The greatest potential for livestock to spread noxious weeds is transportation in the animals' hair. A secondary, but smaller concern could be the concentrated use of areas causing bare patches. If weed occurrences were adjacent, they could provide a seed bed. Livestock may be used as a tool to control of noxious weeds in the future, depending on the species and the estimated effectiveness of domestic animals.

The integration of the new guidelines are hoped to minimize the potential spread of weed occurrences as well as new infestations. The following standards and guidelines will be utilized.

Annual operating plans would provide information to the permittees regarding noxious weed identification, methods of spread and prevention measures.

The exclusion of livestock (and wildlife where feasible) from high priority noxious weed sites should be considered where the animals are likely to cause spread of the weed off site.

Potential cumulative effects of livestock grazing are fairly minimal.

Fire: Fire management activities that have the potential to spread noxious weeds can be separated into two categories: fuels management and suppression. Approximately 17,000 acres are proposed for fuels treatment per year across the Forest: 5,000 acres of prescribed burns and 12,000 acres of mechanical fuels manipulation.

Areas that have mechanical treatments such as brush mowing and coniferous tree understory thinning are less likely to have potential to spread noxious weeds. Activities associated with mowing are not likely to leave bare spaces upon completion of the project. Plus, areas will be mowed when there is less of a chance of equipment spreading seed. Understory thinning will have the guidelines stated in the Timber/Silviculture section.

Prescribed burns have a potential to increase the amount of noxious weed occurrences on the Forest. Areas that are left bare post fire will be considered for seeding with appropriate seed mixes. Other mitigations to minimize the potential for noxious weed spread will be implemented during prescribed burning activities.

Timing of fire in relation to specific weed species in proposed burn area will be considered; if possible, time burning to control weeds. If burning must be during a high-risk period when weed populations are likely to be favored, NEPA documents will discuss the monitoring and prompt treatment immediately upon observing a weed problem. Monitor burned areas intensively the first year after burning, preferably for 3 years.

Fire management treatments will continue to be regulated so any potential adverse effects would be mitigated during the project phase for all federally listed species. Therefore, between the measures to decrease noxious weeds and the mitigations of future fire management activities, the 12.6 acres that could be treated in Goose Lake sucker, Goose Lake tui chub, Goose Lake lamprey, Goose Lake redband trout, Northwestern pond turtle, northern leopard frog, and spotted frog habitat, there are no expected cumulative effect on these three species.

Wildfire and associated suppression and rehabilitation measures on the other hand certainly may provide both an excellent seed source and seed bed. Although there is little control of the location of wildfire, the following standards and guidelines will be implemented during the course of wildfire suppression.

The use of high-priority sites for fire camps and staging areas will be avoided whenever any reasonable alternative exists. Noxious weed prevention will be addressed in fire rehabilitation and restoration plans.

There is no way of quantifying the location and extent of future wildlife fires, therefore a determination of the cumulative effects of fire on sensitive aquatic species is not possible.

Recreation: Although there is a myriad of recreation associated activities that occur on the Modoc National Forest, the two past-times that have the greatest potential to cause the spread of noxious weeds are stock use and equestrian related events such as the Modoc tribe ride. Stock use on Modoc NF is estimated as 6,650 Recreation Visitor Days (RVD) annually with the vast majority within the South Warner Wilderness. Typically there is only one equestrian special use a year, however, there are a few other rides once every five years. Special event horse use averages roughly 50 horses for three days. In summary, there is a rather minor amount of stock and horse use on the Forest as a whole.

In order to decrease the potential for weed introduction via these means, the following Operating Guides have been instituted.

Special emphasis will be placed on inventory and management of noxious weeds at trailheads.

Special Use Permits for equestrian groups would recommend pelletized feed be used rather than hay or straw.

Facilities and high-visibility travel ways would be maintained as weed free zones. Weeds at administration sites, visitor centers, and trailheads would be controlled. Information informing the public and forest service employees that these are "zero tolerance" areas will be posted. This will also be used as opportunities for education. Working cooperatively with the State of California, State of Nevada and the County Weed Boards we will strive to prevent the introduction and establishment of noxious weed infestations as a result of roads, recreation facilities, special use permits, timber harvest, and fuels treatment (see FSM 2081.2),

Given the rather small and mostly localized use of stock and equestrians, plus the implementation of the above guidelines it is not anticipated that recreational activities will significantly contribute

to noxious weed spread on this Forest.

The implementation of the weed control program discussed in this document coupled with recreational activities that occur on the Forest will have no cumulative effect on the sensitive aquatic species.

Other Federal Lands in California:

The Modoc National Forest abuts the Klamath and Shasta-Trinity National Forests on the western flank. The Lassen National Forest administers some of these lands, and also has land that lie roughly 2 to 4 miles south of the Big Valley District.

Klamath National Forest-Goosenest District: Currently, their weed control activities have focused on survey, although they have done a small amount of mechanical treatments (less than 1 acre).

Lassen National Forest – Hat Creek District: There is roughly 40 acres on the areas adjacent to the Modoc National Forest that receive control for noxious weeds. The species targeted include dyer's woad, Scotch thistle, and squarrose knapweed.

Shasta-Trinity National Forest – Mc Cloud District: There is no noxious weed control occurring on the portion of the District administered by the Shasta-Trinity National Forest at this time. There are roughly 10 acres of noxious weeds controlled on the portion of the District administered by the Lassen.

Additional lands administered by the federal government outside of Forest Service jurisdiction include 2 wildlife refuges, 1 national park, and 2 BLM resource areas. All of these agencies have noxious weed management programs in place, which include the use of herbicides. An estimation of these agencies programs is as follows:

Klamath Basin National Wildlife Refuge: The Klamath Basin has weed treatments both as part of their noxious weed eradication program as well as farming that occurs within its jurisdiction. On the Tule Lake unit there is roughly 20-30 acres that are treated with rodeo in order to control purple loosestrife. In the Lower Klamath unit, there is another 50 acres of upland sites that are treated with Banvel and Round up to control pepperweed. There is no control occurring on the Clear Lake unit.

Modoc National Wildlife Refuge: Approximately 200 acres are treated annually to control scotch thistle. Rodeo, Roundup, 2_4D and other chemicals are applied by hand, ATV, and truck in addition to a limited amount of hand grubbing that occurs.

BLM-Alturas: About 50 acres in Modoc County are treated annually for the control of primarily Scotch thistle and Mediterranean Sage. Both Telar and 2,4D are applied using both trucks and helicopters.

BLM- Surprise Valley: There are approximately 425 acres of various weed occurrences on the BLM lands in Modoc and Lassen Counties that have been physically (which includes prescribed fire) or chemically controlled from 1997 to 2002; the vast majority is medusa head (410 acres out of 425 acres total).

Lava Beds National Park: Weed treatments on the Lava Beds National Park consist of a combination of mechanical and chemical treatment using Round Up. Weeds that can not be extracted by hand (using a pulaski) are sprayed by hand with the chemical. This occurs on approximately 170 acres. The main weed species of concern are: mullein, hoarhound mint, bull thistle, stinging nettle, and sweet clover.

Other Federal Lands Within Oregon:

Fremont National Forest: Currently, there are approximately 200 acres per year that are sprayed on the Fremont National Forest. Chemical control is focused on spotted knapweed, dalmation toadflax, and Canada thistle. The Forest also has a hand treatment program. The entire Forest encompasses 1.2 million acres.

BLM-Lakeview: This Resource Area uses both physical and chemical means to treat various noxious weeds. There are approximately 250 acres of chemical treatments that occur per year using picloram, glyphosate, and 2,4 – D (amine). These chemicals are used to treat the following weed species: Russian knapweed, hoary cress, Mediterranean sage, Canada thistle, and medusa head. There is an additional 40 acres per year treated by physical means to control musk thistle and Mediterranean sage. There are 3.2 million acres within the boundaries of this Resource Area.

State and Private Lands:

There is roughly 10,000 acres a year that are treated with herbicides on private, commercial farm ground, and private forests for noxious weed treatment within Modoc County as a whole (Joseph Moreo, pers.comm.). In addition, 1,000 acres of regulatory noxious weed control occurs. Roughly 11 acres have been treated on the Ft. Bidwell Reservation; Mediterranean sage, scotch thistle, and Dyer's woad were controlled using mechanical means.

Cumulative Effects Summary:

Of the roughly 2.5 million acres of federal lands encompassed by our Modoc National Forest Map only 6,913 acres will receive treatment on the Modoc National Forest for noxious weeds or about 0.0028%. Of the roughly 4 million acres of state, private and federal lands encompassed by the Forest map, about 14,000 acres or .0056% are treated annually for noxious weed eradication (including the acres proposed by the Modoc National Forest). As stated previously, a maximum of 12.6 acres would be treated in areas that have any potential to effect Goose Lake sucker, Goose Lake tui chub, Goose Lake lamprey, Goose Lake redband trout, Northwestern pond turtle, northern leopard frog, and spotted frog. Due to the location of most of the weed infestations in areas outside of live water occupied by sensitive aquatic species, the short duration of management activities, and other mitigations specific within the Project Design Standards, there are no significant cumulative effects expected with implementation of mechanical, physical and chemical control activities associated with the Noxious Weed Treatment Project.

VIII. Determination:

There will be a "No Impact" determination for all aquatic species for implementation of the No Action alternative or the implementation of the prevention program.

There will be a "No Impact" determination for all aquatic species for implementation of physical/manual treatment. The effects of these treatments are expected to be minor and temporary in duration.

There will be a "No Impact" determination for the following species for implementation of chemical treatments: California floater, scalloped juga, Cascade frog, and Warner Valley redband trout. These species do not have suitable habitat that is directly, indirectly, or cumulatively affected.

There will be a May impact individuals, but not likely to cause a trend to federal listing or a loss of viability" for chemical activities for the following species: Goose Lake sucker, Goose Lake tui chub, Goose Lake lamprey, Goose Lake redband trout, Northwestern pond turtle, northern leopard frog, and spotted frog. This determination is based on the fact that buffer zones (100') of no chemical use have been established for these species and the limited number of sites to be treated (12.6 acres). The only chemical proposed for use within 10' of live water is a riparian approved formulation of glyphosate.

IX. Personal Communications:

Marc Hayes, Washington Department of Fish and Wildlife. Olympia, WA

Joseph Moreo, Modoc County Agricultural Advisor. Alturas, CA.

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Appendix U: Fish and Aquatic Wildlife Species Management Indicator Species Report

Management Indicator Species Report
Fisheries/Aquatic Resources

Noxious Weed Treatment Project

Modoc National Forest

Prepared By /S/ MARTY YAMAGIWA Date: _1/25/07_

Marty Yamagiwa, Forest Wildlife and Fisheries Program Manager

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MANAGEMENT INDICATOR SPECIES REPORT

1. INTRODUCTION

The purpose of this report is to evaluate and disclose the impacts of the Noxious Weed Treatment Project on the Fisheries and Aquatic Management Indicator Species (MIS) identified in the Forest (NF) Land and Resource Management Plan (LRMP) (USDA 1991). This report documents the effects of project alternatives on the habitat of selected MIS. Detailed descriptions of the Noxious Weed Treatment Project alternatives are found in Chapter 2 of the Project Environmental Impact Statement (USDA 2007).

MIS are animal or plant species identified in the Modoc NF LRMP (USDA 1991, which was developed under the 1982 National Forest System Land and Resource Management Planning Rule (1982 Planning Rule) (36 CFR 219). Guidance regarding MIS set forth in the Modoc NF LRMP directs Forest Service resource managers to (1) at project scale, analyze the effects of proposed projects on the habitats of each MIS affected by such projects, and (2) at the national forest (forest) or bioregional scale, monitor populations and/or habitat trends of forest MIS, as identified by the LRMP.

1.a. Direction Regarding the Analysis of Project-Level Effects on MIS

Project-level effects on MIS are analyzed and disclosed as part of environmental analysis under the National Environmental Policy Act (NEPA). This involves examining the impacts of the proposed project alternatives on MIS habitat by discussing how direct, indirect, and cumulative effects will change the quantity and/or quality of habitat in the analysis area.

These project-level impacts to habitat are then related to broader scale (generally national forest, and, in some cases, bioregional) population and/or habitat trends. The appropriate approach for relating project-level impacts to broader scale trends depends on the terms in the LRMP. Under the 2005 National Forest System Land Management Planning Rule (2005 Planning Rule) (70 Federal Register 1060, January 5, 2005), national forests with LRMPs developed under the 1982 planning rule, including the Modoc NF, “may comply with any obligations relating to MIS by considering data and analysis relating to habitat unless the plan specifically requires population monitoring or population surveys for the species” (36 CFR 219.14(f)).

Hence, where the Modoc NF LRMP requires population monitoring or population surveys for an MIS, the project-level effects analysis for that MIS must be informed by population monitoring data, which are gathered at the forest or bioregional scale. Population monitoring and survey data are not generally gathered for site-specific projects, consistent with the 2005 planning rule, which states, “Site-specific monitoring or surveying of a proposed project or activity area is not required, but may be conducted at the discretion of the Responsible Official” (36 CFR 219.14(f)). For certain MIS, the Modoc NF LRMP does not require population monitoring or surveys; for these MIS, project-level MIS effects analysis can be informed by forest-scale habitat monitoring and analysis alone. The Modoc NF LRMP requirements for MIS analyzed for the Noxious Weed Treatment Project are summarized in Section 3 of this report.

Therefore, adequately analyzing project effects to MIS, including Threatened, Endangered, and Sensitive (TES) species that are also MIS, involves the following steps:

Identifying which MIS have habitat that would be either directly or indirectly affected by the project alternatives; these MIS are potentially affected by the project.

Identifying the LRMP forest-level or bioregional-level monitoring requirements for this subset of forest MIS.

Analyzing project-level effects on MIS habitats or habitat components for this subset of forest MIS.

Discussing forest or bioregional scale habitat and/or population trends for this subset of forest MIS.

Relating project-level impacts on MIS habitat to habitat and/or population trends for the affected MIS at the forest or bioregional scale.

These steps are described in detail in the Pacific Southwest Region's draft document "MIS Analysis and Documentation in Project-Level NEPA, R5 Environmental Coordination" (USDA 2006). This Management Indicator Species (MIS) Report documents application of the above steps to select and analyze potentially affected MIS for the Noxious Weed Treatment Project.

1.b. Direction Regarding Monitoring of MIS Population and Habitat Trends at the Forest or Bioregional Scale

Forest or bioregional scale monitoring requirements for the Modoc NF's MIS are found in the Monitoring Plan of the LRMP (USDA 1991) and in Appendix E of the Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement (FEIS) (USDA 2001), as adopted by the 2004 Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD) (USDA 2004).

Habitat Status and Trend

The Modoc NF LRMP (USDA 1991) requires forest-scale monitoring of habitat status and trend for select MIS on the Modoc NF; for MIS with habitat potentially affected by the Noxious Weed Treatment Project, these habitat monitoring requirements are summarized in Table 2 of this report. Habitat status is the current amount of habitat on the Modoc NF. Habitat trend is the direction of change in the amount of habitat between the time the LRMP was approved and the present. The methodology for assessing habitat status and trend is described in detail in the Modoc National Forest MIS Report (USDA 2007).

Habitats are the vegetation types (for example, mixed conifer forest) and/or ecosystem components (for example, cliffs or lakes) and any special habitat elements (for example, snags) required by an MIS for breeding, cover, and/or feeding. Required habitat is identified using habitat relationships data or models. Habitat relationships for fish MIS are identified individually.

Population Status and Trend

Population monitoring requirements for the MIS of the Modoc NF are identified in either Appendix E of the Sierra Nevada Forest Plan Amendment (SNFPA) FEIS (USDA 2001), as adopted by the 2004 Sierra Nevada Forest Plan Amendment Record of Decision (ROD) (USDA 2004), or the Monitoring Plan of the LRMP (USDA 1991).

For Modoc NF MIS (USDA 1991) that are listed in Appendix E of the SNFPA FEIS (USDA 2001), population monitoring requirements are identified in Appendix E. For all other Modoc NF MIS, population monitoring requirements are identified in the LRMP Monitoring Plan (USDA 1991). This document requires monitoring of population status and trend for select MIS on the Modoc NF. There are many types of population data, and this document also identifies the type of population monitoring data required for each MIS. The population monitoring requirements

for the MIS with habitat potentially affected by the Noxious Weed Treatment Project are summarized in Table 2 of this report. All population monitoring data are collected and/or compiled at the forest or bioregional scale, consistent with the LRMP as amended by the SNFPA and the 2005 Planning Rule that "site specific monitoring or surveying of a proposed project or activity area is not required" (36 CFR 219.14(f)).

Population status is the current condition of the MIS related to the type of population monitoring data (population measure) required in the LRMP for that MIS. Population trend is the direction of change in that population over time.

As discussed in Appendix E of the 2001 SNFPA (USDA 2001), there is a wide range of monitoring data that can be used to describe the status and trend (or change) of populations, ranging from describing changes in distribution based on presence-absence data to describing changes in population structure. A distribution population monitoring approach is identified for most MIS listed in Appendix E (Tables E-9 to E-11). Distribution population monitoring consists of collecting presence data for the MIS across a number of sample locations; over time, changes in the distribution of the MIS can be identified and tracked. Presence data is collected using a number of direct and indirect methods, such as surveys (population surveys), bird point counts, tracking number of hunter kills, counts of species sign (such as deer pellets), and so forth.

Presence population data for MIS are collected and consolidated by the Modoc NF in cooperation with State and Federal agency partners (including the California Department of Fish and Game, U.S. Geological Survey, and USDI Fish and Wildlife Service) or conservation partners (including Partners in Flight and various avian joint ventures). The Modoc NF's MIS monitoring program for species typically hunted, fished, or trapped was designed to be implemented in cooperation with California Department of Fish and Game (CDFG), consistent with direction in the 1982 Planning Rule to monitor forest-level MIS population trends in cooperation with state fish and wildlife agencies to the extent practicable (36 CFR 219.19(a)(6)). To be biologically meaningful for wide-ranging MIS, presence data are collected and tracked not only at the forest scale, but also at larger scales, such as rangewide, state, province, or important species management unit (for example, Deer Assessment Unit or waterfowl migratory routes). Population data at various scales are important to both assess and provide meaningful context for population status and trend at the forest scale.

2. Selection of Project Level Fisheries/Aquatic MIS

Management Indicator Species (MIS) for the Modoc NF are identified in the LRMP (USDA 1991). The Fisheries/Aquatic MIS analyzed for the Project were selected from this list of MIS identified in the LRMP and are listed below in Table 1. In addition, Table 1 identifies the status of the MIS (2nd column), reason each MIS was identified in the LRMP (3rd column) and discloses whether or not the MIS is potentially affected by the Noxious Weed Treatment Project (4th column).

Table 1. Fisheries/Aquatic Management Indicator Species Selected for Project-Level Analysis for the Noxious Weed Treatment Project, Modoc NF.

Management Indicator Species	Species Status	LRMP Habitat Indicator	Category for Project Analysis [1]
Shortnose sucker	Endangered	Cold water aquatic	3
Lost river sucker	Endangered	Cold water aquatic	3
Modoc sucker	Endangered	Cold water aquatic	3
Goose Lake redband trout	Sensitive	Cold water aquatic	3
Rainbow trout	Non-TES	Cold water aquatic	3
Brook trout	Non-TES	Cold water aquatic	2
Brown trout	Non-TES	Cold water aquatic	3
Largemouth bass	Non-TES	Warm water aquatic	3

[1] **Category 1:** MIS whose habitat is not in or adjacent to the project area and would not be affected by the project.

Category 2: MIS whose habitat is in or adjacent to project area, but would not be either directly or indirectly affected by the project.

Category 3: MIS whose habitat would be either directly or indirectly affected by the project.

Brook trout, identified as Category 2 above, will not be further discussed because, although there is suitable habitat in the area, this species is found at higher elevations where no treatment is scheduled and therefore will have no impact on forest-level brook trout habitat or population trends.

The Fisheries/Aquatic MIS whose habitat would be either directly or indirectly affected by the Noxious Weed Treatment Project, identified as Category 3 in Table 1, are carried forward in this analysis, which will evaluate the direct, indirect, and cumulative effects of the proposed action and alternatives on the habitat of these MIS. The MIS selected for Project-Level MIS analysis for the Noxious Weed Treatment Project are: Shortnose sucker, Lost River sucker, Modoc sucker, Goose Lake redband trout, rainbow trout, brown trout, and largemouth bass.

3. LRMP Monitoring Requirements for MIS Selected for Project-Level Analysis

3.a. MIS Monitoring Requirements

The Modoc NF LRMP (USDA 1991) and Appendix E of the Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement (USDA 2001), as adopted by the 2004 Sierra Nevada Forest Plan Amendment ROD (USDA 2004), identify forest and bioregional scale habitat and population monitoring requirements for the Modoc NF MIS. As discussed in the introduction to this report, forest-scale habitat monitoring requirements are identified in the Monitoring Plan of the Modoc NF LRMP (USDA 1991). For those Modoc NF MIS that are listed in Appendix E of the SNFPA FEIS (USDA 2001), population monitoring requirements are described in Appendix E. For all other Modoc NF MIS, population monitoring requirements are described in the LRMP Monitoring Plan (USDA 1991). Habitat and population monitoring results for Modoc NF's MIS are described in the Modoc National Forest Management Indicator Species

Report (USDA 2007) and are summarized below for the MIS being analyzed for the Noxious Weed Treatment Project.

Table 2. Modoc NF LRMP MIS Requirements for the Selected Project-Level Fisheries/Aquatic MIS for the Noxious Weed Treatment Project (USDA 2007, as amended by the SNFPA 2004).

SELECTED PROJECT-LEVEL MIS	mis Monitoring Requirements	
	Habitat	Population
Shortnose sucker	Stream surveys, photo points	Recovery Plan
Lost River sucker	Stream surveys, photo points	Recovery Plan
Modoc sucker	Stream surveys, channel profiles, photo points	Population sampling
Goose Lake redband trout	Stream surveys, photo points	Distribution/relative abundance
Rainbow trout	Stream/lake habitat surveys	Distribution/population
Brook trout	Stream/lake habitat surveys	Distribution/population
Brown trout	Stream/lake habitat surveys	Distribution/population
Largemouth bass	Stream/lake habitat surveys	Distribution/population

LRMP, Monitoring Plan (USDA 1991). FEIS, Appendix E (USDA 2001).

3.b. Methodologies for MIS Monitoring

Shortnose Sucker/Lost River Sucker

Quality of habitat is assessed using a variety of techniques that range from subjective observation to intensive measurements. Photographs can be used to document conditions over time. Assessment of Proper Functioning Condition (PFC) can be used by Interdisciplinary teams to document observations of channel morphology and riparian vegetation. PFC is a nationally adopted protocol most useful in low gradient stream systems where range management is often the management practice of concern. Two other regionally adopted inventory protocols are used to evaluate habitat condition. Fish Habitat Inventory collects information at the scale of the habitat unit and is useful in characterizing condition. The R5 Stream Condition Inventory is used to monitor changes at the reach scale, and to compare reaches. Both methodologies include attributes most likely to be changed by management; these include shade, substrate composition, pools, channel shape, and large wood. Data is used to determine trend in conditions, and evaluated using data from similar streams, rather than against a model or set of standard objectives. The Modoc National Forest MIS Report (USDA 2007) provides additional information about the distribution and population trend for this species.

Modoc Sucker

Important habitat components for the Modoc sucker include: the shading of streams by vegetation; coarse woody debris; the presence of pools in the summer; the presence of algae, detritus, and aquatic invertebrates; the presence of sand and gravels of various sizes not covered by sediment; and good water quality. This species is found in the following CWHR habitat type: riverine.

Quality of Modoc sucker habitat is assessed using a variety of techniques that range from subjective observation to intensive measurements. Photographs can be used to document conditions over time. Assessment of Proper Functioning Condition (PFC) can be used by Interdisciplinary teams to document observations of channel morphology and riparian vegetation. PFC is a nationally adopted protocol most useful in low gradient stream systems where range management is often the management practice of concern. Two other regionally adopted

inventory protocols are used to evaluate Modoc sucker habitat condition. Fish Habitat Inventory collects information at the scale of the habitat unit and is useful in characterizing condition. The R5 Stream Condition Inventory is used to monitor changes at the reach scale, and to compare reaches. Both methodologies include attributes most likely to be changed by management; these include shade, substrate composition, pools, channel shape, and large wood. Data is used to determine trend in conditions, and evaluated using data from similar streams, rather than against a model or set of standard objectives. Channel cross-sections and vegetative greenline survey are also used to monitor riparian condition over time. The Modoc National Forest MIS Report (USDA 2007) provides additional information about the distribution and population trend for this species.

Goose Lake Redband Trout

Quality of redband trout habitat is assessed using a variety of techniques that range from subjective observation to intensive measurements. Photographs can be used to document conditions over time. Assessment of Proper Functioning Condition (PFC) can be used by Interdisciplinary teams to document observations of channel morphology and riparian vegetation. PFC is a nationally adopted protocol most useful in low gradient stream systems where range management is often the management practice of concern. Two other regionally adopted inventory protocols are used to evaluate redband trout habitat condition. Fish Habitat Inventory collects information at the scale of the habitat unit and is useful in characterizing condition. The R5 Stream Condition Inventory is used to monitor changes at the reach scale, and to compare reaches. Both methodologies include attributes most likely to be changed by management; these include shade, substrate composition, pools, channel shape, and large wood. Data is used to determine trend in conditions, and evaluated using data from similar streams, rather than against a model or set of standard objectives. The Modoc National Forest MIS Report (USDA 2007) provides additional information about the distribution and population trend for this species.

Rainbow Trout, Brown Trout, Largemouth Bass

Quality of habitat for these species is assessed using a variety of techniques that range from subjective observation to intensive measurements. Photographs can be used to document conditions over time. Assessment of Proper Functioning Condition (PFC) can be used by Interdisciplinary teams to document observations of channel morphology and riparian vegetation. PFC is a nationally adopted protocol most useful in low gradient stream systems where range management is often the management practice of concern. Two other regionally adopted inventory protocols are used to evaluate trout habitat condition. Fish Habitat Inventory collects information at the scale of the habitat unit and is useful in characterizing condition. The R5 Stream Condition Inventory is used to monitor changes at the reach scale, and to compare reaches. Both methodologies include attributes most likely to be changed by management; these include shade, substrate composition, pools, channel shape, and large wood. Data is used to determine trend in conditions, and evaluated using data from similar streams, rather than against a model or set of standard objectives. The Modoc National Forest MIS Report (USDA 2007) provides additional information about the distribution and population trend for these species.

4. Description of Proposed Project.

Summary Comparison of Alternatives for the Noxious Weed Treatment Project

Alternatives / Alternative Features	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Treatment Timeframe	**Ongoing**	**5 years**	**5 years**	**10 years**	**10 years**	**10 years**
Treatment Sites and Acres	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**
Total Inventoried Weeds (2004)	541/6908	541 / 6908	541 / 6908	541 / 6908	541 / 6908	541 / 6908
Inventoried Weeds Fully Treated	**20-30** ac/yr[1]	520 / **5,995**	494 / **5,993**	520 / **5,995**	520 / **180**	538/ **241**
Inventoried Weed Sites Receiving Partial Treatment2	0/0	16/904[2]	0/0	16/904[2]	0/0	0/0
Inventoried Weeds Receiving Limited Treatment3	0/**0**	0/**0**	0/**0**	0/0	9/**100**[3]	3/**100**[3]
Inventoried Weeds Not Treated4	6,878[1]	5/9[4]	47/916[4]	5/9[4]	5 / 5515	0/6,567[4]
Proportion of Inventoried Weeds Treated	0.4%	n.a. / 87%	91% / 87%	99 % / 99 %	100 % / 4 %	100 % / 5 %
Noxious Weeds Treated Through Early Detection – Rapid Response (acres)5		0 acres	0 acres	Up to **200** acres (100 ac max/yr)	Up to **200** acres (100 ac max/yr)	Up to **200** acres (100 ac max/yr)
Total Acres of Weeds Treated	20-30 ac/yr1	**6,899** acres	**5,993** acres	**7,099** acres	**480** acres	**541** acres
Treatment Methods for Inventoried Noxious Weeds (2004)	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**
Physical – hand pulling, hoeing, grubbing	0/0	161/31	494/5,993	161/31	0/0	0/0
Physical+ – Physical plus, clipping seed head or plant, weed eater, mulch/tarp	20-30 ac/yr1	0/0	0/0	0/0	527/139	116/19
Physical and/or Herbicide Treatments	0/**0**	333/5,961	0/**0**	333/5,961	0/**0**	371/**116**
Herbicide	0/**0**	42/**907**	0/**0**	32/9**07**	0/**0**	46/**65**
Limited Treatment3	0/0	0/0	0/0	0/0	9/100	3/100
Goat Grazing (potential) (physical/herbicide)	0/0	0/0	0/0	0/0	5/41 (no herbicide)	5/**41**
Total Acres Potentially Treated with Herbicides (includes ED-RR acres)6	0/**0**	355/6,868	0/**0**	355/7,068	0/**0**	425/**522**

[1]Under Current Management (Alt. 1), approximately 20 to 30 acres of noxious weeds are treated each year through other site specific NEPA decisions as part of other projects in accordance with the Modoc NF Integrated Weed Management Strategy (2005).

[2]These sites are rhizomotous species that occur within 10 feet of H2O. Those sites that are within 10 feet of H2O would not be treated. Sites with acreage ooutside of this 10 foot no treatment zone would receive partial treatment. The acreage within the 10 foot zone would not be treated, the acreage outside the 10 foot zone would be treated with herbicides.

[3]Includes treating along borders of infestations to prevent spread using the methods specific to each alternative. Treatment is estimated at 100 acres to be proportionally distributed based on the size of the individual infestations. These acres are included in the Inventoried Noxious Weeds Treated acreage.

[4]Excluded in Alt. 2 and Alt. 4: 5 sites of rhizamotous species that are within 10' of live water and partial acreage of 16 sites of rhizamotous species that are within 10' of live water. Rhizamotous species will not be treated by physical methods in these alternatives. Excluded in Alt. 3: 47 sites of rhizamotous species. Excluded in Alt. 5: 5,658 acre Dyer's woad, 850 acre Dalmatian toadflax, 159 acre crupina, and 6 sites of rhizamotous species. These sites will receive limited treatment around the perimeter estimated at 100 acres proportionally distributed based on the size of these sites. Excluded in Alt. 6: 5,658 acre Dyer's woad, 850 acre Dalmatian toadflax, 159 acre crupina. These sites will receive limited treatment around the perimeter estimated at 100 acres proportionally distributed based on the size of these sites.

[5]May use any of the methods approved for use in this NEPA decision.

[6]For Alt. 2 this includes the acres under the physical and/or herbicide method plus the herbicide treated acres. Alt. 4 adds the same categories as Alt. 2 plus adds in the potentially treated 200 acres through early detection rapid response. Alt. 6 includes the Physical and/or Herbicide acres, the herbicide acres, the acres under goat grazing, the acres under the limited treatment category, and the 200 acres under Early Detection-Rapid Response.

5. Effects of Proposed Project on Selected Fisheries/Aquatic MIS

Detailed information on MIS for the Forest is documented in the Modoc Forest MIS Report (USDA 2007).

5.a. Shortnose Sucker, Lost River Sucker

The shortnose sucker and Lost River sucker are federally listed endangered species; additional information on affected environment and environmental consequences of the Noxious Weed Treatment Project on these species is found in the project BA.

5.a.1. Habitat/Species Relationship

Detailed information on MIS for the Modoc NF is documented in the Modoc National Forest MIS Report (USDA 2007), which is hereby incorporated by reference.

The habitat requirements of the shortnose and Lost River suckers are not well known. It appears that the Lost River sucker is primarily a lake species and spends most of its time in fairly deep water (Moyle 2002). The shortnose sucker is thought to have a life history similar to the cui-ui (*Chasmistes cujus*) of Pyramid Lake, Nevada: it is thought to spend most of the year in the open waters of large lakes (Ibid).

Cool water, high amounts of dissolved oxygen, and cool freshwater refuges appear to be important habitat components for both species (Buettner and Scoppettone 1991). When conditions become stressful in lakes, such as in the summer when there can be heavy algal blooms and fluctuations in dissolved oxygen, pH, and suspended and dissolved materials, areas where streams or springs flow into lakes may be important refugia (USFWS 1993).

5.a.2. Project-level Effects Analysis based on Habitat

Key Habitat Factor(s) for the Analysis: The Forest LRMP identified these species as associated with riparian habitats. These species are found in the following CWHR habitat types: lacustrine and riverine.

Analysis Area for Project-level Effects Analysis: These species migrate from Clear Lake Reservoir to spawn in Willow Creek and Boles Creek. Summer holding occurs in reservoirs as well as deeper pools within the channels.

Current Condition of the Key Habitat Factor(s) in the Analysis Area: There are currently 35.5 miles of stream habitat and 1,962 acres of reservoir habitat for the species on the Forest.

Alternative 1 (No Action)

Direct and Indirect Effects to Habitat: Potential adverse effects to the aquatic environment from not controlling spread of noxious weeds include but are not limited to, an increase in sedimentation, reduction in streambank stability, elevated water temperature with the lack of canopy cover, and a potential decrease in the amount of organic matter available to enter affected streams. Without treatment, noxious weeds would likely become widely established across the Forest. This could lead to an increase in soil erosion (sediment deposition) and surface water runoff.

Cumulative Effects to Habitat: As weed infestations become more severe, it becomes more difficult to restore natural or near natural conditions. Conditions arise where instead of using physical treatments or relatively low applications of low toxicity herbicides, more intensive physical treatment or intensive applications at higher concentrations of more toxic herbicides may be necessary to control later stages of weed infestations. When this occurs, the risk to the aquatic environment also increases and viability of aquatic species may also be at risk.

Cumulative Effects Conclusion: It is anticipated that under the No Action alternative there will be an increase in noxious weeds within suitable habitat. The relative cumulative effect to shortnose and Lost River suckers of this increase would be relatively small compared to the existing amount of habitat in the analysis area.

Alternatives 2/4/6

Direct and Indirect Effects to Habitat: Mechanical treatment of weed sites could result in some localized soil disturbance and possibly increased sedimentation of nearby drainages. These effects would be expected to be minor and temporary in duration because of the comparatively few acres of soil disturbance followed by the reclamation and restoration (where appropriate) of treated areas. Treatment would result in better riparian condition, in turn providing more stable and useable aquatic habitat.

Under these alternatives, potential direct effects to aquatic resources would be primarily associated with herbicide application near streams and associated riparian areas, lakes, or wetlands. Most herbicides are applied in liquid formulations and are sprayed on foliage of the target vegetation. In some cases soil may be a major receptor and contamination can occur by chemicals leaching through the soil to the groundwater and ultimately reaching the aquatic environment. This method of introduction usually poses the least amount of risk to the aquatic environment because chemicals typically disappear from the ground surface by either plant uptake of the chemical, volatilization, and natural decomposition of the active ingredients or adsorption of the herbicide by soil particles. Norris et al. (1991), indicates leaching of chemicals through the soil profile is a process of major public concern, but is least likely to occur in forest environments. Prevention measures proposed to address this are included as part of the Project Design Standards. Leaks, spills, and improper storage and handling of containers are the source of most pesticide related groundwater contamination. These impacts can easily be prevented with proper training of personnel and proper storage and disposal of chemicals. Risk from an accidental spill of herbicide into a water body on the Forest is considered low.

Another mode of pesticide entry to the aquatic system includes overland flow from precipitation events. Risk varies depending on soil composition and timing and intensity of precipitation events after application. Risk tends to be lower on well-vegetated forests and rangeland where soil infiltration is typically greater than precipitation. Norris et al. (1991) indicated that overland flow occurs infrequently on most forestland because the infiltration capacity of the forest floor and soil is usually far greater than the rate of precipitation. Aquatic organisms are more at risk of negative impacts from herbicides in small perennial streams, or during late season when flow is reduced, due to their limited capability for dilution. Prevention measures proposed to address precipitation events are included in the Project Design Standards. Under these alternatives, a buffer zones of 100’ have been established where no herbicides except aquatic formulations of gylphosate will be used. A reduction of noxious weeds in riparian areas and other aquatic habitats would benefit native plant species and result in better streambank and riparian condition, in turn providing more stable and useful aquatic environments. An indirect effect of these buffer zones is that not all noxious weeds would be chemically treated. Even under the integrated weed management approach, not all weed populations would be eradicated, leaving an available seed source for continued propagation or the unlikely option of weeds being out-competed by native or desirable plant species.

Cumulative Effects to Habitat: The mechanical treatment of weed sites could result in some localized soil disturbance and possibly increased sedimentation of nearby drainages. These effects would be expected to be minor and temporary in duration because of the comparatively few acres of soil disturbance followed by the reclamation and restoration (where appropriate) of treated

areas**.** Treatment would result better riparian condition, in turn providing more stable and useful aquatic habitat. Mechanical treatment as proposed is not expected to have any direct, indirect, or cumulative adverse effects on these species.

No adverse downstream cumulative effects would be expected from situations involving herbicide runoff or leaching because of the method of application, Best Management Practices (BMP's), and Design Standards to prevent these types of impacts from occurring. See Appendix D for a list of the specific BMP's.

It is not anticipated that there will be any cumulative effects by chemical spraying of noxious weeds due to the use of chemicals at only their prescribed label rate, the relative non-toxicity of the chemicals to other than target (i.e. plant) organisms, the use of riparian buffers, and the limited area of chemical treatment. Riparian habitat would benefit by decreasing weeds and the acreages to be treated are very small so there is no direct contact with fish and other aquatic species.

Cumulative Effects Conclusion: It is anticipated that implementation of these alternatives, in combination with these past, present, and reasonably foreseeable future actions, would result in the treatment of 0.36 acres (4 sites) of suitable habitat across the analysis area. Therefore, the cumulative effect to shortnose sucker and Lost River sucker under these alternatives would be negligible compared to the amount of existing habitat in the analysis area.

Alternative 3/5

Direct and Indirect Effects to Habitat: Mechanical treatment of weed sites could result in some localized soil disturbance and possibly increased sedimentation of nearby drainages. These effects would be expected to be minor and temporary in duration because of the comparatively few acres of soil disturbance followed by the reclamation and restoration (where appropriate) of treated areas. Treatment would result in better riparian condition, in turn providing more stable and useful aquatic habitat.

Cumulative Effects to Habitat: The mechanical treatment of weed sites could result in some localized soil disturbance and possibly increased sedimentation of nearby drainages. These effects would be expected to be minor and temporary in duration because of the comparatively few acres of soil disturbance followed by the reclamation and restoration (where appropriate) of treated areas**.** Treatment would result better riparian condition, in turn providing more stable and useful aquatic habitat.

Cumulative Effects Conclusion: Mechanical treatment as proposed is not expected to have any direct, indirect, or cumulative adverse effects on these species.

5.a.3. Summary of Habitat and Population Status and Trend at the Forest/Bioregional Scale

The Modoc NF LRMP (as amended by the SNFPA) requires forest-scale habitat monitoring and bioregional-scale population monitoring for the shortnose sucker and Lost River sucker (Table 2); hence, the shortnose sucker and Lost River sucker effects analysis for the Noxious Weed Treatment Project must be informed by both habitat and population monitoring data. The sections below summarize the habitat and population status and trend data for the shortnose and Lost River sucker. This information is drawn from the detailed information on habitat and population trends in the Modoc National Forest MIS Report (USDA 2007), which is hereby incorporated by reference.

Habitat Status and Trend: Barring future water developments on the Modoc National Forest, the amount of habitat appears stable. As fish passage problems are recognized, it is probable that quality of habitat will be increased.

Lost River sucker and shortnose sucker habitat on the Modoc is considered abundant and has

remained relatively constant since the development of the Forest Plan (M.Yamagiwa pers. comm.).

Population Status and Trend: The shortnose and Lost River suckers were listed as endangered species on July 18, 1988 (USFWS 1988). No Critical Habitat has been designated. A recovery plan has been written for both species (USFWS 1993). Population decreases of these suckers seem to be primarily related to decreasing spawning habitat from damming, draining, and dredging of historical spawning areas (Ibid). Other predominant threats to these suckers are continued loss of habitat, water diversions, competition and predation by introduced species, hybridization with other sucker species, insularization of remaining habitats, and drought (USFWS 1988). Decreases in water quality resulting from timber harvest, dredging activities, removal of riparian vegetation, and livestock grazing may also cause problems for these species (USFWS 1988).

All of the streams containing these fish on the Modoc National Forest have become intermittent during the drought of the late 1980s and early 1990s. The varied causes for the declines in these two species are not clearly understood (USFWS 1988). What is clear is that there has been a drastic reduction in the spawning success of these long-lived species; for example, populations of both species in Oregon and in Copco Reservoir have not spawned for about 18 years (Ibid).

Based upon recent surveys conducted by the National Biological Survey, there are 23,000 Lost River suckers and 73,000 shortnose suckers on the Modoc NF. According to past survey records there appears to be an increasing trend in the population numbers in the past ten year period (Ibid). Habitat availability trends for this same time period seem to be experiencing an increasing trend (Ibid). The Annual Monitoring Report for 2002 suggest that populations of these two species are relatively stable but the demographics of the populations appears to be changing. Data suggest that fish captured are beginning to appear in the older age class (U.S. Geological Survey 2003).

Both the Lost River and Shortnose Suckers were petitioned for delisting. The USFWS found that the petition did not present substantial scientific or commercial information indicating that either species warranted delisting (67 FR 34422).

5.a.4. Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the Species: Mechanical treatment as proposed will not alter or contribute to existing forest-wide trend in population or distribution.

Herbicide treatment would result in the treatment of 0.36 acres (4 sites) of suitable habitat across the analysis area. Therefore, the impact of the Noxious Weed Treatment Project will not alter or contribute to existing forest-wide trend in population or distribution for the shortnose sucker and Lost River sucker.

5.b. Modoc Sucker

The Modoc sucker is a federally listed endangered species; additional information on affected environment and environmental consequences of the Noxious Weed Treatment Project on these species is found in the project BA.

5.b.1. Habitat/Species Relationship

Detailed information on MIS for the Modoc NF is documented in the Modoc National Forest MIS Report (USDA 2007), which is hereby incorporated by reference.

Suitable habitat consists of large, shallow, muddy-bottomed pools that are partially shaded by vegetation and contain cool (less than 77° F.), moderately clear water (Moyle 2002). The

temperature of water in two Modoc sucker streams indicated that a maximum water temperature of less than 70° F., with daily temperature variations of less than 10° F., provides suitable conditions, and that maximum temperatures of 60 to 65° F. seem to be optimum (Studinski 1993).

Most of the creeks in which Modoc suckers occur become intermittent by mid summer, severely limiting the available habitat. Pools, especially during drought years, may be the most critical factor limiting populations (Ibid). The Modoc sucker utilizes toe-logs and tips of juniper revetments and coarse woody debris in streams for cover (USFS unpublished data). They also will use rocky substrate and algae if no other cover is available in the pool.

5.b.2. Project-level Effects Analysis based on Habitat

Key Habitat Factor(s) for the Analysis: The Forest LRMP identified these species as associated with riparian habitats. These species are found in the following CWHR habitat types: lacustrine and riverine.

Analysis Area for Project-level Effects Analysis: The Modoc sucker occurs in two sub-drainages of the Pit River system within the Modoc NF in northeastern California. The streams in which this species occurs are characterized by low summer flows and large, shallow pools with cover, soft sediments, and clear water (USFWS 1985). In many cases, large sections of the streams have only subsurface flows in the summer and the suckers are confined to relatively small permanent pools (Studinski 1993). These streams are within the Devil's Garden and Big Valley Ranger Districts of the Modoc NF

Current Condition of the Key Habitat Factor(s) in the Analysis Area: The Modoc sucker has been extirpated from a significant portion of its naturally limited range due to hybridization with the Sacramento sucker (*Catostomus occidentalis*) (USFWS 1985) and habitat loss from overgrazing, siltation, channelization, and other agricultural activities (USFWS 1985). Habitat degradation has also eliminated some natural within-stream barriers that prevented Sacramento suckers from invading Modoc sucker habitat (USFWS 1985). Additional factors include predation by introduced brown trout (*Salmo trutta*) (Ibid) and the late 1980 and early 1990 drought, which has increased the number of creeks which were intermittent during the summer

Alternative 1 (No Action)

Direct and Indirect Effects to Habitat: Potential adverse effects to the aquatic environment from not controlling spread of noxious weeds include but are not limited to, an increase in sedimentation, reduction in streambank stability, elevated water temperature with the lack of canopy cover, and a potential decrease in the amount of organic matter available to enter affected streams. Without treatment, noxious weeds would likely become widely established across the Forest. This could lead to an increase in soil erosion (sediment deposition) and surface water runoff.

Cumulative Effects to Habitat: As weed infestations become more severe, it becomes more difficult to restore natural or near natural conditions. Conditions arise where instead of using physical treatments or relatively low applications of low toxicity herbicides, more intensive physical treatment or intensive applications at higher concentrations of more toxic herbicides may be necessary to control later stages of weed infestations. When this occurs, the risk to the aquatic environment also increases and viability of aquatic species may also be at risk.

Cumulative Effects Conclusion: It is anticipated, that under the No Action Alternative, there will be an increase in noxious weeds within suitable habitat. The relative cumulative effect to Modoc suckers would be relatively small compared to the existing amount of habitat in the analysis area.

Alternatives 2/4/6

Direct and Indirect Effects to Habitat: Mechanical treatment of weed sites could result in some localized soil disturbance and possibly increased sedimentation of nearby drainages. These effects would be expected to be minor and temporary in duration because of the comparatively few acres of soil disturbance followed by the reclamation and restoration (where appropriate) of treated areas. Treatment would result in better riparian condition, in turn providing more stable and useful aquatic habitat.

Under these alternatives, potential direct effects to aquatic resources would be primarily associated with herbicide application near streams and associated riparian areas, lakes, or wetlands. Most herbicides are applied in liquid formulations and are sprayed on foliage of the target vegetation. In some cases soil may be a major receptor and contamination can occur by chemicals leaching through the soil to the groundwater and ultimately reaching the aquatic environment. This method of introduction usually poses the least amount of risk to the aquatic environment because chemicals typically disappear from the ground surface by either plant uptake of the chemical, volatilization, and natural decomposition of the active ingredients or adsorption of the herbicide by soil particles. Norris et al. (1991), indicates leaching of chemicals through the soil profile is a process of major public concern, but is least likely to occur in forest environments. Prevention measures proposed to address this are included as part of the Project Design Standards. Leaks, spills, and improper storage and handling of containers are the source of most pesticide related groundwater contamination. These impacts can easily be prevented with proper training of personnel and proper storage and disposal of chemicals. Risk from an accidental spill of herbicide into a water body on the Forest is considered low.

Another mode of pesticide entry to the aquatic system includes overland flow from precipitation events. Risk varies depending on soil composition and timing and intensity of precipitation events after application. Risk tends to be lower on well-vegetated forests and rangeland where soil infiltration is typically greater than precipitation. Norris et al. (1991) indicated that overland flow occurs infrequently on most forestland because the infiltration capacity of the forest floor and soil is usually far greater than the rate of precipitation. Aquatic organisms are more at risk of negative impacts from herbicides in small perennial streams, or during late season when flow is reduced, due to their limited capability for dilution. Prevention measures proposed to address precipitation events are included in the Project Design Standards. Under these alternatives, a buffer zones of 100’ have been established where no herbicides except aquatic formulations of gylphosate will be used. A reduction of noxious weeds in riparian areas and other aquatic habitats would benefit native plant species and result in better streambank and riparian condition, in turn providing more stable and useful aquatic environments. An indirect effect of these buffer zones is that not all noxious weeds would be chemically treated. Even under the integrated weed management approach, not all weed populations would be eradicated, leaving an available seed source for continued propagation or the unlikely option of weeds being out-competed by native or desirable plant species.

Cumulative Effects to Habitat: The mechanical treatment of weed sites could result in some localized soil disturbance and possibly increased sedimentation of nearby drainages. These effects would be expected to be minor and temporary in duration because of the comparatively few acres of soil disturbance followed by the reclamation and restoration (where appropriate) of treated areas**.** Treatment would result better riparian condition, in turn providing more stable and useful aquatic habitat. Mechanical treatment as proposed is not expected to have any direct, indirect, or cumulative adverse effects on these species.

No adverse downstream cumulative effects would be expected from situations involving herbicide runoff or leaching because of the method of application, Best Management Practices

(BMP's) and Design Standards to prevent these types of impacts from occurring. See Appendix D for a list of the specific BMP's.

It is not anticipated that there will be any cumulative effects by chemical spraying of noxious weeds due to the use of chemicals at only their prescribed label rate, the relative non-toxicity of the chemicals to other than target (i.e. plant) organisms, the use of riparian buffers, and the limited area of chemical treatment. Riparian habitat would benefit by decreasing weeds and the acreages to be treated are very small so there is no direct contact with fish and other aquatic species.

Cumulative Effects Conclusion: It is anticipated that implementation of these alternatives, in combination with these past, present, and reasonably foreseeable future actions, would result in the treatment of 1.93 acres (8 sites) of suitable habitat across the analysis area. Therefore, the cumulative effect to Modoc sucker under these alternatives would be negligible compared to the amount of existing habitat in the analysis area.

Alternative 3/5

Direct and Indirect Effects to Habitat: Mechanical treatment of weed sites could result in some localized soil disturbance and possibly increased sedimentation of nearby drainages. These effects would be expected to be minor and temporary in duration because of the comparatively few acres of soil disturbance followed by the reclamation and restoration (where appropriate) of treated areas. Treatment would result in better riparian condition, in turn providing more stable and useful aquatic habitat.

Cumulative Effects to Habitat: The mechanical treatment of weed sites could result in some localized soil disturbance and possibly increased sedimentation of nearby drainages. These effects would be expected to be minor and temporary in duration because of the comparatively few acres of soil disturbance followed by the reclamation and restoration (where appropriate) of treated areas**.** Treatment would result better riparian condition, in turn providing more stable and useful aquatic habitat.

Cumulative Effects Conclusion: Mechanical treatment as proposed is not expected to have any direct, indirect, or cumulative adverse effects on these species.

5.b.3. Summary of Habitat and Population Status and Trend at the Forest/Bioregional Scale

The Modoc NF LRMP (as amended by the SNFPA) requires forest-scale habitat monitoring and bioregional-scale population monitoring for the Modoc sucker (Table 2); hence, the Modoc sucker effects analysis for the Noxious Weed Treatment Project must be informed by both habitat and population monitoring data. The sections below summarize the habitat and population status and trend data for the Modoc sucker. This information is drawn from the detailed information on habitat and population trends in the Modoc National Forest MIS Report (USDA 2007), which is hereby incorporated by reference.

Habitat Status and Trend: Based on the observations of biologists, habitat availability, as a result of improved cattle allotment management, has increased over the past ten year period (M. Yamagiwa pers. comm.).

Population Status and Trend: Past reports estimated the population of the Modoc sucker to be less than 5,000 individual fish (Moyle 2002) and 2,605 (Ford 1977), with the reproductive (effective) population being 200 and 104, respectively, based on length-frequency analyses (Ford 1977, USFS unpublished data). Moyle and Ford, however, did not census the entire reaches where Modoc suckers are known to exist.

A more recent estimate of the effective population is 3,000 individual fish, which was determined from 1994 surveys conducted by the National Biological Survey (M. Yamagiwa pers. comm.).

Population numbers for Modoc suckers is difficult to obtain and interpret. Visual counts have been conducted during night surveys with no definitive population numbers obtained, just distribution. It is known that there is a positive increase in numbers of Modoc suckers where exotic fish (largemouth bass) are removed (S. Reid pers. comm.). Based upon past survey records, it is estimated that the population trend for this species is increasing over the past ten year period (Ibid).

5.b.4. Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the species: Mechanical treatment as proposed will not alter or contribute to existing forest-wide trend in population or distribution.

Herbicide treatment would result in the treatment of 1.93 acres (8 sites) of suitable habitat across the analysis area. Therefore, the impact of the Noxious Weed Treatment Project will not alter or contribute to existing forest-wide trend in population or distribution for the Modoc sucker.

5.c. Goose Lake Redband Trout

The Goose Lake redband trout is a Forest Service listed sensitive species; additional information on affected environment and environmental consequences of the Noxious Weed Treatment Project on these species is found in the project BE.

5.c.1. Habitat/Species Relationship

Detailed information on MIS for the Modoc NF is documented in the Modoc National Forest MIS Report (USDA 2007), which is hereby incorporated by reference.

The Goose Lake redband trout is a Forest Service sensitive species. The name redband trout is used to cover a complex of distinctive trouts that occur in isolated headwater streams of the McCloud, Pit, Klamath, and Columbia river systems of California, Nevada, and Oregon. The Goose Lake basin can be considered a disrupted part of the Sacramento River basin because Goose Lake has overflowed to the Pit River in historical times.

5.c.2. Project-level Effects Analysis based on Habitat

Key Habitat Factor(s) for the Analysis: The Forest LRMP identified these species as associated with riparian habitats. These species are found in the following CWHR habitat types: lacustrine and riverine.

Analysis Area for Project-level Effects Analysis: The Goose Lake redband trout is endemic to Goose Lake and its major tributaries (Lassen and Willow creeks in California and the extensive Thomas Creek system and Crane Creek in Oregon) as well as to smaller streams such as Cottonwood Creek in California and several small streams in Oregon. Berg (1987) reported that Joseph, Parker, and East creeks, tributaries of the upper Pit River in California, contained trout genetically similar to Goose Lake redband trout. It is generally recognized that the native trout of the upper Pit River are Goose Lake redband trout.

Current Condition of the Key Habitat Factor(s) in the Analysis Area: The long-term persistence of this fish depends largely on the health of populations in the headwater streams flowing into Goose Lake in Oregon and California, even though much of the conservation attention has focused on large fish in the lake itself. The extirpation of the lake population during a drought and its subsequent partial recovery indicate the probable importance of downstream colonization of the lake from headwater populations. Because of the high level of concern over extirpation of Goose Lake redbands (and other native fishes) from Goose Lake when it dried up,

conservation efforts have been under way in the watershed, by both agencies and private landowners, to restore streams (e.g., by changing grazing practices) and to remove or alter migration barriers (Moyle 2002).

Alternative 1

Direct and Indirect Effects to Habitat: Potential adverse effects to the aquatic environment from not controlling spread of noxious weeds include but are not limited to, an increase in sedimentation, reduction in streambank stability, elevated water temperature with the lack of canopy cover, and a potential decrease in the amount of organic matter available to enter affected streams. Without treatment, noxious weeds would likely become widely established across the Forest. This could lead to an increase in soil erosion (sediment deposition) and surface water runoff.

Cumulative Effects to Habitat: As weed infestations become more severe, it becomes more difficult to restore natural or near natural conditions. Conditions arise where instead of using physical treatments or relatively low applications of low toxicity herbicides, more intensive physical treatment or intensive applications at higher concentrations of more toxic herbicides may be necessary to control later stages of weed infestations. When this occurs, the risk to the aquatic environment also increases and viability of aquatic species may also be at risk

Cumulative Effects Conclusion: It is anticipated, that under the No Action Alternative, there will be an increase in noxious weeds within suitable habitat. The relative cumulative effect to Goose Lake redband trout would be relatively small compared to the existing amount of habitat in the analysis area.

Alternatives 2/4/6

Direct and Indirect Effects to Habitat: Mechanical treatment of weed sites could result in some localized soil disturbance and possibly increased sedimentation of nearby drainages. These effects would be expected to be minor and temporary in duration because of the comparatively few acres of soil disturbance followed by the reclamation and restoration (where appropriate) of treated areas. Treatment would result in better riparian condition, in turn providing more stable and useful aquatic habitat.

Under these alternatives, potential direct effects to aquatic resources would be primarily associated with herbicide application near streams and associated riparian areas, lakes, or wetlands. Most herbicides are applied in liquid formulations and are sprayed on foliage of the target vegetation. In some cases soil may be a major receptor and contamination can occur by chemicals leaching through the soil to the groundwater and ultimately reaching the aquatic environment. This method of introduction usually poses the least amount of risk to the aquatic environment because chemicals typically disappear from the ground surface by either plant uptake of the chemical, volatilization, and natural decomposition of the active ingredients or adsorption of the herbicide by soil particles. Norris et al. (1991), indicates leaching of chemicals through the soil profile is a process of major public concern, but is least likely to occur in forest environments. Prevention measures proposed to address this are included as part of the Project Design Standards. Leaks, spills, and improper storage and handling of containers are the source of most pesticide related groundwater contamination. These impacts can easily be prevented with proper training of personnel and proper storage and disposal of chemicals. Risk from an accidental spill of herbicide into a water body on the Forest is considered low.

Another mode of pesticide entry to the aquatic system includes overland flow from precipitation events. Risk varies depending on soil composition and timing and intensity of precipitation events after application. Risk tends to be lower on well-vegetated forests and rangeland where soil infiltration is typically greater than precipitation. Norris et al. (1991) indicated that overland flow

occurs infrequently on most forestland because the infiltration capacity of the forest floor and soil is usually far greater than the rate of precipitation. Aquatic organisms are more at risk of negative impacts from herbicides in small perennial streams, or during late season when flow is reduced, due to their limited capability for dilution. Prevention measures proposed to address precipitation events are included in the Project Design Standards. Under these alternatives, a buffer zones of 100' have been established where no herbicides except aquatic formulations of gylphosate will be used. A reduction of noxious weeds in riparian areas and other aquatic habitats would benefit native plant species and result in better streambank and riparian condition, in turn providing more stable and useful aquatic environments. An indirect effect of these buffer zones is that not all noxious weeds would be chemically treated. Even under the integrated weed management approach, not all weed populations would be eradicated, leaving an available seed source for continued propagation or the unlikely option of weeds being out-competed by native or desirable plant species.

Cumulative Effects to Habitat: The mechanical treatment of weed sites could result in some localized soil disturbance and possibly increased sedimentation of nearby drainages. These effects would be expected to be minor and temporary in duration because of the comparatively few acres of soil disturbance followed by the reclamation and restoration (where appropriate) of treated areas**.** Treatment would result better riparian condition, in turn providing more stable and useful aquatic habitat. Mechanical treatment as proposed is not expected to have any direct, indirect, or cumulative adverse effects on these species.

No adverse downstream cumulative effects would be expected from situations involving herbicide runoff or leaching because of the method of application, Best Management Practices (BMP's) and Design Standards to prevent these types of impacts from occurring. See Appendix D for a list of the specific BMP's.

It is not anticipated that there will be any cumulative effects by chemical spraying of noxious weeds due to the use of chemicals at only their prescribed label rate, the relative non-toxicity of the chemicals to other than target (i.e. plant) organisms, the use of riparian buffers, and the limited area of chemical treatment. Riparian habitat would benefit by decreasing weeds and the acreages to be treated are very small so there is no direct contact with fish and other aquatic species.

Cumulative Effects Conclusion: It is anticipated that implementation of these alternatives, in combination with these past, present, and reasonably foreseeable future actions, would result in the treatment of 12.6 acres (9 sites) of suitable habitat across the analysis area.

Therefore, the cumulative effect to Goose Lake redband trout under these alternatives would be negligible compared to the amount of existing habitat in the analysis area

5.d. Rainbow Trout, Brown Trout, and Largemouth Bass

The rainbow trout, brown trout, and largemouth bass are MIS game species on the Modoc NF. They are all found in lacustrine and riverine habitats on the forest. These species have historically been moved and stocked in many streams and lakes of the Modoc NF throughout the 20th century, although many lakes and streams have naturally reproducing populations. It is unknown to what extent naturally reproducing rainbow trout are of native genetic stock, unaffected by hatchery introductions, while all brown trout and largemouth bass are non-native to the area.

5.d.1. Habitat/Species Relationship

Detailed information on MIS for the Modoc NF is documented in the Modoc National Forest MIS Report (USDA 2007), which is hereby incorporated by reference.

5.d.2. Project-level Effects Analysis based on Habitat

Key Habitat Factor(s) for the Analysis: The Forest LRMP identified these species as associated with riparian habitats. These species are found in the following CWHR habitat types: lacustrine and riverine.

Analysis Area for Project-level Effects Analysis: Rainbow trout are widely distributed throughout streams and lakes within the Sierra Nevada bio-region. Rainbow trout habitat on the Modoc is considered abundant and has remained relatively constant since the development of the Forest Plan (M. Yamagiwa pers. comm.).

Brown trout are widely distributed throughout streams and lakes within the Sierra Nevada Bio-region. Brown trout habitat on the Modoc is considered abundant and well distributed at higher elevations across the Forest, primarily on the Warner Mountain Ranger District (M.Yamagiwa pers. comm.).

Available largemouth bass habitat on the Modoc National Forest consists primarily of Big Sage Reservoir with bass occupying several other small reservoirs on the Devil's Garden and Doublehead Districts

Current Condition of the Key Habitat Factor(s) in the Analysis Area: Several grazing strategies have been implemented on allotments (containing rainbow trout) to improve riparian conditions. Habitat trend for rainbow trout on the Modoc appears to be stable at this time (M. Yamagiwa pers. comm.).

This species has stable populations across the Sierra Nevada Bioregion. Some Forests, including the Modoc National Forest, are actively removing brown trout from streams to restore native fisheries and amphibian populations.

The amount of largemouth bass habitat has remained relatively stable since the development of the Forest Plan, as the existing lakes and reservoirs have not undergone any substantial change in habitat conditions.

Alternative 1

Direct and Indirect Effects to Habitat: Potential adverse effects to the aquatic environment from not controlling spread of noxious weeds include but are not limited to, an increase in sedimentation, reduction in streambank stability, elevated water temperature with the lack of canopy cover, and a potential decrease in the amount of organic matter available to enter affected streams. Without treatment, noxious weeds would likely become widely established across the Forest. This could lead to an increase in soil erosion (sediment deposition) and surface water runoff.

Cumulative Effects to Habitat: As weed infestations become more severe, it becomes more difficult to restore natural or near natural conditions. Conditions arise where instead of using physical treatments or relatively low applications of low toxicity herbicides, more intensive physical treatment or intensive applications at higher concentrations of more toxic herbicides may be necessary to control later stages of weed infestations. When this occurs, the risk to the aquatic environment also increases and viability of aquatic species may also be at risk

Cumulative Effects Conclusion: It is anticipated, that under the No Action Alternative, there will be an increase in noxious weeds within suitable habitat. The relative cumulative effect to

these species would be relatively small compared to the existing amount of habitat in the analysis area.

Alternatives 2/4

Direct and Indirect Effects to Habitat: Mechanical treatment of weed sites could result in some localized soil disturbance and possibly increased sedimentation of nearby drainages. These effects would be expected to be minor and temporary in duration because of the comparatively few acres of soil disturbance followed by the reclamation and restoration (where appropriate) of treated areas. Treatment would result in better riparian condition, in turn providing more stable and useful aquatic habitat.

Under these alternatives, potential direct effects to aquatic resources would be primarily associated with herbicide application near streams and associated riparian areas, lakes, or wetlands. Most herbicides are applied in liquid formulations and are sprayed on foliage of the target vegetation. In some cases soil may be a major receptor and contamination can occur by chemicals leaching through the soil to the groundwater and ultimately reaching the aquatic environment. This method of introduction usually poses the least amount of risk to the aquatic environment because chemicals typically disappear from the ground surface by either plant uptake of the chemical, volatilization, and natural decomposition of the active ingredients or adsorption of the herbicide by soil particles. Norris et al. (1991), indicates leaching of chemicals through the soil profile is a process of major public concern, but is least likely to occur in forest environments. Prevention measures proposed to address this are included as part of the Project Design Standards. Leaks, spills, and improper storage and handling of containers are the source of most pesticide related groundwater contamination. These impacts can easily be prevented with proper training of personnel and proper storage and disposal of chemicals. Risk from an accidental spill of herbicide into a water body on the Forest is considered low.

Another mode of pesticide entry to the aquatic system includes overland flow from precipitation events. Risk varies depending on soil composition and timing and intensity of precipitation events after application. Risk tends to be lower on well-vegetated forests and rangeland where soil infiltration is typically greater than precipitation. Norris et al. (1991) indicated that overland flow occurs infrequently on most forestland because the infiltration capacity of the forest floor and soil is usually far greater than the rate of precipitation. Aquatic organisms are more at risk of negative impacts from herbicides in small perennial streams, or during late season when flow is reduced, due to their limited capability for dilution. Prevention measures proposed to address precipitation events are included in the Project Design Standards. Under these alternatives, buffer zones have been established. The prescribed widths of the Streamside Management Zones (SMZ's) are consistent with the LRMP as modified by the Sierra Nevada Framework ROD, 2001. The specified distances for perennial streams, lakes and special aquatic features is 300 feet and 150 for seasonally flowing streams. Herbicide treatment for these alternatives are as follows: From high water outward to 10 feet – no herbicide use. From a distance of 10 feet to the outer edge of the SMZ only glyphosate may be applied by wicking on the plant. From the outer edge of the SMZ, glyphosate, clopyralid, diacamba, and triclopyr may be used. 2,4-D will not be applied within 1,000 feet of surface or live water. A reduction of noxious weeds in riparian areas and other aquatic habitats would benefit native plant species and result in better streambank and riparian condition, in turn providing more stable and useful aquatic environments. An indirect effect of these buffer zones is that not all noxious weeds would be chemically treated. Even under the integrated weed management approach, not all weed populations would be eradicated, leaving an available seed source for continued propagation or the unlikely option of weeds being out-competed by native or desirable plant species.

Cumulative Effects to Habitat: The mechanical treatment of weed sites could result in some localized soil disturbance and possibly increased sedimentation of nearby drainages. These effects would be expected to be minor and temporary in duration because of the comparatively few acres of soil disturbance followed by the reclamation and restoration (where appropriate) of treated areas**.** Treatment would result better riparian condition, in turn providing more stable and useful aquatic habitat. Mechanical treatment as proposed is not expected to have any direct, indirect, or cumulative adverse effects on these species.

No adverse downstream cumulative effects would be expected from situations involving herbicide runoff or leaching because of the method of application, Best Management Practices (BMP's) and Design Standards to prevent these types of impacts from occurring. See Appendix D for a list of the specific BMP's.

It is not anticipated that there will be any cumulative effects by chemical spraying of noxious weeds due to the use of chemicals at only their prescribed label rate, the relative non-toxicity of the chemicals to other than target (i.e. plant) organisms, the use of riparian buffers, and the limited area of chemical treatment. Riparian habitat would benefit by decreasing weeds and the acreages to be treated are very small so there is no direct contact with fish and other aquatic species.

Cumulative Effects Conclusion: Under these alternatives, the potential for direct and indirect effects to water quality would be prevented through the application of Design Standards. It is unlikely that these alternatives would introduce pesticides into either the North/South Fork of the Pit River or Klamath River that are in excess of the applicable Basin Water Quality Plans and would meet state and federal water quality objectives (Adams 2007).

Therefore, the cumulative effect to rainbow trout, brown trout, and largemouth bass under these alternatives would be negligible.

Alternative 3/5

Direct and Indirect Effects to Habitat: Mechanical treatment of weed sites could result in some localized soil disturbance and possibly increased sedimentation of nearby drainages. These effects would be expected to be minor and temporary in duration because of the comparatively few acres of soil disturbance followed by the reclamation and restoration (where appropriate) of treated areas. Treatment would result in better riparian condition, in turn providing more stable and useful aquatic habitat.

Cumulative Effects to Habitat: The mechanical treatment of weed sites could result in some localized soil disturbance and possibly increased sedimentation of nearby drainages. These effects would be expected to be minor and temporary in duration because of the comparatively few acres of soil disturbance followed by the reclamation and restoration (where appropriate) of treated areas**.** Treatment would result better riparian condition, in turn providing more stable and useful aquatic habitat.

Cumulative Effects Conclusion: Mechanical treatment as proposed is not expected to have any direct, indirect, or cumulative adverse effects on these species.

Alternative 6

Direct and Indirect Effects to Habitat: See Alternative 2/4 discussion. The primary difference is under this alternative the SMZ's would be treated for noxious weeds by the use of herbicides other than glyphosate. From the outer edge of the high water mark for a distance of 10 feet, aquatic formulations of glyphosate may be used. From 10 feet from the edge of the high water mark outward, 2,4-Damine, chlorsulfuron, and glyphosate may be used. From 25 feet from the edge of the high water mark outward clopyralid, dicamba, triclopyr, and Tank Mix #1

(chlorsulfuron + 2,4-D amine) and Tank Mix #2 (dicamba + 2,4-D amine). Outside of 100 feet ester forms of 2,4-D may be used in the tank mix.

Cumulative Effects to Habitat: In this alternative, 6.1 acres are within 10 feet of a waterway and 37.5 acres are located within 100 feet of water. The concentrations of herbicides that are proposed to be applied near or adjacent to water (within 25 feet of high water mark for streams, lakes, and special aquatic features) are less than label directions and are determined to be a low risk to adversely effect downstream beneficial uses (Adams 2007).

Cumulative Effects Conclusion: Under these alternatives, the potential for direct and indirect effects to water quality would be prevented through the application of Design Standards. It is unlikely that these alternatives would introduce pesticides into either the North/South Fork of the Pit River or Klamath River that are in excess of the applicable Basin Water Quality Plans and would meet state and federal water quality objectives (Adams 2007).

Therefore, the cumulative effect to rainbow trout, brown trout, and largemouth bass under these alternatives would be negligible.

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Noxious Weed Project

Aquatic Resources Supplement

Prepared by /s/ Marty Yamagiwa **Date: 1/28/08**

Marty Yamagiwa, Forest Wildlife and Fisheries Program Manager

This supplement provides additional information on the aquatic resources potentially affected by the Modoc National Forest Noxious Weed Treatment Project.

Sensitive species:

The current (March 2005), USDA Forest Service, Pacific Southwest Region Sensitive Animal Species list was reviewed for consistency with the list used during the preparation of the Biological Evaluation for this project. An additional species, the Topaz snail, Juga (Calibasis) acutifilosa, was found to be on the latest list. This snail occurs in the Fall River and Hat Creek subdrainages far downstream of the project area in the Fall River Mills area of Shasta County. Like the Scalloped Juga, this species does not have suitable habitat that is directly, indirectly, or cumulatively affected by the Modoc National Forest Noxious Weed Treatment Project and will not be carried forward for further analysis.

Threatened or endangered species:
The current USFWS species list (February 2007) was reviewed for consistency with the Biological Assessment prepared for the project. No new listed species were found for the vicinity of the project area.

Risk assessment information:

Specific sites

We excluded all sites that were greater than 100 feet from water because the potential for contamination from the chemical was essentially zero because the chemical does not move that far off site under typical conditions. Typical conditions were described in the EIS and were tied back to labeling requirements (wind speed, time until precipitation, droplet size, temperature limits for volatilization, etc.)

The following are specific noxious weed occurrences within 100’ of TES species habitat.

WM012CIAR4 – This is a Canada thistle site of 0.08 acres. It is located near Fitzhugh Creek which is occupied by the Goose Lake redband trout. There are approximately 100 plants in the area.

WM003LIDA – This is a Dalmation toadflax site of 8.25 acres near Lassen Creek which is occupied by the Goose Lake redband trout.

BV006CEDI3 – This is a Diffuse Knapweed site of 0.06 acres near Johnson Creek which is occupied by the Goose Lake redband trout and Modoc sucker. There are more than 100 plants in the area.

BV004CEDI3 - This is a Diffuse Knapweed site of 0.08 acres near Johnson Creek which is occupied by the Goose Lake redband trout and Modoc sucker. There are more than 1000 plants in the area.

BV006CEDI - This is a Diffuse Knapweed site of 0.87 acres near Johnson Creek which is occupied by the Goose Lake redband trout and Modoc sucker. There are approximately 100 plants in the area.

WM002ISTI – This is a Dyers woad site of 2.58 acres near Buck Creek which is occupied by Goose Lake redband trout.

BV001SAAE – This is a Mediterranean sage site of 0.27 acres near Johnson Creek which is occupied by the Goose Lake redband trout and Modoc sucker. There are more than 100 plants in the area.

BV260ONAC – This is a Scotch thistle site of 0.10 acres near Johnson Creek which is occupied by the Goose Lake redband trout and Modoc sucker. There are more than 100 plants in the area.

BV002CEMA4 – This is a Spotted knapweed site of 0.31 acres near Johnson Creek which is occupied by the Goose Lake redband trout and Modoc sucker. There are approximately 300 plants in the area.

BV117ONAC – This is Scotch thistle site of 0.15 acres near Ash Creek which is occupied by Modoc sucker.

DG043ONAC – This is a Scotch thistle site of 0.09 acres near Cottonwood Campground. This is within Modoc sucker habitat.

DG005CIAR4 – This is a Canada thistle site of 0.10 acres along the Fairchild Swamp ditch which is shortnose sucker habitat. This ditch is often seasonally dry.

DG006CIAR4 - This is a Canada thistle site of 0.09 acres along the Fairchild Swamp ditch which is shortnose sucker habitat. This ditch is often seasonally dry.

DG016CIAR4 - This is a Canada thistle site of 0.09 acres along the Fairchild Swamp ditch which is shortnose sucker habitat. This ditch is often seasonally dry.

DH012CIAR4 – This is a Canada thistle site of 0.08 acres along Willow Creek near Clear Lake Reservoir, habitat for the Lost River and shortnose sucker.

Total habitat affected: Lost River sucker, shortnose sucker, and Modoc sucker (endangered) is 2.29 acres. Goose Lake redband trout (sensitive) is 12.6 acres. There is overlap in the distribution of the Modoc sucker and Goose Lake redband trout, so the total area affected is 13.2 acres.

Herbicides proposed for use and rates of application can be found in ***Table 2-11*** in Chapter 2 of the Noxious Weed Treatment Project Environmental Impact Statement**.**

General Discussion of Effects on Selected Herbicides on Aquatic Species:

Herbicides are specially formulated chemicals to kill all or parts of target plants. Many kinds of herbicides, varying from broad-spectrum varieties, which are effective against most species of plants, to narrow-spectrum varieties, which are effective against specific target plants or classes of plants, could be used for noxious weed treatment. Herbicide formulations come in both liquid and solid forms.

The risk rating system is based on typical application rates and resulting exposure rates relative to the LC_{50} and the NOEL/NOAELs, when they are available.

Two main factors determine the degree to which adverse effects on a species could occur from herbicide applications: 1) the toxicity of the herbicide, and 2) the likelihood that an animal or plant species would be exposed to toxic levels of the herbicide.

Information regarding the effects of the proposed herbicides on riparian and aquatic species in their natural environments is almost non-existent, effects have been measured under laboratory conditions. The data presented for aquatic and riparian associated special status species are derived from numerous studies conducted primarily on species that serve as surrogates.

For each of the herbicides considered in this analysis, information concerning the hazard identification, exposure assessment, dose-response assessment, and risk characterization come directly from SERA reports, pesticide fact sheets, US EPA, and other references cited below. Where information is inconsistent, an interpretation is made as it relates to forest aquatic and riparian-associated species.

The NPE surfactant associated with herbicides are analyzed in this Final Supplement. During the site-specific implementation, NPE or any other surfactants proposed for use would be analyzed.

Aquatic and Riparian-Associated Species Risk Assessment

Herbicide and NPE-based Surfactants Effects on Surrogate Species

Table 1 below illustrates the herbicide and NPE-based surfactant typical application rates, exposure rate, NOECs, and LC_{50}s for a variety of fish species. Exposure rate estimates for fish species are based on a water contamination rates. Three exposure scenarios presented are: 1) acute exposure in a stream contaminated by runoff and/or percolation; 2) chronic exposure in a stream contaminated by runoff and/or percolation; and 3) acute exposure in a small pond after a spill of 200 gallons of an herbicide mixture. These three scenarios are based on the typical application and dilution rates. NOEC and LC_{50} values for fish species were taken from SERA and the US EPA Reregistration Eligibility Decisions (1993, 1998). Exposure numbers are from the project file worksheets. Additional references not included in these documents are identified. Soil or organic matter absorption, transport through soil, water dilution, degradation, dispersion, etc., are considered. Different formulations than the ones noted below may have different effects on individuals and/or different LC_{50}s.

Information about effects on aquatic invertebrates, aquatic macrophytes, and algae are not included in the following section. If these organisms are affected by herbicides or NPE-based surfactants, fish could be indirectly affected by changes food supply or habitat. The following compound-specific discussions are excerpted from the indicated SERA or Forest Service documents. Exposure numbers are from the project file worksheets. Additional references not included in these documents are identified.

Clopyralid

Clopyralid appears to have a very low potential to cause adverse effects in any aquatic species. As shown in Table XX, using the application rate of 0.25 lb/ac results in a potential acute exposure for the aquatic animal of 0.0022 mg/L for runoff and percolation, 0.00052 mg/L for potential chronic exposure, and 0.908 mg/L for a spill scenario. These concentrations are far below the LC_{50} values for fathead minnow (greater than 1,015 mg/L), Rainbow trout (103.5 mg/L), and Bluegill (1,000 mg/L). Daphnia (water flea), a benchmark species for fish, have acute and chronic NOEC values of 23.1 mg/L, well above the exposure rate levels. All of the potential exposure rates for fish and aquatic invertebrates are below the LC_{50} and NOEC values (SERA 1999).

Glyphosate

At the typical application rate of 2.55 lb e.i./ac, the anticipated short-term (acute) levels in water as a result of runoff or percolation would be 0. 0077mg/L. Chronic values would be about 0. 00255 mg/L. In the event of a spill, glyphosate would reach concentrations of 9.24 mg/L. Exposures via percolation and runoff would be below the fish LD_{50}s (as low as 8.7 mg/L) and the fish NOEC for glyphosate (1 mg/L), so it is unlikely that effects would occur from the application of glyphosate. However, a spill would represent a risk of toxic effects to fish. A major difference between the effect of glyphosate and glyphosate formulations on aquatic and terrestrial organisms is attributed to the polyethoxylated tallow amine surfactant (POEA) used in Roundup formulations. For fish, the surfactant is more toxic than glyphosate. This is reflected in the lower NOEC for Roundup of 0.1 mg/L. For exposures via percolation and runoff, the acute and chronic exposures would still be below the Roundup NOEC (by at least a factor of 13), hence no adverse effects to fish would be anticipated. A spill involving Roundup, like glyphosate itself, would represent a risk of toxic effects (SERA 1996).

Table 1. Expected herbicide exposure rates of surrogate fish species from typical application rates and central/typical water contamination rates compared to effects thresholds.

Herbicide	Application Rate	Test Species	LC_{50} (mg/L = ppm)	Exposure Rate	NOEC Effect Level or Concentrations
Clopyralid	0.25lbs/ac	Fathead minnow Rainbow trout Bluegill	>1,015 mg/L 103.5 mg/L 1000 mg/L	0.0022 mg/L (acute) 0.00052 mg/L (chronic) 0.9084 mg/L (spill)	23.1 mg/L (acute and chronic)
Glyphosate	3lbs/ac	Fathead minnow Rainbow trout Bluegill Coho salmon (fry) Sockeye salmon (fry)	84.9 mg/L 38 ppm >24 mg/L 12.8 ppm 8.7 ppm	0.0077 mg/L (acute) 0.00255 mg/L (chronic) 9.24 mg//L (spill)	1.0 mg/L=glyphosate 0.1mg/L=Roundup (acute and chronic)
Chlorsulfuron	0.05-0.0625 lbs/ac	Rainbow trout embryos, alevins, and fingerlings	Not determined since 50% mortality not observed	18-900 mg/L	32 mg/L
Triclopyr BEE	1.5lbs/ac	Fathead minnow Rainbow trout Bluegill	2.31 ppm 0.65 ppm 0.36 ppm	0.135 mg/L (acute) 0.045 mg/L (chronic) 5.45 mg/L (spill)	0.6 mg/L (acute and chronic)
Triclopyr TEA	1.0lbs/ac	Fathead minnow Rainbow trout Bluegill	279 ppm 240 ppm 471 ppm	0.09 mg/L (acute) 0.03 mg/L (chronic) 3.63 mg/L (spill)	50 mg/L (acute and chronic)
Diacamba	1.5lbs/ac	Fish, typical	100-500 mg/L	0.0001-0.0004 mg/L (acute) 1-10 mg/L (spill)	
2, 4-D	1.5lbs/ac	Fathead minnow Rainbow trout	263 mg/L 358 mg/L		

Sources: SERA (1996-2001, and 2003), USDA Forest Service (2003), and US EPA Reregistration Eligibility Decisions (1993, and 1998).
Note: Tests were not conducted above NOECs.

Chlorsulfuron

Acute toxicity studies have been conducted in several species of fish. A single study investigated the effects of chronic exposure of chlorsulfuron in rainbow trout. Due to limited water solubility of chlorsulfuron, full dose-response curves counld not be generated. However, fish do not appear particularly susceptible to chlorsulfuron toxicity, with LC_{50} values in most species exceeding the limit of solubility for chlorsulfuron toxicity (250 to 989 ppm) (SERA 2004).

Triclopyr

Two commercial formulations of triclopyr, Garlon 3A and Garlon 4, have been used in Forest Service vegetation management programs. Garlon 3A consists of the triethylamine salt of triclopyr (TEA) (44.4 %) plus emulsifiers, surfactants, and ethanol. Garlon 4 contains the butoxyethyl ester (BEE) of triclopyr (61.6 %) plus inerts (38.4 %) that include deodorized kerosene (SERA 1996).

Triclopyr BEE

At a typical application rate of 1.5 lbs/ac, the estimated acute and chronic concentration of triclopyr BEE in water is 0.135 and 0.045 mg/L, respectively, while a spill could result in concentration of 5.45 mg/L. These concentrations are below the LC_{50} for fathead minnows (2.31 ppm), rainbow trout (0.65 ppm) and bluegill (0.36 ppm). However, the exposure rate from the spill scenario exceeds the acute and chronic NOEC of less than or equal to 0.25. A spill involving triclopyr BEE appears to have a potential to cause adverse effects in fish species.

Triclopyr TEA

At the typical application rate of 1.0 lbs/ac, the estimated acute and chronic concentration of triclopyr TEA in water is 0.09 and 0.03 mg/L, respectively,, while a spill could result in a concentration of 3.63 mg/L. These exposure levels are below the lowest LC_{50} of 240 mg/L for rainbow trout and the acute and chronic NOEC of 199 mg/L and 104 mg/L, respectively for fish. Triclopyr TEA is not expected to have a direct effect on fish species.

Dicamba

Relatively little information is available regarding the toxicity of dicamba to aquatic species. The only endpoints that have been examined are acute lethal responses for aquatic animals (LC_{50} values) and growth inhibition in unicellular algae (EC_{50} values). Comparable studies on aquatic algae and aquatic animals clearly indicate that some species of algae are much more sensitive to dicamba, compared to fish and aquatic invertebrates. Under typical conditions of exposure ambient concentrations of dicamba in water would be far below any plausible effect levels, even in the most sensitive algal species.

For most fish species and amphibians, maximum anticipated levels in water would not exceed 0.1 of the LC_{50}. Although some mortality might occur in these species as a result of a severe spill (i.e. dicamba levels of 10 mg/L), mortality is far less likely to occur in a moderate spill (i.e. dicamba levels of 1 mg/L).

..... 2, 4-D

Fish (fathead minnows and rainbow trout) were more sensitive to 2, 4-D acid than to the dimethylamine formulation over 24 to 96-hour exposure periods. The EC_{50} values for the acid ranged between 260 and358 mg/L. For the dimethylamine EC_{50} values ranged from 250 to more than 600 mg/L. Using the acid as a surrogate for the amine may be a conservative assumption.

2, 4-D has been reported to cause behavioral effects in some fish species. Swimming behavior of green sunfish was affected by the butoxyethanol ester after about 60 minutes of exposure to 100 ppm (Sargent et al. 1970). Rainbow trout exposed to a butoxyethanol ester of 2, 4-D became lethargic and could not avoid capture (Dodson and Mayfield 1979). The rheotropic response of rainbow trout was also modified such that they no longer oriented themselves into the water current. Smaller fish were least affected, while larger fish were the first to die.

.....

Herbicide Effects on Surrogate Invertebrate Species

Table 2 below illustrates the typical herbicide application rates, exposure rates, NOECs, and LC_{50}s for a variety of surrogate invertebrate species. Exposure rate estimates for invertebrate species are based on a water contamination rates. Three exposure scenarios presented are: 1) acute exposure in a stream contaminated by surface or subsurface runoff, 2) chronic exposure in a stream contaminated by surface or subsurface runoff, and 3) acute exposure in a small pond after a spill of 200 gallons of an herbicide mixture. These three scenarios are based on the typical application and dilution rates. NOEC and LC_{50} values for invertebrate species were taken from SERA (1996-2001), and USDA Forest Service (2003), and the US EPA Reregistration Eligibility Decisions (1993,1998). Additional references not included in these documents are identified. Soil or organic matter absorption, transport through soil, water dilution, degradation, and dispersion, etc., are considered. Formulations different than the ones noted below may have different effects on individuals and/or a different LC_{50}.

Table 2. Expected herbicide exposure rates of surrogate aquatic invertebrate species from typical application rates and central and typical water contamination rates.

Herbicide	Application Rate	Test Species	Exposure Rate (mg/L = ppm)	NOEC	LC_{50} for animal (48 to 96hr exposures)
Clopyralid	0.25lbs/ac	Daphnia magna (water flea)	0.0022 mg/L (acute) 0.00052mg/L (chronic) 0.9084 mg/L (spill)	(1) 23.1 mg/L[1]	232–350 mg/L
Glyphosate	3.0lbs/ac	Daphnia sp. Midge larvae Grass shrimp Fiddler crab Larval oyster	0.0077 mg/L (acute) 0.00255 mg/L (chronic) 9.24 mg/L (spill)	-- -- (2) 210 ppm[2] (2) 650 ppm[2] (2) 10 ppm[2]	218-780 ppm 1,216 ppm
Chlorsulfuron	0.05-0.0625 lbs/ac	Daphnia magna	0.01 to 100 mg/L for 48 hours	10 mg/L	>100 mg/L. Estimated mortality of 30% at 100 mg/L concentration.
Triclopyr BEE	1.5lbs/ac	Daphnia magna Ephemeroptera Mayflies Plecoptera Stoneflies Trichoptera Caddisflies Odonata Dragonflies Diptera Blackflies Shrimp Oyster	0.135 mg/L (acute) 0.045 mg/L (chronic) 5.45mg/L (spill)	NA	1.7-12 mg/L >320 mg/L (1-hr) 249-370 mg/L (1-hr) 21.8–290mg/L(1-hr) >320 mg/L (1-hr) 0.6 mg/L (1-hr) 1.7–2.47 mg/L 0.32 mg/L (EC_{50})
Triclopyr TEA	1.0lbs/ac	Daphnia magna Oyster Shrimp Crab	0.09 mg/L (acute) 0.03 mg/L (chronic) 3.63 mg/L (spill)	80.7 mg/L (reproduction) LOEC = 149 mg/L	950–1,590 mg/L 56-87 ppm (EC_{50}) 326-895 ppm >1000 ppm
Dicamba	1.5lbs/ac	Daphnia sp.			10->40 mg/L
2, 4-D	1.5lbs/ac	Daphnia magna Dragonfly nymph Culex triaeniorhynchus			3390 mg/L 1540 mg/L 1.6 mg/L

Table Footer:
mg/L = milligrams per liter, ppm = parts per million, mg/L = ppm; Note: Tests for LC_{50}s were not available.
Table Footer:
(1)=NOEC, (2)=NOEL; [1] Chronic exposure [2] Acute exposure [3] Subchronic exposure.
Source = SERA 1996-2001, and 2003 USDA Forest Service (2003), and US EPA Reregistration Eligibility Decisions (1993, and 1998).

Clopyralid

The application of clopyralid at the typical rate of 0.25 lb/acre could lead to potential exposure rates of 0.0022 mg/L (acute) and 0.00052 mg/L (chronic) for aquatic invertebrates living in streams. In the scenario involving an herbicide spill into a pond, the potential exposure rate is 0.9084 mg/L. A NOEC of 23.1 mg/L and an LC_{50} of 232-350 mg/L have been established for the water flea. This is the only species of aquatic invertebrate for which there is data available. For all of the scenarios considered in this analysis, the potential exposure rates are below the NOEC and LC_{50} for the water flea (SERA 1999).

Glyphosate

At the typical application rate of 2.55 lb/acre, scenarios for runoff and/or percolation into a stream yield potential exposure rates of 0.0077 mg/L (acute) and 0.00255 mg/L (chronic). In the case of a spill into a pond, the estimated exposure rate is 9.24 mg/L. The LC_{50} for the water flea ranges from 218 to 780 mg/L. For aquatic invertebrates the acute NOEC is less than or equal to 11.0 mg/L and the chronic NOEC is 0.7 mg/L Exposure rates for aquatic invertebrates are below NOECs and LC_{50}s for all species tested (SERA 1996).

Chlorsulfuron

Chlorsulfuron appears to be relatively non-toxic to aquatic invertebrates. Standard toxicity bioassays to assess the effects of chlorsulfuron on aquatic invertebrates were conducted in daphnia and mysid shrimp. Similar LC_{50} values are reported for both species. For reproductive effects, an NOEC of 20 mg/L was reported in a 21-day exposure study in *D. magna* (SERA 2004).

Triclopyr BEE

Potential exposures expected with the typical application of 1.5 lb/acre of triclopyr BEE in a stream scenario are 0.135 mg/L (acute) and 0.045 mg/L (chronic). A spill into a pond could result in an exposure rate of 5.45 mg/L. Tests for effects of this herbicide have been performed for several species of aquatic invertebrates, including aquatic larvae of insects. Exposure rates for stream scenarios are below all of the LC_{50} values for these species. The acute NOEC is 8.55 mg/L and the chronic NOEC is 80.7 mg/L (NOTE* the chronic is higher than the acute because triclopyr BEE quickly changes to triclopyr TEA in water). In the case of a spill, the exposure could exceed the LC_{50} for the water flea, blackfly larvae, shrimp, and oysters (SERA 1996).

Triclopyr TEA

The application of triclopyr TEA at the typical rate of 1 lb/acre could lead to potential exposure rates of 0.09 mg/L (acute) and 0.03 mg/L (chronic) for aquatic invertebrates living in streams. In the scenario involving an herbicide spill into a pond, the potential exposure rate is 3.63 mg/L. A reproductive chronic NOEC of 80.7 mg/L and an LC_{50} of 950-1590 mg/L have been established for the water flea. Estimated exposure rates do not exceed the NOEC and LC_{50} values published for various species of aquatic invertebrates (SERA 1996).

..... Dicamba

At the typical application rate of 1.5 lbs/ac, the LC_{50} of 10->40 mg/L have been established. Aquatic invertebrates are somewhat intermediate in sensitivity between sensitive algal species and fish. Mortality is a plausible concern for sensitive invertebrate species like Daphnia pulex after a severe spill.

..... 2, 4-D

The relative toxicity of the various formulations of 2, 4-D can vary considerably for different species of aquatic crustaceans. Toxicity of 2, 4-D varies between groups of organisms. Ranked in order of greatest to least sensitivity to 2, 4-D are insect larvae, oligochaetes, snails, and zooplankton (Sarkar 1991).

The exposure scenarios as modeled in the risk assessment worksheets represent generalized conditions and assumptions based upon typical herbicide applications. Site-specific environmental information regarding the suitability and timing of certain treatments reduces the potential risk to some degree. Toxicity tests are generally conducted under static laboratory conditions and do not accurately represent, and may not account for, the range of conditions facing species in their natural environments. It is reasonable to assume the model and toxicity values represented in the literature are conservative and provide some further reduction in risk. In the spill scenario, the peak concentrations of any chemical would be greatest at the point of introduction. The ameliorating effects of flow would quickly reduce the spill concentrations as they travel downstream to levels unlikely to incur direct effect. Aquatic systems and riparian habitats are not the targets of herbicide treatment in this project and the effects to these systems and habitats should rarely occur and with low intensity.

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Appendix V:

Terrestrial Wildlife Species Specialist Reports

Appendix V: Terrestrial Wildlife Species Specialist Reports

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Appendix V: Terrestrial Wildlife Biological Evaluation

Biological Evaluation for Terrestrial Wildlife Species

Noxious Weed Treatment Project

Modoc National Forest

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I. Introduction:

The potential effects to terrestrial species are analyzed in three different documents: a Biological Evaluation, a Biological Assessment, and a Management Indicator Species Report. This Biological Evaluation (BE) evaluates the effects of the proposed actions documented in the Final Environmental Impact Statement Noxious Weed Treatment Project on USDA Forest Service Pacific Southwest Region (5) sensitive species found on the Modoc National Forest (NF); it follows standards established in Forest Service Manual direction (FSM 2600, Chap. 70) (USDA 1995). Separate BEs were written for the sensitive plant and fish species.

Three Biological Assessments (BAs) were completed to document the potential effects to federally listed species; these include a terrestrial, an aquatic, and a plant BA. Two separate Management Indicator Species (MIS) Reports were completed for this project (terrestrial and aquatic); they discuss the Modoc NF Management Indicator Species that are either harvest or ecological indicators that are not federally listed or Forest Service Sensitive.

The Modoc National Forest has been through various iterations of the noxious weed treatment project over the past 12 years. Implementation of the weed treatment activities may begin in 2007. See Appendix A for a history of the revisions of the terrestrial wildlife input.

The analysis area for this document includes the entire Modoc NF. This area encompasses about 1.6 million acres of Forest System lands as well as 337,000 acres of lands administered by other agencies or private landowners. Table 1 lists the terrestrial Forest Service sensitive wildlife species that are present on the Modoc NF. The Region 5 Regional Forester's Sensitive species list dated June 8, 1998 (as amended by the 2004 Regional Office direction letter) is the basis for determining a species status as sensitive.

Table 1. USDA Forest Service Region 5 Sensitive Species that occur on the Modoc NF

Mammal	Bird
American Marten ***(Martes amerciana)***	California Spotted Owl **(*Strix occidentalis occidentalis)***
California Bighorn Sheep **(*Ovis canadensis californiania)***	Great Gray Owl **(*Strix nebulosa)***
California Wolverine **(*Gulo luteus)***	Greater Sandhill Crane **(*Grus canadensis tabida)***
Pallid Bat **(*Antrozous pallidus)***	Northern Goshawk ***(Accipiter gentilis*)**
Sierra Nevada Red Fox **(*Vulpes necator)***	Peregrine Falcon **(*Falco peregrinus)***
Townsend's Big-eared Bat **(*Corynorhinus townsendii)***	Sage Grouse **(*Centrocercus urophasianus)***
	Swainson's Hawk **(*Buteo swainsoni)***
	Willow Flycatcher **(*Empidonax traillii)***

This BE will be separated into the following sections: current management direction, a brief description of the proposed activities, a combined species account and effects section for non-MIS sensitive species, a combined species account and effects section for MIS sensitive species, a determinations table, and the reference section. **Exact acreages of habitat were used in order to make it easy to track the values from the GIS queries.**

II. Management Direction for Sensitive Species

Direction for sensitive species is provided in several documents; the most specific direction is found in Forest Service planning documents. The Migratory Bird Treaty Act provides broad scale direction for several of the species covered within this document. The Migratory Bird Treaty Act (1918 as amended by PL 99-645 1986) states that, “Except as allowed by implementing regulations, this act makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs, or migratory bird products. Public Law 95-616 also ratified a treaty with the Soviet Union specifying that both nations will take measures to protect identified ecosystems of special importance to migratory birds from pollution, detrimental alterations, and other environmental degradations.”

Current direction from the Forest Service for sensitive species has been outlined in the Forest Service Manual (FSM) (USFS 1991a), the Modoc National Forest Final Land and Resource Management Plan (LRMP) (USFS 1991b), and Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement (USFS 2004). FSM manual direction provides that Forests, "Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions ... As part of the National Environmental Policy Act process, review programs and activities, through the biological evaluation, to determine their potential effect on sensitive species." Direction further states that Forests are to "Avoid or minimize impacts to species, whose viability has been identified as a concern".

In addition, there is direction provided by the Modoc LRMP (1991b) as amended by the Sierra Nevada Forest Plan Amendment (USDA 2001 and USDA 2004). Direction for each sensitive species is summarized within the write up for each species.

Forest Service Sensitive Species that are also MIS:

The Modoc National Forest has eight Forest Service sensitive species, which are also considered Management Indicator Species (MIS). MIS are defined in the Modoc NF LRMP (USDA 1991a, Pages 4-25 to 4-29), per direction developed under the 1982 National Forest System Land and Resource Management Planning Rule (1982 Planning Rule) (36 CFR 219). Guidance regarding MIS set forth in the Modoc NF LRMP directs Forest Service resource managers to (1) at project scale, analyze the effects of proposed projects on the habitats of each MIS affected by such projects, and (2) at the national forest or bioregional scale, monitor populations and/or habitat trends of forest MIS, as identified by the LRMP.

Potential changes in both habitat and wildlife populations in relation to the Modoc NF Weed Treatment Project are discussed within this BE. Forest or bioregional scale monitoring requirements for the Modoc NF’s MIS are found in two documents. The first, is the Monitoring Plan of the Modoc LRMP (USDA 1991b, Chapter 5, pages 5-16 to 5-20); the second, is in Appendix E of the Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement (FEIS) (USDA 2001), as adopted by the 2004 Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD) (USDA 2004). These requirements have been summarized in Table 2. Because the Noxious Weed Treatment Project includes the entire Forest as the Project Area, all of the Forest Service sensitive species identified are analyzed either in this document or the associated Biological Assessment (BA) or Management Indicator Species (MIS) Report prepared for the Noxious Weed Treatment Project.

Table 2. Monitoring Requirements for the MIS on the Modoc NF (USDA 2001, as amended by SNFPA 2004)

MIS	MIS MONITORING REQUIREMENTS	
	Habitat [b]	Population [a]
American Marten	Vegetation mapping, down log & snag transects	Bioregional - status & change in geographic distribution
Bighorn Sheep	N/A - Extirpated	N/A - Extirpated
Greater Sandhill Crane	Livestock utilization measurements	Distribution population
Northern Goshawk	Ground surveys and vegetation measurement	Bioregional - status & change
Peregrine Falcon	Ground surveys during and after reintroduction efforts	Distribution population
Sage Grouse	Habitat surveys including ecological condition (e.g. vegetation mapping, condition and trend, etc.)	Distribution population
Swainson's Hawk	Habitat utilization assessment	Distribution / relative abundance
Willow Flycatcher	Vegetation sampling, photo points	Bioregional status and change

[a] **Sierra Nevada Forest Plan Amendment, Appendix E**

[b] **Modoc NF FLRMP (USDA Forest Service 1991)**

Project-level impacts to habitat are related to broader scale (generally national forest, and in some cases, bioregional) population and/or habitat trends. Hence, where the Modoc NF LRMP requires population monitoring or population surveys for an MIS, the project-level effects analysis for that MIS must be informed by population monitoring data, which are gathered at the forest or bioregional scale. Population monitoring and survey data are not generally gathered for site-specific projects, consistent with the 2005 planning rule, which states, “Site-specific monitoring or surveying of a proposed project or activity area is not required, but may be conducted at the discretion of the Responsible Official” (36 CFR 219.14(f)).

Habitat status is the current amount of habitat on the Modoc NF for each species. Habitat trend is the direction of change in the amount of habitat between the time the LRMP was approved and the present. Habitat relationship models were developed utilizing a combination of sources including California Wildlife Habitat Relationship (Zeiner et al 1990 Volumes II and III) as well as scientific literature. Detailed information on the habitat relationships for MIS on the Modoc NF can be found in the Modoc National Forest MIS Report (USDA 2007b).

Population status is the current condition of the MIS related to the type of monitoring data (population measure) required in the LRMP for that MIS. Population trend is the direction of change in that population measure over time.

For several MIS (American marten, northern goshawk and willow flycatcher), population data are collected, compiled, and reported at the bioregional (Sierra Nevada) scale, not the forest scale (USDA 2006b). Distribution population monitoring consists of collecting presence data for the MIS across a number of sample locations throughout the forest. Presence data are collected using a number of direct and indirect methods, such as intensive stand searches and bird point counts. Presence population data for MIS are collected and consolidated by the Modoc NF in cooperation with State and Federal agency partners (including the California Department of Fish and Game and USDI Fish and Wildlife Service) or conservation partners (including Partners in Flight and various avian joint ventures). Population data at various

scales are important to both assess and provide meaningful context for population status and trend at the forest scale.

III. Description of the Proposed Activities by Alternative and Design Standards:

The following section provides a **very brief** synopsis of the activities for the Modoc Noxious Weed Treatment Project. See Chapter 2, of the Noxious Weed Treatment FEIS for the detailed description activities considered under the Noxious Weeds Project FEIS (Table 3).

Table 3. Summary Comparison of Alternatives for the Noxious Weed Treatment Project

Alternatives / Alternative Features	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Treatment Timeframe	**Ongoing**	**5 years**	**5 years**	**10 years**	**10 years**	**10 years**
Treatment Sites and Acres	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**
Total Inventoried Weeds (2004)	541/6908	541 / 6908	541 / 6908	541 / 6908	541 / 6908	541 / 6908
Inventoried Weeds Fully Treated	**20-30** ac/yr[1]	520 / **5,995**	494 / **5,993**	520 / **5,995**	520/ **180**	538/ **241**
Inventoried Weed Sites Receiving Partial Treatment2	0/0	16/904[2]	0/0	16/904[2]	0/0	0/0
Inventoried Weeds Receiving Limited Treatment3	0/**0**	0/**0**	0/**0**	0/**0**	9/**100**[3]	3/**100**[3]
Inventoried Weeds Not Treated4	6,878[1]	5/9[4]	47/916[4]	5/9[4]	5 / 5515	0/6,567[4]
Proportion of Inventoried Weeds Treated	0.4%	n.a. / 87 %	91% / 87%	99 % / 99 %	100 % / 4 %	100 % / 5 %
Noxious Weeds Treated Through Early Detection – Rapid Response (acres)5		0 acres	0 acres	Up to **200** acres (100 ac max/yr)	Up to **200** acres (100 ac max/yr)	Up to **200** acres (100 ac max/yr)
Total Acres of Weeds Treated	**20-30** ac/yr1	**6,899** acres	**5,993** acres	**7,099** acres	**480** acres	**541** acres
Treatment Methods for Inventoried Noxious Weeds (2004)	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**	**Sites/Acres**
Physical – hand pulling, hoeing, grubbing	0/0	161/31	494/5,993	161/31	0/0	0/0
Physical+ – Physical plus, clipping seed head or plant, weed eater, mulch/tarp	20-30 ac/yr1	0/0	0/0	0/0	527/139	116/19
Physical and/or Herbicide Treatments	0/**0**	333/**5,961**	0/**0**	333/**5,961**	0/**0**	371/**116**
Herbicide	0/**0**	42/**907**	0/**0**	32/9**07**	0/**0**	46/**65**
Limited Treatment3	0/0	0/0	0/0	0/0	9/100	3/100
Goat Grazing (potential) (physical/herbicide)	0/0	0/0	0/0	0/0	5/41 **(no herbicide)**	5/**41**
Total Acres Potentially Treated with Herbicides (includes ED-RR acres)6	0/**0**	355/**6,868**	0/**0**	355/**7,068**	0/**0**	425/**522**

[1]Under Current Management (Alt. 1), approximately 20 to 30 acres of noxious weeds are treated each year through other site specific NEPA decisions as part of other projects in accordance with the Modoc NF Integrated Weed Management Strategy (2005).
[2]These sites are rhizomotous species that occur within 10 feet of H2O. Those sites that are within 10 feet of H2O would not be treated. Sites with acreage ooutside of this 10 foot no treatment zone would receive

partial treatment. The acreage within the 10 foot zone would not be treated, the acreage outside the 10 foot zone would be treated with herbicides.

[3]Includes treating along borders of infestations to prevent spread using the methods specific to each alternative. Treatment is estimated at 100 acres to be proportionally distributed based on the size of the individual infestations. These acres are included in the Inventoried Noxious Weeds Treated acreage.

[4]Excluded in Alt. 2 and Alt. 4: 5 sites of rhizamotous species that are within 10' of live water and partial acreage of 16 sites of rhizamotous species that are within 10' of live water. Rhizamotous species will not be treated by physical methods in these alternatives. Excluded in Alt. 3: 47 sites of rhizamotous species. Excluded in Alt. 5: 5,658 acre Dyer's woad, 850 acre Dalmatian toadflax, 159 acre crupina, and 6 sites of rhizamotous species. These sites will receive limited treatment around the perimeter estimated at 100 acres proportionally distributed based on the size of these sites. Excluded in Alt. 6: 5,658 acre Dyer's woad, 850 acre Dalmatian toadflax, 159 acre crupina. These sites will receive limited treatment around the perimeter estimated at 100 acres proportionally distributed based on the size of these sites.

[5]May use any of the methods approved for use in this NEPA decision.

[6]For Alt. 2 this includes the acres under the physical and/or herbicide method plus the herbicide treated acres. Alt. 4 adds the same categories as Alt. 2 plus adds in the potentially treated 200 acres through early detection rapid response. Alt. 6 includes the Physical and/or Herbicide acres, the herbicide acres, the acres under goat grazing, the acres under the limited treatment category, and the 200 acres under Early Detection-Rapid Response.

The treatment activities in each Alternative also include the Design Standards. The Design Standards that are specific to wildlife are listed below.

DS- Planning: The Forest will develop an annual work plan for treating noxious weeds, specifying locations and treatments. The annual work plan will be provided to the US Fish and Wildlife Service, California Department of Fish and Game and the appropriate Regional Water Quality Control Boards, well in advance of treatment initiation for their review and comment. Consultation on the annual work plan will be conducted with all affected tribes.

DS 10 Wildlife and Fish - Terrestrial: Limited Operating Periods for TES and MIS species, as called for in the Forest Plan and the Sierra Nevada Framework, will be implemented if weed infestations occur within the specified protection areas. An additional an LOP for sandhill crane will be implemented from 1 April to 30 August for all active crane nests. Applicable to all Alternatives.

DS 11 Wildlife and Fish – Aquatic TES: Herbicides will not be applied within 100 feet of habitats of TES aquatic species, with the exception of aquatic formulations of glyphosate, which may be used within this zone. Applicable to Alternatives 2, 4, and 6.

DS-12a Wildlife and Fish – No Dicamba or 2,4-D (either alone or in tank mix) will be used within occupied sage grouse habitat. The range for this species is very restricted on this forest. Applicable to Alternatives 2, 4, and 6.

DS 12b Wildlife and Fish – No 2,4-D on weed occurrences greater than 2 acres in size. Applicable to Alternative 6.

DS 13 Wildlife and Fish – No 2,4-D (either alone or in tank mix) will be used within 25 feet of the water's edge in occupied bald eagle habitat. Applicable to Alternatives 2, 4, and 6.

IV. Species Accounts/Effects Section For Non-Mis Sensitive Species:

The following section provides detailed information concerning the Non-MIS sensitive species found on the Modoc NF. Each species or group of species will have information concerning presence on the Modoc NF, habitat requirements, and management direction, followed by the effects of the activities proposed within the Noxious Weeds Project FEIS by Alternative.

Survey and incidental sighting data is the foundation for determining species distributions across the forest. The corporate data files are the basis of the analysis of occupied habitat for many species for the Noxious Weed FEIS, which were updated in late March and April of 2005.

The 1997 Forest eveg data files (mdf_eveg97_04) were utilized for modeling both occupied and potential habitat. The 1997 vegetation layer was used for the FEIS analysis for two reasons. First, there was no change between the 1997 and 1999 data submitted for the Forest. Second, we hoped to maintain as much consistency between the DEIS and FEIS, realizing there are changes in aspects of the project, including number of weed occurrences, locations of animals, and proposed activities.

The following Forest Service Sensitive Species are analyzed within this section (Table 4). The analysis will include a species account (detailing presence, LRMP management direction, habitat suitability, and acres of habitat on the Forest) followed by an effects analysis. The section for each species or group of species will be self-contained.

Table 4. USDA Forest Service Region 5 Sensitive Non-MIS Species that occur on the Modoc NF

Common Name ***Scientific Name***	**Habitat or species is potentially affected by project**	**Habitat or species is in project area, but will not be affected by project**	**Habitat or species is not within the project area**

California Spotted Owl (*Strix occidentalis occidentalis)*	X		
California Wolverine (*Gulo gulo luteus)*	X		
Great Gray Owl (*Strix nebulosa)*	X		
Pallid Bat (*Antrozous pallidus)*	X		
Sierra Nevada Red Fox (*Vulpes vulpes necator)*	X		
Townsend's Big-eared Bat (*Corynorhinus townsendii)*	X		

The analysis of potential effects to wildlife from the ingestion of herbicides was completed using various sources of information. Syracuse Environmental Research Associates, Inc. (SERA) risk assessments authored by Dr. Patrick Durkin, PhD under contract to the Forest Service formed a basis for the narratives and tables. David Bakke, USDA Forest Service Region 5 Pesticide Use Specialist, developed the worksheets, which contain these tables; they are found within the Project File for the Modoc NF Noxious Weeds Project. In addition, peer reviewed journal articles provided insights to the potential effects of herbicides on wildlife conducted in field situations (as opposed to laboratory experiments) as well as the potential effects of noxious weeds on wildlife species and their habitats.

In essence, this pesticide risk assessment consists of an estimate of the potential doses that different types of wildlife may be exposed to from the application of herbicides under various scenarios (e.g. large bird consuming herbicide contaminated vegetation). These doses are then compared against the lowest sub-chronic or chronic “No Observable Effect Level” (NOEL) or the “No Observable Adverse Effect Level” (NOAEL) for a comparable species. The ratio of the dose ingested to the NOEL/NOAEL is called a Hazard Quotient (HQ). The lowest NOEL or NOAEL is based on data from experiments on surrogate species (e.g. rats, dogs, ducks) instead of the species of interest themselves (spotted owls, marten, etc). By using the lowest NOEL/NOAEL regardless of the species, some of the interspecies variability is undoubtedly taken into account.

This information takes into account the variance found within the application rate or the applied concentration of an herbicide, which may change based on local conditions. In addition, some variability occurs in the various scenarios including the percentage of an animals’ diet containing contaminated materials (insects, vegetation, fish, small mammals) or a spill of a chemical into water. In either case, exposure depends on the amount of chemical hypothetically ingested or absorbed by a type of animal (e.g. predatory bird eating contaminated fish, small bird eating contaminated insects, carnivorous mammal eating prey).

The risk is expressed as a central estimate bounded by lower and upper levels. Because of the need to encompass many different types of exposure as well as the need to express the uncertainties in the assessment, this risk assessment involves numerous calculations. These calculations are contained in worksheets in the project file for this FEIS, and are based on the SERA risk assessments for the various herbicides proposed for use in the FEIS. The acute scenarios discussed within the Biological Assessment, the Biological Evaluation, and the Management Indicator Species Report assume that 100% of the diet contains contaminated materials. For the chronic levels (on-site), the lower level consists of 10%, the central level consists of 30%, and the upper level consists of 100% of the diet in contaminated materials.

As described in worksheets, exposure rates are expressed in milligrams (mg) of absorbed dose per kilogram (kg) of body weight per day. For the acute exposure scenario, the estimated residue level is taken as the product of the application rate and the residue rate. For the longer-term exposure scenario, a duration of 90 days is used and the dissipation on the vegetation is estimated based on the estimated or established foliar halftimes.

The quantitative risk characterization is expressed as the Hazard Quotient, which is the ratio of the estimated exposure doses to the lowest NOEL/NOAEL. The hazard quotient provides a way to relate the risk of the use of the various herbicides, so the decision maker can make an informed decision. Hazard Quotients greater than 1.0 are expressed in standard decimal notation and smaller numbers are expressed in scientific notations - e.g., 7 E-7 equivalent to 7×10^{-7} or 0.0000007.

There are Hazard Quotients for each of the herbicides proposed for use within the Noxious Weed Project FEIS. Additives to the formulations that might be used when herbicides are applied are not considered quantitatively in this risk assessment, with the exception of surfactants containing nonylphenol polyethoxylate as an active ingredient.

Acute exposure -- A single exposure or multiple exposures occurring within a short time (24 hours or less).

Chronic exposure -- Long-term exposure studies often used to determine the carcinogenic potential of chemicals. These studies are usually performed in rats, mice, or dogs and extend over the average lifetime of the species (for a rat, exposure is 2 years).

No Observable Effect Level" (NOEL) – The dose of a chemical at which no statistically or biologically significant increases in frequency or severity of adverse effects were observed between the exposed population and its appropriate control. Effects may be produced at this dose, but they are not considered to be adverse to the organism.

No Observable Adverse Effect Level" (NOAEL) - The dose of a chemical at which no treatment related effects were observed.

California Spotted Owl

There are two sub-species found on the Modoc NF: northern spotted owl (*Strix occidentalis caurina*) and California spotted owl. The northern spotted owl sub-species is addressed in the terrestrial BA prepared for this project. The California spotted owl is discussed below.

Management Direction: The Modoc NF LRMP contains no management direction for this species. Direction in the Sierra Nevada Framework includes the maintenance of Spotted Owl Protected Activity Centers (PACs). Management for the California Spotted Owl was one of the driving forces behind the Sierra Nevada Forest Plan Amendment.

There is only one location on the Modoc NF, although extensive surveys (approximately 90,000 acres) to protocol have been conducted throughout the Forest. These owls are on the Big Valley Ranger District near Manzanita Mountain. A pair of spotted owls were observed in 1992 and 1993. Only single owls were detected in 1994, 1995, 1996, 1998, 2000, and 2006. In 2007 a spotted owl was detected apparently paired with a barred owl. It appears the two produced a hybrid offspring (B. Turner pers. comm.). No spotted (or barred) owls were detected in 1997, 1999, or from 2001 through 2005.

During the assessment of habitats found within California, the California Spotted Owl Team did not delineate the rest of the Modoc National Forest within the main range for the California spotted owl (Verner et. al. 1992). The scientists felt that the Modoc NF would be considered a population sink, where individual owls or pairs may establish themselves, but would not contribute genetic material into the main population.

California spotted owls in northern Sierra Nevada are associated with mixed conifer and true fir types that have high canopy covers (>70% for nesting) and medium to large trees (Verner et al. 1992). The Manzanita Mountain owls are found in upper elevation mixed conifer habitat characterized by large old trees, with dense understory stocking of second growth. To date, the only documented reproduction is a hybrid offspring with a barred owl in 2007 (B. Turner per. comm.). There are 1,151.5 acres within the one California spotted owl Protected Activity

Center (PAC) on the Forest (CA SpottedOwlPacsAndBase file, updated 5-17-06), which has vegetation types including: Sierran mixed conifer, white fir, and a very small amount of eastside pine.

The following information concerning food habits was obtained from Verner et. al. (1992). Spotted owls consume a variety of different foods: small mammals, birds, frogs, bats, and insects. The most common prey items for spotted owls consists mainly of northern flying squirrels, woodrats, and gophers. Owls tend to forage in areas with medium to large trees, higher canopy closure, and large amounts of snags and logs, although they have been observed to forage for insects from bark, the ground, and even hawking them from the air (Neal et al. 1989 in Verner et al 1992).

Effects of the Alternatives considered within the Noxious Weeds FEIS

Key Habitat Factor(s) for the Analysis:

The proposed project, the removal of noxious weeds from Forest System Lands, will have no affect on California spotted owl habitat. The spotted owls prefer older seral stage stands with large trees and snags as well as logs. The potential effects are limited to the consumption of herbicide contaminated prey materials and disturbance.

Alternative 1 (Current Management)

Direct and Indirect Effects The Forest Service currently treats 20 to 30 acres a year by physical methods. Currently, the Forest does not use herbicides to treat noxious weeds. Therefore, there would be no potential for the consumption of contaminated prey.

Implementing weed treatments under Alternative 1 would have no effect to the spotted owl habitat. There will be no change in the current or future amount of large trees and snags or dead and downed materials by the treatment of noxious weeds. There would be no change in the amount of late seral stage habitat. Therefore, 0 % of the current spotted owl habitat in the analysis area would be affected by implementation of Alternative 1.

Cumulative Effects
Because there is no direct or indirect effect to the California spotted owl or its habitat, there are no cumulative effects to spotted owl or its habitat under this alternative.

Alternatives 2 to 6

Direct and Indirect Effects

Currently, there is one weed occurrence along the road system for a total of 0.1 acres that could be treated within the California spotted owl PAC. This occurrence could be treated by either physical or herbicide means.

Weed treatment by either herbicide or physical means would have no effect on spotted owl habitat. There would be no removal of potential nest/roost trees. Weed treatments of 0.1 acre would still provide ample residual native vegetation for any potential prey within the 1,151.5-acre PAC. Therefore, weed treatments would have no impact to owl habitat under any alternative.

Disturbance and potential ingestion of contaminated prey are the greatest concerns to the spotted owl. Although there have been no known nest sites within the PAC (including FY 2006), pre-treatment surveys would be conducted to protect nesting owls from disturbance. If owls are actively nesting, a Limited Operating Period (LOP), for weed treatment activities would be instituted to protect nest sites.

There is little chance of owls being affected by the contamination of herbicides. Only 0.009%

of the current PAC could receive herbicides. It is highly unlikely that 10% to 100% of the owl's diet would be composed of contaminated prey on such a small site. In addition, none of the herbicides has a hazard quotient above 1 for a predatory bird ingesting contaminated mammals, making the risk of using these herbicides low (Table 5). Given the small acreage and the low risk from the herbicides proposed for use, there will be no discernable direct or indirect effects expected to the spotted owl by the implementation of herbicide treatments.

Table 5: Risk Assessment Values and Hazard Quotient Ratings for Acute Toxicity Levels for the Consumption of Containment of Contaminated Small Mammals by a Predatory Bird by Herbicide Rates

Herbicide/Application Rate	Exposure Assessment Value mg/kg/day or mg/kg/event			Hazard Quotient Rating		
	Central	Lower	Upper	Central	Lower	Upper
2,4 – D						
a) 1.5 lbs/ac	4.8	4.8	4.8	0.5	0.5	0.5
b) 2.0 lbs/ac	6.46	6.46	6.46	0.4	0.4	0.4
Chlorsulfuron 1.0 oz/ac	0.2	0.2	0.2	1×10^{-4}	1×10^{-4}	1×10^{-4}
Clopyralid 0.25 lb/ac	0.8	0.8	0.8	1×10^{-3}	1×10^{-3}	1×10^{-3}
Dicamba						
a) 1.0 lb/ac	3.23	3.23	6.46	0.2	0.2	0.2
b) 2.0 lbs/ac	6.46	6.46	6.46	0.5	0.5	0.5
Glyphosate 3.75 lbs/ac	12.1	12.1	12.1	0.02	0.02	0.02
Triclopyr (Acid) 1.5 lbs/ac	4.8	4.8	4.8	9×10^{-3}	9×10^{-3}	9×10^{-3}
Triclopyr (BEE) 1.5 lbs/ac	4.85	4.85	4.85	0.01	0.01	0.01
NPE	No data	No data	No data	No data	No data	No data

Under the alternatives with Early Detection/Rapid Response activities, new occurrences would be reviewed by wildlife biologists prior to implementation. If concerns for spotted owl surface, additional Design Standards could be added if weed treatments were not consistent with the conditions analyzed above.

Cumulative Effects

Past activities that have affected California spotted owls, or their habitat include the California Pines development (CalPines) which is adjacent to the National Forest. The CalPines area appears to have provided potential habitat for spotted owls at one time. The extensive system of roads, utility corridors and developed lots probably has reduced the suitability for spotted owls. Commercial timber harvest has also occurred on private lands adjacent to the National Forest. These actions included salvage harvest and regeneration harvest prescriptions. Regeneration harvest appears to have removed habitat in the past. Planned private activities include fuel break construction and maintenance within the CalPines development. Planned Federal activities within the area where California spotted owls may occur include the Rush2 Vegetation treatment project, which is proposing to treat approximately 3,600 acres of National Forest, including the owl-protected activity center and the owl home range core area. Thus, the proposed action for noxious-weed treatment would affect approximately 0.01% of the amount of land affected by the Rush2 project. This proposed project would have no direct effects and would have the indirect effect of potentially affecting a handful of prey items. Thus, the effects of this proposed action are undetectable against the backdrop of on-going projects and insignificant in scope and impact. Thus, this project would not contribute to any cumulative effect trend either positively or negatively.

California Wolverine and Sierra Nevada Red Fox

These species were lumped within this analysis for the following reasons. First, they are both large mammalian carnivores. Second, there is no current definitive evidence that they currently inhabit the Modoc NF. Third, their numbers would probably be low, if they currently exist based on historical sighting information. Finally, their ranges would be restricted to the upper elevations on the Forest, even though they might utilize different habitats within these areas. Therefore, the effects of implementation are similar even if the magnitudes of potentially affected acreages are different.

Management Direction: The Modoc LRMP contained no management direction for either species. The SNFPA FEIS ROD states "Detection of a wolverine or Sierra Nevada red fox will be evaluated by a forest carnivore specialist. When verified sightings occur, conduct an analysis to determine if activities within 5 miles of the detection have a potential to affect the species. If necessary, apply limited operating period from January 1 to June 30 to avoid adverse impacts to potential breeding. Evaluate activities of the Wolverine and Sierra Nevada Red Fox for a 2-year period for detections not associated with a den site." (SNFPA FSEIS Record of Decision (ROD), page 54, D-32). (USDA 2004).

Wolverines in California were thought to be rare and declining in the 1950's (Banci in Ruggiero et. al. (1994)). There are only a few old unconfirmed sightings of this wide-ranging forest carnivore on the Forest. Wolverine presence has not been detected during track plate surveys, nor is there any presence of wolverine at baited camera stations placed to detect forest carnivores. To the south, there have been no confirmed sightings of wolverine on the Lassen National Forest since at least 1980 (B. Turner, pers. comm.).

Habitats used in the northern Sierra Nevada include mixed conifer, red fir, lodgepole pine, and dwarf alpine shrub (Zeiner and others 1990). Wolverines use a wide variety of habitats; caves, hollows in cliffs, hollow logs, rock outcrops, and burrows may be used for cover and dens. "Habitat is probably best defined in terms of adequate year-round food supplies in large, sparsely inhabited wilderness areas, rather than in terms of particular types of topography or plant associations" (Kelsall 1981 in Ruggiero et. al. 1994). There are 130,121 acres of the potential wolverine habitat on the Forest. The model utilized a combination vegetation types at elevations 7000 and greater. The dominant vegetation types included: sagebrush and shrub communities, east-side pine, white and red fir, mixed conifer and lodgepole.

Wolverine foraging information came from Ruggiero et. al. (1994). Wolverines are considered opportunistic omnivores in the summer and scavengers in the winter. Carrion from large ungulates is considered important. "Wolverines are too large to survive on only small prey", although small prey are important when large mammal carrion is unavailable.

There were Sierra Nevada red foxes (SNRF) sighted in the Medicine Lake Highlands previous to the 1960's; there was also an unconfirmed sighting of a red fox in the Warner Mountains in the Bucher Creek area (Schempf and White 1977). Although there was a recent sighting of an unknown red fox near Hackamore on the Devil's Garden RD in pine/bitterbrush habitat in the summer, biologists felt that it was probably an escaped domesticated red fox (Tom Ratcliff, pers. comm.). The most recent sightings of Sierra Nevada red fox occur in the Lassen National Park/Lassen National Forest vicinity. According to Campbell et al., (2000), this species historically maintained a continuous distribution in high-elevation habitats in the Sierra Nevada; it "historically occurred in low densities".

Habitat for the red fox is not well understood. This fox usually resides in areas above 7,000 feet and seldom is detected below 5,000 feet (Schempf and White 1977). It appears to utilize mixed conifer, red fir and lodge pole pine forests, especially in proximity to meadows and riparian areas as well as brush fields. Forested habitats are used for reproduction and cover; young may be reared in cavities or spaces within rock piles or talus slopes (Campbell et. al. 2000). The GIS

query for potential habitat included the various vegetation types around wet meadows that occurred above 7,000 feet. The dominant vegetation types in the potential habitat include: white fir, mixed conifer, lodgepole pine and wet meadows. There were 18,940 acres of potential habitat modeled for Sierra Nevada red fox (SNRF) on the Modoc NF.

The Sierra Nevada red fox prefers open areas while hunting, grassy parks and meadows, and open forest stands (various authors in Schempf and White 1977). Diets for SNRF includes: small mammals, birds, carrion, and fruits (Zeiner et. al. 1990); in the western United States, the red fox diet was composed of mice, chipmunks, microtines, woodrats, squirrels, pikas, and rabbits/hares (various authors in Campbell et. al. 2000). Territory size for SNRF is estimated to be greater than 1,700 to 3,900 acres, because the prey base is more limited in the Sierras (Duncan Interagency Workgroup in Campbell et. al. 2000).

Effects of the Alternatives considered within the Noxious Weeds FEIS

Key Habitat Factor(s) for the Analysis:

The proposed project, the removal of noxious weeds from Forest System Lands, will have no affect on potential wolverine or SNRF habitat. These species use cavities and hollows to rear their young; they do not rely on weeds for food. The potential effects are limited to the consumption of herbicide contaminated prey and disturbance.

Alternative 1 (Current Management)

Direct and Indirect Effects The Forest Service currently treats 20 to 30 acres a year by physical methods. Currently, the Forest does not use herbicides to treat noxious weeds. Therefore, there would be no potential for the consumption of contaminated prey.

Implementing weed treatments under Alternative 1 would have no effect to potential wolverine or SNRF habitat, nor would it affect any individual animals. None of the weed treatments occur within potential habitat for either species. There will be no change in the current or future amount of preferred denning or foraging habitats. Therefore, 0 % of the current wolverine and SNRF habitat in the analysis area, would be affected by implementation of Alternative 1. There are no weed occurrences in the potential SNRF habitat.

Cumulative Effects
Because there is no direct or indirect effect to the wolverine or SNRF or their habitats, there are no cumulative effects to either species or their habitats under this alternative.

Alternatives 2 to 6

Direct and Indirect Effects

There are no current occurrences for either species on the Forest. Both of these species are rare, and were included in the analysis because there are historical sightings on the Forest. There are no weed occurrences within SNRF habitat. Therefore, there will be no effect to either SNRF or its habitat by the implementation of any Alternative.

There is no chance of consumption of contaminated prey for wolverine under Alternatives 3 and 5 (alternatives where no herbicides will be used), or the physical treatments in 2, 4, and 6. There are 3.55 acres of weed occurrences within the highest potential wolverine habitat, that could be treated by physical or herbicide means under all 5 action alternatives (Table 6). Therefore, a maximum of 0.003% of the modeled 130,121 acres of wolverine habitat would be treated by either physical treatment or herbicides. Treating this small acreage with physical or herbicide methods will have no biological relevance for a species with a home range greater than 50 miles^2 (home range values from Banci 1994 in Campbell et al. 2000).

Table 6. Proposed Treatment Acres within Potential Wolverine and SNRF Habitat

Species	Total Acres of Potential Habitat Forest wide	Total Maximum Acres o Physical Treatments *	Total Maximum Acres of Herbicide Treatments *
Wolverine	130,121	3.55	3.55
Sierra Nevada Red Fox	18,940	0.00	0.00

***This figure includes the maximum, where physical or herbicide methods may be employed**

The maximum acres of potential wolverine habitat treated with herbicide under Alternatives 2 and 4 are 1.5 acres forest-wide (or 0.001 % of the 130,121 acres potential habitat); under Alternative 6, the maximum acres of habitat treated with herbicide would be 3.55 (or 0.003 % of the potential habitat). The largest weed occurrence is 1.03 acres. None of the weed occurrences are in the Medicine Lake Highlands, which have the highest potential to support wolverine.

No potential den sites will be affected by the implementation of any action alternative. Potential prey will not be affected; therefore, there are no anticipated direct or indirect effects on denning or foraging habitat for wolverine.

With the small acreage to be treated, it is highly unlikely that wolverine would be affected by the consumption of contaminated prey. A significant portion of the wolverine diet would be comprised of contaminated prey given their territory sizes, when only 3.55 acres of potential habitat could be sprayed. In addition, the hazard quotient ratings for all the herbicides that could be used to treat weeds on the Modoc NF are less than 1, meaning there is a low risk to the animals described, given the parameters of the scenario (Table 7).

Table 7. Hazard Quotient for Acute Levels for Mammal Eating Contaminated Mammals

Herbicide/Application Rate	Exposure Assessment Rate			Hazard Quotient Rating		
	Central	Lower	Upper	Central	Lower	Upper
2,4 - D						
a) 1.5 lbs/ac	3.15	3.15	3.15	0.3	0.3	0.3
b) 2.0 lbs/ac	4.2	4.2	4.2	0.4	0.4	0.4
Chlorsulfuron 1.0 lb/ac	0.131	0.131	0.131	0.002	0.002	0.002
Clopyralid 0.25 lb/ac	0.525	0.525	0.525	0.007	0.007	0.007
Dicamba						
a) 1.0 lb/ac	2.1	2.1	2.1	0.05	0.05	0.05
b) 2.0 lbs/ac	4.2	4.2	4.2	0.09	0.09	0.09
Glyphosate 3.75 lbs/ac	7.87	7.87	7.87	0.04	0.04	0.04
Triclopyr (Acid & BEE) 1.5 lbs/ac	3.15	3.15	3.15	0.03	0.03	0.03

When reviewing the literature, disturbance is the most significant potential effect to wolverine within the FEIS. Wolverines choose natal den sites with high elevation rocky substrates; the California sites were under rocky ledges above 10,000 feet elevation (various authors in Campbell 2000). Denning occurs in late winter and early spring for wolverine (Campbell 2000). SNRF young are born March to May (Zeiner et al. 1990). It is unlikely that weed treatment activities will affect wolverine, because the habitats with the greatest potential of occupancy will be inaccessible during weed treatment implementation times.

Under the alternatives with Early Detection/Rapid Response activities, new occurrences will be reviewed by wildlife biologists prior to control implementation; if concerns for wolverine or SNRF surface, additional Design Standards could be added, if weed treatment areas were outside of the conditions analyzed within the FEIS.

Given the small acreage to be treated, the low risk associated with the herbicides proposed for

use on these species, and the low potential for disturbance, there are no direct or indirect effects for wolverine or SNRF or their habitats by the implementation Alternatives 2-6.

Cumulative Effects

Because there are no direct or indirect effects to the wolverine or SNRF or their habitat, there are no cumulative effects to either species or their habitats under Alternatives 2-6.

Great Gray Owl

Great gray owls have been detected in a few locations near Medicine Lake (Doublehead). In addition, a great gray owl was seen at Crowder Flat Guard Station (Devil's Garden) on a few occasions in 1993 (T. Ratcliff and M. Flores, pers. comm.). Great gray owls are uncommon throughout their range (Bull et. al. 1989b). During the planning process for Sierra Nevada Framework, three great gray owl Protected Activity Centers (PACs) were established on the Warner Mountains, although there has never been conclusive evidence of occupancy.

Management Direction: The Modoc NF LRMP (1991b) contained no direction for this species. The Sierra Nevada Framework direction manages these owls using a series of Protected Activity Centers and survey. Maintaining meadow vegetation within and adjacent to PACs will improve habitat for voles and pocket gophers, the Great Gray Owls prey. (SNFPA FEIS page 292 and the Final Supplemental Environmental Impact Statement (FSEIS ROD, page 39). (USDA 2004).

Although they are usually associated with dense, timbered stands with large open meadows nearby, in northeastern Oregon, great gray owls nested in all types of forests; however, nests were more prevalent in over-mature or remnant stands of Douglas fir and grand fir forest on north facing slopes (Bull and Duncan 1993, Bull et. al. 1988). On the average, there are 3.2 larger live trees per acre (19.6 inches dbh) and 1 larger diameter snag (19.6 inches dbh). On their study site Bull et. al. (1988) found that 68% of the stick nests used by great gray owls were originally made by northern goshawks. Roosts sites were also in stands with 11 to 59% canopy cover.

Habitat on the Modoc NF for great gray owl was estimated in the following manner. Within the great gray owl PAC's set up by the Sierra Nevada framework, there are a total of 598 acres of assorted vegetation types: lodgepole pine, Sierran mixed conifer, white fir, wet meadow, and sagebrush. An additional 2,025 acres of potential nesting habitat were modeled using eveg data: mixed conifer, eastside pine, ponderosa pine, Jeffrey pine, Douglas-fir, white fir, red fir, and lodgepole pine with a tree size = 4, 5, 6 and canopy cover = 40% or greater, that were within 1,000 feet of meadows.

Meadows associated with nest stands need to contain enough cover to provide for prey. Diets for great gray owls consisted mainly of voles and pocket gophers (Bull et. al. 1989a). Males preferentially foraged in stands with 11 to 59% canopy cover and avoided clearings.

Effects of the Alternatives considered within the Noxious Weeds FEIS

Key Habitat Factor(s) for the Analysis:

The proposed project, the removal of noxious weeds from Forest System Lands, will have no affect on great gray owl habitat. Great gray owls prefer older seral stage stands with large trees and snags as well as logs near meadows. The main potential effect is limited to the consumption of herbicide contaminated prey materials.

<u>Alternative 1 (Current Management)</u>

Direct and Indirect Effects The Forest Service currently treats 20 to 30 acres a year by physical methods. Currently, the Forest does not use herbicides to treat noxious weeds.

Therefore, there would be no potential for the consumption of contaminated prey. None of the treatment areas are within the great gray owl PAC's, therefore there will be no disturbance to owls by physical treatments.

Implementing weed treatments under Alternative 1 would have no effect on great gray owl habitat. There will be no change in the current or future amount of large trees and snags or dead and downed materials by the treatment of noxious weeds. There would also be no change in the amount of late seral stage or meadow habitat. Therefore, 0 % of the current great gray habitat in the analysis area would be affected by implementation of Alternative 1.

Cumulative Effects
Because there is no direct or indirect effect to the great gray owl or its habitat, there are no cumulative effects to great gray or its habitat under this alternative.

Alternatives 2 to 6

Direct and Indirect Effects

There are no weed treatments within any PAC or any potential habitat, so no great gray owl habitat would be affected by weed treatments. Nor would there be any disturbance or consumption of contaminated prey expected with implementation of the project. Therefore, there would be no effects to individual birds.

Under the alternatives with Early Detection/Rapid Response activities, new occurrences would be reviewed by wildlife biologists prior to implementation. The herbicides proposed for use have low hazard ratings for predatory birds consuming contaminated prey (Table 5), so depending on the size of the new weed occurrences, there should be little risk of effects by the consumption of contaminated prey. If concerns for great gray owl surface, additional Design Standards could be added if weed treatment areas were outside of the conditions analyzed within the FEIS.

As stated above, there would be no treatments within any great gray owl PACs or potential habitat. Therefore, there will be no direct or indirect effects to great gray owl or its habitat by implementation of Alternatives 2-6.

Cumulative Effects

Because there is no direct or indirect effect to the great gray owl or its habitat, there are no cumulative effects to the great gray owl or its habitat under these alternatives.

Pallid and Townsend's Big-eared Bats

These species were lumped within this analysis for the following reasons. First, they are both mammalian insectivores. Second, there would not be any proposed treatment of roost sites for either species. Therefore, the effects of implementation are similar even if the magnitudes of potentially affected acreages are different.

Management Direction : There is no direction in the Modoc LRMP for either of these species of bats. Although not highlighted specifically in the SNFPA Record of Decision, pallid bat direction consists of conservation measures listed in Volume 3 of the Sierra Nevada Forest Plan Amendment (USDA 2001, page 55 of Chapter 3, part 4.4). These measures are paraphrased as follows: Provide for hardwood stands into the future (especially older stands, to produce healthy hardwood crowns or regeneration as well as adequate flight space), adopt mine and cave plans, and develop a mosaic of stands in chaparral.

Pallid bats have been found during hazard tree removal and snag topping projects on the Forest; the individuals found were roosting under the bark of large pine snags.

Pallid bats appear to prefer open, dry habitats with rocky areas for roosting and foraging

(Zeiner et. al. 1990, Philpott 1997). Radio tracking surveys by Southern Oregon State College found pallid bats roosting most commonly in large pine snags and occasionally in large live pine. They will also, on occasion, roost in rock crevices (Vaughan and O'Shea 1976) or man-made structures; a maternity roost with 39 bats was found in the side entrance way of a college boarding house in Inyo County (Szewczak et. al. 1998). Night roosts in central Oregon were located in buildings, under rock overhangs, and under bridges (Lewis 1994). There are approximately 256,000 acres of habitat with a large pine component that could act as potential habitat forest wide.

Pallid bats are mainly insectivorous, however, they have been known to eat lizards and smaller bats while in captivity, as well as fruits and seeds (although there is speculation as to whether these events happened incidentally, while bats were feeding on insects on the plant parts) (Hermanson and O'Shea 1983). These bats may feed on insects taken from the ground or from the surfaces of vegetation (Hermanson and O'Shea 1983, Zeiner et. al. 1990), but may also forage over open ground 0.5 to 2.5 meters (1.6 to 8 feet) above the ground (Zeiner et. al. 1990). Pallid bats were documented to forage 1 to 3 miles from their day roost (Zeiner et. al. 1990).

Townsend's big-eared bats (TBEB) roost in the lava caves on Doublehead RD near Lava Beds National Monument. There are a few scattered locations elsewhere on the Modoc NF that have the potential to support these bats; the High Grade Area in the northern Warner Mountains has the highest concentration, however, there are small, localized areas in the Medicine Lake Highlands, Adin Pass, and the Stone Coal area.

This species is dependent upon caves, mines and buildings for roosting habitat (Campbell and MacFarlane 2000; Zeiner et. al. 1990). Caves need to meet specific microclimatic conditions for successful roosting, and this species is very susceptible to disturbance (Campbell and MacFarlane 2000). In the Inyo Mountains, this species has been seen roosting in lava tube caves (Szewczak et. al. 1998); personnel on the Modoc National Forest have observed this as well. This species has been documented to use sage-brush-grass steppe, juniper woodlands, and mountain brush communities in Utah (Sherwin et al. 2000). There is approximately 214,000 acres of foraging habitat within 10.5 kilometer of occupied caves. The habitat types from this query include: bitterbrush, eastside pine, sagebrush, juniper, and mixed conifer. There is no GIS data for lava tube and mine locations, so additional potential habitat was not modeled.

TBEBs utilize caves, mine tunnels, and buildings for the location of nursery colonies (Pierson 1988); they will return to these areas annually, if not disturbed. Hibernating sites tend to be structurally stable caves (Pierson 1988). In the Inyo and White Mountains, hibernation was considered to occur from November to March (Szewczak et. al. 1998).

They feed in a wide variety of habitats from open agricultural fields to dense forest (Pierson 1988). Foraging habitats are varied, but this species concentrates primarily on moths (Zeiner et al. 1990). Although they are very specialized in their diet and take mostly moths (they have also been observed to feed on: Neuroptera, Coleotera, Diptera, Hymenoptera (Kunz and Martin 1982. Data from California show that these bats may forage up to 10.5 km from the day roost as well as tended to forage in the same areas each night (Fellers and Pierson 2002). There are reports of these bats gleaning insects from foliage (Zeiner et. al. 1990); however, in a study from California, they usually capture prey in the air, 10 to 30 meters off the ground, between mid to top of the canopy (Fellers and Pierson 2002).

Effects of the Alternatives considered within the Noxious Weeds FEIS

Key Habitat Factor(s) for the Analysis:

The proposed project, the removal of noxious weeds from Forest System Lands, will have no affect on pallid bat or TBEB habitat. These bats roost in large trees, snags, caves, and rock crevices; none of these structures will be affected by weed treatment activities. The potential

effects are limited to the consumption of herbicide contaminated prey and disturbance.

Alternative 1 (Current Management)

Direct and Indirect Effects The Forest Service currently treats 20 to 30 acres a year by physical methods. Currently, the Forest does not use herbicides to treat noxious weeds. Therefore, there would be no potential for the consumption of contaminated prey.

Implementing weed treatments under Alternative 1 would have no effect on the habitat for either bat species. There will be no change in the current or future amount of large trees and snags or caves by the treatment of noxious weeds. There would be no change in the amount of potential prey habitat, as there will be ample native plants for insects to use as food and cover. Therefore, 0 % of the current bat habitat in the analysis area would be affected by implementation of Alternative 1.

Cumulative Effects
Because there is no direct or indirect effect to the pallid or TBEB or their habitat, there are no cumulative effects to pallid or TBEB or their habitat under this alternative.

Alternatives 2 to 6

Direct and Indirect Effects

Physical and herbicide weed treatments will not affect pallid and TBEB roosting or foraging habitat by implementation of any action alternatives. As stated in the SNFPA FSEIS, pg 419, roost sites are the primary limiting factor for Pallid and Townsend's Big-eared bats. (USDA 2004). A maximum of 2586.59 acres of pallid bat territory could receive physical treatments and a maximum of 2582.8 acres could receive herbicide treatments. Acres to be treated in TBEB territory would be a maximum of 1939.23 for physical treatment and a maximum of 1933.8 for herbicide treatments. Therefore, 0.91% of the 214,000 acres of TBEB habitat, could be treated forest-wide and 1.01% of the 256,000 acres of pallid bat habitat forest-wide could be treated. (Table 8).

Table 8. Proposed Treatment Acres within Potential Pallid and Townsend's Big-eared Bat Habitat

Species	Total Acres of Potential Habitat Forest wide	Total Maximum Acres o Physical Treatments *	Total Maximum Acres of Herbicide Treatments *
Pallid bat	256,000	2586.59	2582.8
Townsend's big-eared bat	214,000	1939.23	1933.8

***This figure includes the maximum, where physical or herbicide methods may be employed**

Although there are large acreages of weeds that could be treated either physically or with herbicides within the potential foraging range for both species under Alternatives 2, 3 and 4; the effect to prey habitat should be minor (Table 8). First, the vast majority of the weed patches are less than one acre (33 out of 35 weed occurrences for TBEB and 101 out of 109 for pallid bat). There are native species that these insects can use in the matrix and directly adjacent to the weed occurrence. Second, revegetation of bare areas will provide food and cover for insects in the absence of the weeds. Finally, both bats utilize a wide variety of habitats for foraging, so they are not tied to one given area or vegetation type.

Disturbance is not an issue for Townsend's big eared bats, since weed treatment activities will be away from caves. Based on personal observations during snag improvement projects, George Studinksi (pers.comm.) noted that pallid bats did not fly from roost trees when contractors were within stands working on the habitat improvement projects; therefore, physical treatments and pump sprayers (which are quieter than chainsaws) are expected to cause little

disturbance; the exception would be weed wackers, which could be noisy and provide a source for disturbance.

Pallid bats would have a potential risk of both direct contact with the herbicides and ingestion of contaminated insects, since they have been known to forage on the ground or from the surface of the vegetation. The drying times for herbicides are such that herbicides sprayed in the later afternoon would not be dry until after dark, when pallid bats would be out. The greatest potential for effect would be under Alternatives 2 and 4 in DH013ISTI (Dyer's woad), where up to 2,500 acres could be treated with herbicides. There would be little potential effect for direct contact under Alternative 6, because only the fringes of this weed occurrence would be treated.

Townsend's big eared bats (TBEB) are aerial foragers (Campbell and MacFarlane 2000), therefore, there should be no direct contact with herbicides. They forage higher in the canopy, however, some contaminated insects could be sprayed and consequently ingested, especially with larger weed occurrences.

The herbicides with the highest risk are 2,4 –D and their associated tank mixes and dicamba (2 lbs/acre) at all rates, as well as, the higher concentrations of dicamba (1 lbs/acre), glyphosate, and triclopyr (Table 9). The herbicide 2,4-D is of the greatest concern under this scenario, because the hazard quotient exceeds 1 in all levels (meaning there is an elevated risk). Based on the SERA for 2,4-D, the effects to small mammals include neurotoxicity and some degenerative changes to various organs; these effects, although not fatal, could certainly make individual animals more susceptible to predation depending on the amount of herbicide consumed. It is important to note that this risk scenario assumes that 100% of the bats' diet would be contaminated. The two bat species foraging behaviors only make this scenario realistic within the larger weed occurrences.

Table 9. Hazard Quotient for Acute Levels for Small Mammal Eating Contaminated Insects (100% of the diet)

Herbicide/Application Rate	Exposure Assessment Rate			Hazard Quotient Rating		
	Central	Lower	Upper	Central	Lower	Upper
2,4 - D						
a) 1.5 lbs/ac	34.7	34.7	104	3.0	3.0	10.0
b) 2.0 lbs/ac	46.3	46.3	139	5.0	5.0	14.0
Chlorsulfuron 1.0 lb/ac	1.45	1.45	4.34	0.02	0.02	0.06
Clopyralid 0.25 lb/ac	5.78	5.78	17.3	0.08	0.08	0.2
Dicamba						
a) 1.0 lb/ac	23.1	23.1	69.4	0.5	0.5	1.5
b) 2.0 lbs/ac	46.3	46.3	139	1.0	1.0	3.0
Glyphosate 3.75 lbs/ac	86.7	86.7	260	0.5	0.5	1.5
Triclopyr (Acid & BEE) 1.5 lbs/ac	34.7	34.7	104.0	0.3	0.3	1.0

For both pallid and Townsend's, herbicide treatment under Alternatives 2 and 4, would have negative effects for the DH013ISTI (Dyer's woad), where a roughly 2,000 acre block would be sprayed. Since bats may forage in the same areas each night, individuals for either species might ingest a significant portion of their diet, in contaminated insects. This is not the case for the weed occurrences under Alternative 6, only a small amount of weed treatment is proposed on the periphery for Dyer's woad.

Outside of the DH013ISTI (Dyer's woad) there are 4.06 acres of Townsend's big-eared bat habitat that could be treated with herbicides. The DH001HYPE (Klamath weed) occurrence (1

acre in TBEB habitat) would be treated by physical means, under Alternatives 2 and 4; it could be treated with either physical or herbicide methods under Alternative 6. The remaining 3.06 acres are dispersed among 19 weed occurrences and do not appear to be a risk associated with implementation of Alternatives 2, 4 and 6.

In potential pallid bat habitat, eight additional weed occurrences are greater than one acre (outside of the DH013ISTI, Dyer's woad). Two weed occurrences (WM002CEDI3 [diffuse knapweed] and DG024SAAE [Dyer's woad]) are scheduled for physical treatments under all Alternatives and would therefore pose no risk to pallid bats.

The remaining occurrences could have herbicides treatments and therefore may pose a risk to pallid bats. Under Alternatives 2 and 4, 30.98 acres of BV001CRVU2 (Crupina) could be sprayed. Since bats may forage in the same areas each night, individual pallid bats might ingest a significant portion of their diet in contaminated insects. Although glyphosate is the preferred herbicide for the treatment of crupina, 2,4-D could be used. As stated above, the hazard quotient is above 1.0 (meaning elevated risk) for all levels of 2,4-D (Table 9). Therefore, some individuals could consume 100% of their diet in contaminated insects and consequently could suffer effects (including making them more susceptible to predation). This is not the case for the weed occurrences under Alternative 6, because only the periphery is proposed for treatment for this crupina occurrence.

About 7 acres of BV006LIDA (Dalmatian toadflax) could be sprayed under Alternatives 2 and 4. Bats foraging in a seven acre block that has been treated with herbicides, could undergo effects of herbicide ingestion, especially from 2,4-D. However, the lava country does not produce the same amount of insects as the more mesic sites; therefore it would be difficult for bats foraging in an area this size to consume 100% of their diet (B. Turner, pers. comm.). Under Alternative 6, only small satellites from the main weed occurrence could be sprayed; treatment of BV006LIDA (Dalmatian toadflax) under Alternative 6, would pose no risk to pallid bats.

Potentially, 32.20 acres of WM003LIDA (Dalmatian toadflax) could be treated with herbicides under Alternatives 2, 4 and 6. However, the impact is relatively small for the following reasons. Under Alternatives 2 and 4, there would be no 2,4-D used on the site, because it is within 1,000 feet of water. Under Alternative 6, there would be no 2,4-D used on the site, because it is larger than 2 acres. Design Standard DS 12b caps the size of weed occurrences treated with 2,4-D to less than 2 acres. The other herbicides do not have hazard quotient ratings above 1.0 at the lower and central levels; therefore, they pose a low risk to mammals consuming insects under the above scenario. The second reason is the relatively small amount of toadflax present in the weed occurrence. The site is basically a large, contiguous matrix of native plants with small clumps of weeds (many of the patches of weeds were 10 feet by 10 feet). Although the entire weed occurrence encompasses roughly 40 acres, the weeds are actually distributed in small clumps, found in lava rock talus, an old road bed, and along old, dry, rocky streambeds. There were no toadflax plants along the main channels of Lassen Creek. Consequently, the chance of a pallid bats diet containing 10% to 100% contaminated insects would be remote under Alternatives 2, 4 or 6 for this weed occurrence.

There are two additional weed occurrences above 1.0 acre in potential pallid bat habitat, where herbicides may be applied. There are 2.46 acres in BV302ONAC (Scotch thistle) and 1.13 acres in WM018ISTI (Dyer's woad) are expected to be large enough, where pallid bats could consume 100% of their diet in contaminated insects given the bats' prey and foraging habits. As stated previously, the remaining 101 out of 109 sites are small (less than 1 acre) and scattered throughout the Forest, so there would not be large acreages where herbicides are concentrated within potential pallid bat habitat. Therefore, there is little anticipated risk for pallid bats to consume harmful levels of contaminated insects outside of the large localized weed occurrences discussed in the paragraphs above.

Under the alternatives with Early Detection/Rapid Response activities, up to 100 acres per year

could be treated forest-wide. New occurrences will be reviewed by wildlife biologists prior to implementation; if conditions are outside of those analyzed within the FEIS for bats, additional Design Standards can be developed.

To reiterate, the action alternatives may impact individuals, but it is not likely to cause a trend toward listing for Townsend's big-eared bat. The potential effects under Alternative 6 are vastly smaller than Alternatives 2 and 4 for TBEB, because only 4.06 acres could be treated with herbicides forest-wide. In addition, no roost site will be affected, which is the primary limiting factor for this species.

The action alternatives may impact individuals, but it is not likely to cause a trend toward listing for pallid bat. The potential effects under Alternative 6 are vastly smaller than Alternatives 2 and 4, because only the periphery of the large weed occurrences could be treated under Alternative 6. As with the Townsend's, no roost site will be affected, which is also a limiting factor for this species.

Cumulative Effects

There are other activities that cause disturbance to both bat species. Disturbance at roost sites is a critical issue for both species, and the potential effects of timber management, recreation and mineral development at known roost sites would need to be addressed, site specifically under the appropriate NEPA decision or working with the special use coordinator.

There are weed treatments using herbicides on the Lava Beds National Park that could occur in potential Townsend's big-eared bat (TBEB) foraging habitat. Weed treatments on the Lava Beds National Park consist of a combination of physical and herbicide treatment using glyphosate. The Park personnel treated 473 acres, spraying approximately 10% of the area. There would be a low risk from additional consumption of contaminated insects, because the hazard quotient for glyphosate exceeds 1.0 only at the upper levels. Under the upper level scenario, the bats would need to consume 100% of their diets in contaminated insects. Given TBEB foraging strategies and prey preferences, this scenario is unlikely. For pallid bat, there are no known additional herbicides within the foraging habitat for the Modoc National Forest.

Based on the information presented in this cumulative effects section, the implementation of Alternatives 2-6 may have an incremental impact on individual Townsend's big-eared and pallid bats; however, no roosts will be affected by the implementation of activities described within the Noxious Weeds Treatment Project. According to the SNFPA Final Supplement Impact Statement (2004) (Appendix C page 419), "They [pallid and Townsend's big-eared bats] appear to be most impacted by physical changes or human disturbance of roost sites." Therefore, Alternatives 2-6 may impact individuals but are not likely to cause a trend to federal listing or a loss of viability for either species.

V. Species Accounts/Effects Section For Terrestrial Sensitive, Management Indicator Species:

The foundation of this Forest Service sensitive MIS analysis is found in the Modoc National Forest Management Indicator Species Report and its associated species accounts (USDA 2007b). The information on habitat and population status pertinent to the Noxious Weeds FEIS is summarized below for the terrestrial sensitive MIS, which may be potentially affected by the implementation of various weed treatments. Table 9 is a list of species analyzed within this section.

Table 10. USDA Forest Service Region 5 Sensitive Species that Occur on the Modoc NF

Common Name Scientific Name	Habitat or species is potentially affected by project	Habitat or species is in project area, but will not be affected by project	Habitat or species is not within the project area
American Marten *(Martes amerciana)*	X		
California Bighorn Sheep (*Ovis canadensis californiania)*			X
Greater Sandhill Crane (*Grus canadensis tabida)*	X		
Northern Goshawk *(Accipiter gentilis*)	X		
Peregrine Falcon (*Falco peregrinus)*			X
Sage Grouse (*Centrocercus urophasianus)*	X		
Swainson's Hawk (*Buteo swainsoni)*	X		
Willow Flycatcher (*Empidonax traillii)*	X		

The basis for the analysis for the Noxious Weed FEIS is the corporate data files for various species, which were updated in late March and April of 2005. Habitat for various species was modeled using the 1997 Forest eveg data files (mdf_eveg97_04). These data were utilized for two reasons. First, there was no change between the 1997 and 1999 data submitted for the Forest. Second, we hoped to maintain as much consistency between the DEIS and FEIS, realizing there are changes in aspects of the project including number of weed occurrences, locations of animals, and proposed activities.

Detailed information on habitat suitability and population trends for MIS is found in the Modoc NF Modoc National Forest MIS Report (USDA 2007b), which is hereby incorporated by reference. The information for each species is contained within a single section. Basic habitat preferences are summarized first; the potential effects from the proposed weed treatment activities to habitat and populations follow.

American Marten

The American marten is a terrestrial MIS and a Forest Service Sensitive species.

Management Direction: Direction for marten under the Modoc NF LRMP consisted of designating a minimum of 13 marten territories forest-wide (4 on the Doublehead District and 9 on the Warner Mountain District). These territories were to encompass 2,000 acres and be managed to provide late seral habitat. They were established in areas that had previous sightings or provided the potential to serve as marten habitat.

Protect marten den site buffers from disturbance by vegetative treatments with a limited operating period (LOP) from May 1 through July 31, as long as habitat remains suitable. Mitigate impacts where there is documented evidence of disturbance to den site. Evaluate proposed developments for potential disturbances to Marten den sites. (FSEIS Record of Decision (ROD), page 62, D-88 and D-89.) (USDA 2004).

Habitat/Species Relationship

Marten were found to prefer late-successional stands of mesic coniferous forest, especially those with complex physical structure near the ground (Buskirk and Powell, 1994 in Ruggiero et. al. 1994). Suitable habitats on the Modoc consist of dense (>40% crown closure) coniferous forests that have significant amounts of snags and logs. Small clearings and riparian areas may also be used for foraging. Marten occur at elevations ranging from 4,000-13,000 feet in the northern Sierras. Habitat associations are characterized by dense canopied, multi-storied, multi-species climax coniferous forest with a high number of large snags and downed woody

material. Habitat preference includes mature mesic forests of red fir, red fir/white fir mix, lodgepole pine, Sierran mixed conifer and Klamath mixed conifer. Current models suggest that 2.5 - 20 logs/acre and >3 snags/acre (>15"DBH) be left in managed areas to provide moderate suitability for marten. On the Modoc National Forest, marten have been sighted in mixed conifer (white fir dominated) and lodgepole pine habitats.

Marten habitats on Modoc National Forest are similar to the neighboring Lassen National Forest. Extensive survey work for forest carnivores on the Lassen National Forest has included over 22,000 trap-nights (14,000 on the Eagle Lake Ranger District; and 8,000 on the Hat Creek Ranger District) with no detections of marten in eastside pine habitats (B. Turner and T. Rickman, pers. comm.).

There are about 39,200 acres of various vegetation types found within Modoc NF marten territories. The major vegetation types are located within these territories: white fir, red fir, Sierran mixed conifer, and lodgepole pine. There are an additional 17,606 acres of potential marten habitat forest wide, which is often located adjacent to these forest marten territories. The vegetation types for this query included: mixed conifer, Douglas-fir, white fir, lodgepole pine, and red fir with larger tree sizes and denser canopies.

Home range sizes for males are larger than females and vary in size between 0.6 square miles

(422 acres) and 1.7 square miles (1,088 acres) (Freel 1991). Marten give birth to their young in March and April; they are weaned in about 42 days (Ruggiero et. al. 1994).

The following information concerning food habits was obtained from Ruggiero et. al. (1994). Marten consume a variety of different foods: small mammals, birds, fruit, carrion, and insects. The most common prey items for marten consists mainly of small mammals: voles, ground squirrels, and Douglas squirrels. Marten often forage in meadows and or shrub patches.

Habitat Status and Trend at the Forest Scale

Both the Northwest Forest Plan (USDA/USDI 1994) and the Sierra Nevada Framework amended the Modoc National Forest Land and Resource Management Plan direction. Both large scale amendments to our Forest Plan stress the protection and management of late seral habitats. The intent of Late Successional Reserves and Managed Late Successional Areas (where the occupied den site is located) is to 1) Provide a distribution, quantity, and quality of old-growth forest habitat, sufficient to avoid foreclosure of future management options, 2) Provide habitat for populations of species, that are associated with late-successional forests (specifically to protect the Scientific Advisory Team’s list of species closely associated with old growth), and 3) To help ensure that late-successional species diversity will be conserved. Riparian Reserves were established to benefit aquatic species, as well as, provide for greater connectivity of late-successional forest habitat, which in turn improves travel and dispersal corridors for terrestrial animals and plants. The direction for the Sierra Nevada Framework (US Forest Service 2004) is summarized and paraphrased below. Management [for marten] consists of providing 100 acre buffers of the highest quality habitat adjacent to the den site, which includes guidelines for snags and logs.

The trend for habitat in the Medicine Lake Highlands (MLH) is stable to increasing, in the higher elevation sites, and decreasing at the lower elevation sites, based on the following information. Fire exclusion and commercial timber management activities of the past 70 years or so, has resulted in elevated stand densities, insect and disease activity, which have augmented fuel loadings in most vegetation types in the MLH, thus increasing the risk of crown fire and large stand replacing fire events. The current trend for marten habitat within the area amended by the Sierra Nevada Framework, maintains the current level of potential marten habitat on the Modoc National Forest.

Project-level Effects Analysis based on Habitat

Key Habitat Factor(s) for the Analysis: The proposed project, the removal of noxious weeds from Forest System Lands, will have no effect on American marten habitat. The marten prefer older seral stage stands with large snags, stumps, and logs; enhancing riparian areas under the Riparian Management Prescription were thought to improve potential marten prey (USDA 1991b,

Page 3-104). The potential effects are limited to the potential consumption of herbicide contaminated prey and disturbance.

Analysis Area for Project-level Effects Analysis: The analysis area for marten is limited to the 39,200 acres within the thirteen Modoc NF marten territories, and an additional 17,606 acres of potential habitat forest-wide. This habitat is limited to the upper elevations of the forest that have mixed conifer, white and red fir, and lodgepole pine. In general, the marten territories and additional potential marten habitat include the Warner Mountain Ranger District and the Medicine Lake Highlands.

Alternative 1 (Current Management)

Direct and Indirect Effects to Habitat The Forest Service currently treats 20 to 30 acres a year by physical methods. Currently, the Forest does not use herbicides to treat noxious weeds.

Implementing weed treatments under Alternative 1 would have no effect marten habitat. There will be no change in the current or future amount of large trees, snags, or dead and downed materials by the treatment of noxious weeds. Nor would there be any change in the amount of late seral stage habitat. Therefore, 0 % of the current marten habitat in the analysis area, would be affected by implementation of Alternative 1.

Cumulative Effects to Habitat
Because there are no direct or indirect effect to marten habitat, there are no cumulative effects to marten habitat under this alternative.

Alternatives 2 to 6

Direct and Indirect Effects to Habitat

A maximum of 0.1 acres of occupied marten habitat could receive physical treatments and a maximum of 0.29 acres within occupied marten habitat could receive herbicide treatment (Table 11). A maximum of 2.039 acres within potential marten habitat, could receive herbicide treatments (Table 11). Therefore, a maximum of 0.004% of the 56,806 acres of marten habitat forest-wide could receive treatment.

Table 11. Proposed Treatment Acres within Marten Territories, Modoc National Forest

Type of Marten Habita	Total Acres of Marten Habitat Forest wide	Total Maximum Acres of Physical Treatments *	Total Maximum Acres of Herbicide Treatments *
Occupied	39,200	0.1	0.29
Potential	17,606	0.0	2.039

***This figure includes the maximum, where physical or herbicide methods may be employed**

No marten den site habitat will be removed by the implementation of Alternative 2 - 6, nor will there be any reduction in habitat suitability for this species forest-wide. In addition, none of the weed treatments are proposed near the known den site in the Medicine Lake Highlands.

There should be no change in the amount food resources available to marten. Marten have been documented to eat fruit; however, they are not known to consume noxious weeds.

Although, some of the potential prey (small mammals and birds) could potentially use the thistle seeds as food on the WM008CIAR4 and WM004CIAR4 (Canada thistle) sites, there are several other species of native thistles in the Warner Mountains that could provide foraging opportunities for pray. The removal of weeds will also have no effect on insects, because there are still ample native plants to provide food and cover for them. Therefore, the decrease of a maximum of 2.039 acres of thistle would have no discernible effect on the amount of potential marten food.

Cumulative Effects to Habitat

Because there are no direct or indirect effects to marten habitat, there are no cumulative effects to marten habitat under these alternatives.

Project-level Effects Analysis based on Population

Summary of Population Status and Trend at the Forest Scale

The Modoc NF LRMP (as amended by the SNFPA) requires bioregional-scale distribution population monitoring for marten. The sections below summarize population status and trend data for the marten. This information is drawn from the detailed information on population trends in the Modoc National Forest MIS Report (USDA 2007b), which is hereby incorporated by reference.

Population Status and Trend at the Bioregional Scale and Local Scales

The California Natural Diversity Database (CNDDB) rank is "G5S3S4": Global 5 indicates marten is globally "demonstrably secure; commonly found throughout its historic range"; State 3 / State 4 indicates that, in California, marten is between being 'apparently secure'(G4) and 'restricted range/rare'(G3).

Recent studies and sightings indicate that martens are relatively well distributed in a pattern similar to their historical distribution in the Sierra Nevada (Kucera et al.1995). Marten have been tracked and monitored throughout the Sierra Nevada using a variety of survey techniques, including project level surveys; the Pacific Southwest Research Station (PSW) retrospective database (which incorporates CDFG information); all historic data back to Grinnell et al. 1937 in Ruggiero et. al 1994; and systematic surveys conducted from 1992 to 2002 by Zielinski, Truex, Carroll, Clevenger, and Campbell.

Track plate and camera surveys to detect marten have been conducted at various locations on the Modoc National Forest from 1992 to 2007. The only known marten den site on the Forest is located near Medicine Lake (Doublehead Ranger District); however, there have been scattered incidental sightings of marten in the mixed conifer and white fir habitats north of Adin on the Big Valley Ranger District and at various locations throughout the Warner Mountains. The pattern of distribution for marten, based on incidental sightings, has expanded to include the Big Valley Ranger District, since the time of the Modoc LRMP.

Effects of the Alternatives considered within the Noxious Weeds FEIS

There is no chance of consumption of contaminated prey under Alternatives 3 and 5 (alternatives where no herbicides will be used), or the physical treatments in 2, 4, and 6. There is a chance for disturbance at potential den sites; it should be a low likelihood, because these weed occurrences are usually inaccessible until later in June due to snow.

There is a total of 0.19 acres that could be treated, in a total of 5,279 acres within marten territories in the northern and central Warner Mountain District (2,560 acres in Pine Creek and 2,719 acres in the Payne Peak territories) (Table 11). There would be a slight potential for ingestion of contaminated mammals, if both roughly .1 acre weed occurrences, were hand sprayed. According to information from the SERA reports, none of the herbicides has a hazard quotient above 1.0, so the risk to the marten from a cumulative treatment of .2 acres is very low

(See Table 6 the wolverine/SNRF section on page 10 of this document).

Based on field studies, there appears to be little effect to potential prey from the use of herbicides under certain situations. Johnson and Hansen (1969) found litter size for deer mice was little affected by 2,4-D. Sullivan (1990) found that the survival rate, body mass and growth rates of deer mice and Oregon vole were not affected by exposure to herbicides, and that this finding would indicate that there were little or no adverse effects on metabolic or general physiological processes in the development of young. McMurry et al. (1993) found that the woodrat population density was the highest on areas treated with triclopyr, and postulated that there was an increase in forage and nest-building material, which supported the higher numbers of animals. These authors also found that there was no difference in reproductive activity, mean body weight, or animal condition between treated and control sites. Given the small acreage to be treated (0.4 acres total) and the low risks to prey presented by these small acreages, there are inconsequential direct and no indirect effects to marten by implementation of Alternatives 2, 4, and 6.

Under the alternatives with Early Detection/Rapid Response activities, wildlife biologists would review new noxious weed treatment sites prior to implementation. If concerns for marten surface, (including conditions not covered within the analysis for the FEIS), additional Design Standards could be added.

Cumulative Effects to Populations

There are few cumulative effects associated with physical or herbicide treatments for the following reasons. The Pine Creek territory, currently receives little use from recreationists, wood cutters, cattle, and mineral developments. There is little additional activity that could cause additional disturbances to denning animals.

The Payne territory is fairly well roaded and does receive more use, especially near Dry Creek Basin and Upper Deep Creek, where there is a moderate level of camping, hunter, wood cutter, and cattle use. However, the unconfirmed marten sighting was in the northern portion of the territory in a canyon accessible only by foot. There is very little activity in this canyon, which is roughly two miles from the weed occurrences. Repeated weed treatments may cause a small amount of disturbance, but this is not expected to cause any loss of marten habitat or cause mortality.

To reiterate, there will be an inconsequential direct, no indirect, and inconsequential cumulative effects for marten by implementation of Alternatives 2-6 for the following reasons: only a very small amount of weeds will be treated in marten habitat, disturbance is expected to be minimal, and the low risk associated with these herbicides to predatory mammals consuming prey.

Relationship of Project-Level Impacts to Forest-Scale Habitat and Bioregional-Scale Population Trends for the American Marten

The cumulative effects of the Action Alternatives of the Noxious Weeds Project will result in no decrease in forest-wide habitat for marten. Nor is there any potential effect to the marten population on the Forest. Therefore, implementation of the Noxious Weeds Project will not alter the existing forest-wide trend in habitat, nor will it change the existing bioregional-wide trend population distribution of marten.

Greater Sandhill Crane

The greater sandhill crane is a terrestrial MIS, a Forest Service Sensitive, and a California state threatened, fully protected species.

Management Direction: Improve habitat quality by protecting meadows and wetland from

grazing. Over time this would improve population status for the Greater Sandhill Cranes. (SNFPA Final Supplemental Environmental Impact Statement (FSEIS), Appendix C, page 420). (USDA 2004).

Habitat/Species Relationship

This species is most commonly found in and near wetlands, especially along margins of shallow water (Baker et al. 1995, Littlefield 1995a, Zeiner et. al. 1990). Nesting has been documented on islands as well. Some more unusual nest sites include: sagebrush and oak dominated hillside (Ellis and Haskins 1985), black greasewood (Littlefield 1994), alkali bulrush (Littlefield 1994), Canada thistle (Littlefield 1994), desert saltgrass (Littlefield 1994), and barley (Littlefield 1994). Most (71%) of the nests that were in atypical habitats were destroyed or unsuccessful.

A 210 acre buffer, which equated to the average size of a territory (Zeiner et. al. 1990), was run around each nest, to approximate acreage of occupied habitat. According to the data in the query, there are roughly 10,000 acres of occupied habitat on the Forest. The major vegetation types found in proximity to the nest sites include the following: water, sagebrush, juniper, eastside pine, wet meadow/sedge, and annual grassland. An additional 181,521 acres of potential habitat were modeled using the eveg data and buffering all of the wetlands in the corporate Modoc National Forest lakes layer. Lack of concealing vegetation was a significant factor in loss of nest, which made nests more open to predation. Littlefield and Paullin (1990) found that nesting success in the absence of predator control was lower on wetlands grazed by livestock than on ungrazed wetlands. Coyotes, raccoons, and common ravens were common predators (Littlefield 1999, Littlefield 1995a, Littlefield 1995b). Nest success in the Ash Creek Wildlife Area (northeast of Bieber) was 36%, and Ash Creek Valley (16 km west of Madeline) was 0% (Littlefield 1995a). However, drought was likely to be a significant factor.

Foraging habitat for sandhill cranes is varied and includes open grasslands, agricultural fields, as well as, shallow marshes with emergent vegetation (Zeiner et. al. 1990, Tacha et al 1992). Sandhill cranes are omnivorous, exploiting subsurface food items by probing with bills or by gleaning seeds and other foods from the ground. Foods vary widely depending on seasonal availability and location (Tacha et al 1992). Non-migratory subspecies eat insects and their larvae, snails, reptiles, amphibians, nestling birds, small mammals, seeds of various plants, and berries (Tacha et al 1992). To illustrate this ability to utilize a broad scope of foods, Tacha et al. (1992) cite an example of sandhill crane diets of adults and young in southeastern Wisconsin. Both adult and young birds consumed invertebrates and small mammals and reptiles during early brood rearing; non-breeding adults ate mostly tubers of aquatic plants in spring and early summer, and then switched to cultivated grains in late summer.

Habitat Status and Trend at the Forest Scale

There were two foci within the Modoc LRMP to maintain or enhance crane habitat: development of wetlands and control of livestock grazing. In 1965, a program was initiated to increase wetland habitats; this program has been greatly expanded since the time of the Modoc LRMP. As of 2001, the majority of the wetlands development had been completed. New grazing standards have been implemented since the release of the Modoc LRMP. The retention of cover in addition to additional livestock management changes (e.g. alteration of rotations, fencing pastures to exclude cattle at critical times) have helped provide for the increase in sandhill cranes seen on the Forest. Between wetland development and implementation of the Riparian Area Management Prescription, the trend for sandhill crane habitat on the Modoc National Forest is stable. It could potentially increase with further wetland development or livestock management changes, pending future funding.

Project-level Effects Analysis based on Habitat

Key Habitat Factor(s) for the Analysis: The proposed project, the removal of noxious weeds from Forest System Lands, will benefit sandhill crane. Cranes are not directly tied to the noxious weeds for cover or food. In fact, the replacement of natural cover by weeds has a detrimental effect to potential nesting cover. The majority of sandhill crane nests (71%) that were placed in atypical plant cover were destroyed or unsuccessful including: black greasewood (Littlefield 1994), alkali bulrush (Littlefield 1994), Canada thistle (Littlefield 1994), desert saltgrass (Littlefield 1994), and barley (Littlefield 1994).

The potential effects from the implementation of the activities in the Noxious Weeds FEIS are limited to the consumption of herbicide contaminated plants and prey, as well as disturbance to nesting birds.

Analysis Area for Project-level Effects Analysis: The analysis area for sandhill crane includes the estimated 10,000 acres of occupied habitat and the 181,521 acres of potential habitat. A majority of this habitat is located on the Devil's Garden District, but is also scattered adjacent to wetlands across the Forest.

Alternative 1 (Current Management)

Direct and Indirect Effects to Habitat The Forest Service currently treats 20 to 30 acres a year by physical methods. Currently, the Forest does not use herbicides to treat noxious weeds.

Implementing weed treatments under Alternative 1 would have no effect sandhill crane habitat. There will be no change in the current or future amount of nesting and foraging cover by the treatment of noxious weeds. Vegetation diversity is expected to remain the same or very site specifically, be improved on the 30 acres. Therefore, 0 % of the current sandhill crane habitat in the analysis area would be affected by implementation of Alternative 1.

Conversely, the effect of not treating the habitat could cause a significant decrease in the amount of potential cover for cranes.

Cumulative Effects to Habitat
Because there is no direct or indirect effect to sandhill crane habitat, there are no cumulative effects to sandhill crane habitat under this alternative.

Alternatives 2 to 6

Direct and Indirect Effects to Habitat

There could be a maximum of 238.81 acres of physical treatments and 236.99 acres of treatment with herbicides within the potential crane habitat. A maximum of 240.02 acres of herbicide and 242.23 acres of physical treatments could take place within occupied crane habitat. (Table 12). Therefore, a maximum of 0.25% of the 191,521 acres of sandhill crane habitat forest-wide could receive treatments.

Table 12. Proposed Treatment Acres within Greater Sandhill Crane Habitat

Type of Crane Habitat	Total Acres of Crane Habitat Forest wide	Total Maximum Acres of Physical Treatments *	Total Maximum Acres of Herbicide Treatments *
Occupied	10,000	242.23	240.02
Potential	181,521	238.81	236.99

***This figure includes the maximum, where physical or herbicide methods may be employed**

Direct effects to crane habitat include the potential loss of nesting cover and foraging habitat. As stated above, weeds do not provide adequate nesting cover, so removal of weeds, especially with revegetation efforts would benefit cranes.

Foraging habitat should either remain the same or improve. Cranes are not known to use noxious weeds as food; therefore, removal of weeds should not decrease the amount of food available to them. The removal of the weeds should provide improved habitat for small animals and insects. Subsequent replanting bare areas would decrease the potential for reinfestation by weeds and provide better cover (depending on the plant species chosen for revegetation treatments). Therefore, there should be no negative direct or indirect effects to sandhill crane habitat by the implementation of Alternatives 2-6.

Cumulative Effects to Habitat

The cumulative effects to sandhill crane habitat under any alternatives would be the increase of nesting and foraging habitat. As stated above, changes made to livestock management and the development of wetlands have helped provide for the increase in sandhill cranes seen on the Forest as evidenced in the increased numbers and distribution.

Project-level Effects Analysis based on Populations

Summary of Population Status and Trend at the Forest Scale

The Modoc NF LRMP (as amended by the SNFPA) requires forest-scale distribution population monitoring for greater sandhill crane. The sections below summarize population status and trend data for the sandhill crane. This information is drawn from the detailed information on population trends in the Modoc National Forest MIS Report (USDA 2007b), which is hereby incorporated by reference.

Population Status and Trend at the Bioregional Scale and Local Scales

Greater sandhill crane is "S2" in California (NatureServe). This ranking stands for "Imperiled" at the state/province; this ranking is given to species/subspecies because of "rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province". One factor may be where the sandhill cranes in California are nesting. Ivey and Herziger (2001) found the majority (63%) of sandhill crane territories in the 2000 statewide survey were on private lands, which may not provide secure habitat over time. However, when referring to the crane status in Oregon and California, Littlefield and Ivey (2001) stated that the upward trend should continue provided reproductive success was sufficient, breeding habitat remained secure and wintering habitats were protected.

There are three Breeding Bird Survey (BBS) routes with decreasing trends in California. The rest of the routes had stable to increasing trends. In a statewide survey conducted specifically for sandhill cranes, Ivey and Herziger (2001) recorded a 68% increase in the total number of pairs recorded between the 1988 statewide survey to the 2000 statewide survey.

At the Sierra Nevada scale for the period of 1968-2005, Sierra Nevada-wide BBS data classifies sandhill crane as 21.6, which is a positive trend. However, the Regional Credibility ranking is "red", due in part to the sample size of two. A better measure of trend in the Sierra Nevada is the work completed by Ivey and Herziger (2001). They recorded increases in many of the sites in the Sierra Nevada between the 1988 statewide survey to the 2000 statewide survey, although there were localized decreases. An additional paper by Roberts et. al. (1996) noted that the pairs in the South Fork of the Pit River (Modoc County) were stable as well.

The Modoc NF uses data collected on and adjacent to the Forest in both forest level, as well as, project level planning. Modoc NF staff has monitored sandhill cranes for various project induced surveys and Forest Plan monitoring efforts from mid-1980 to the present. The Modoc National Forest has at least 40 locations where sandhill cranes have nested. The number of territories with sandhill cranes in multiple years, exceeds the Modoc National Forest Land and Resource Management Plan (LRMP) goal of "approximately 20 pairs" (USDA 1991a. Page 4-28).

There were approximately 10 pairs of sandhill cranes in the late 1980's during the development of the Modoc National Forest LRMP (US Forest Service 1991b – page 3-107). The current distribution of sandhill cranes as described above has expanded since the release of the LRMP.

Effects of the Alternatives Considered within the Noxious Weeds FEIS

The two potential effects to sandhill crane populations come from disturbance to nesting birds and consumption of contaminated food. Weed treatments, both physical and herbicide, would occur annually until both the weeds and their seed banks are eliminated, so there would be a slight chance for potential disturbance over time. Gary Ivey, sandhill crane species expert, stated that that crane nest success is generally about 50%, and brood survival is usually less than 10%, so caution [in implementing management activities] is advised (pers. comm.). Design Standard (DS)10 has been developed to provide a Limited Operating Period for nesting sandhill cranes, as recommended by Gary Ivey (pers. comm.). Pre-season work plans (DS 02)

are a critical component to implementation. Use of surveys and LOPs for nesting animals should minimize potential disturbance problems.

The second concern for individual animals is the potential ingestion of herbicide-contaminated plants or prey. Based on the data in table 11, the only herbicides with a hazard quotient above 1.0 (meaning elevated risk) are 2, 4-D (alone or in tank mixes) as well as the upper level of dicamba, glyphosate, and triclopyr. The highest potential risk for cranes is the chronic-exposure scenario of a bird consuming contaminated vegetation for the chemicals discussed above. Under this scenario, at the upper rates 100% of the animals' diet would consist of contaminated vegetation, which is unlikely in the field. The herbicide 2, 4 –D would still be of concern, because even at the lowest level, which assumes 10% consumption of contaminated vegetation, there is an elevated risk.

Table 11. Chemicals and their application rates for chronic exposures to large birds (goose sized) consuming contaminated vegetation where there is no spray buffer and a boom application method on site.

Chemical/Application Rate	**Exposure Assessment Rate mg/kg/day or mg/kg/event**			**Hazard Quotient Rating**		
	Central	Lower	Upper	Central	Lower	Upper
2,4 - D						
a) 1.5 lbs/ac	2.69	.896	25.3	3.0	.9	25
b) 2.0 lbs/ac	3.58	1.19	33.7	4.0	1.2	34
Chlorsulfuron 1.0 oz/ac	.212	.0708	2.0	.002	5×10^{-4}	.01
Clopyralid .25 lb/ac	.815	.217	10.0	.05	.01	.7
Dicamba						
a) 1.0 lb/ac	1.16	.388	11.0	.09	.03	.8
b) 2.0 lbs/ac	2.33	.776	21.9	.2	.06	1.6
Glyphosate 3.75 lbs/ac	16.6	5.53	156	.2	.06	1.6
Triclopyr (Acid & BEE) 1.5 lbs/ac	5.92	1.52	75.2	.6	.2	8.0
NPE	.216	.0576	2.85	.02	.006	.3

As for the contamination risk from herbicides, there is little concern within occupied habitat for the following reasons. First, a maximum of 2.53 acres or .0253% forest-wide could be treated with herbicides. The two largest occurrences (DG059ONAC (Scotch thistle) and DG001ISTI (Dyer's woad) are found in 1 territory; therefore, the vast majority of the herbicides used forest-wide in occupied habitat (2.43 acres treated with herbicides out 2.73 acres of weed occurrences in occupied habitat forest-wide) will be centralized in one territory.

Second, the herbicide with the highest hazard quotients, 2, 4-D, would not be used under any Alternative. Both weed occurrences are within 1,000 feet of water (DG059ONAC is within the 300 foot SMZ and DG001ISTI (Dyer's woad) is within 10 feet of the water's edge). Under

Alternatives 2 and 4, 2, 4-D will not be used within 1,000 feet of water. Under Alternative 6, these occurrences would only be treated with physical means.

Third, these weed occurrences are located along a railroad outside of the wetland where the crane pair forages, which is mainly along the reservoir shores (J. Irvin, pers. comm.). Therefore, there will be no effect from consumption of contaminated materials by cranes within occupied habitat.

Owing to the size of the following weed occurrences, there could be potential effects to sandhill cranes, who reside in potential habitat. The areas of greatest risk would be the wetland around BV006LIDA (Dalmatian toadflax) (217.19 acres in potential crane habitat) and WM009CIAR4 (Canada thistle) (10 acres in potential crane habitat). The majority of the rest of the weed occurrences are scattered 0.1 acre patches across the Forest.

BV006LIDA (Dalmatian toadflax) - The majority of the area is lava reef country with open conifer stands. The entire weed occurrence is roughly 850 acres. In the area adjacent to Lava Lake, the toadflax has a patchy distribution consisting of small clumps of plants that are less than 0.001 acre in size. No toadflax occurrences were observed in the riparian margin of the lake where the potential crane habitat exists. There is a lava reef that surrounds the lake, so there is no chance of direct spray to any crane, nor is there a chance of drift. The chance of disturbance to nesting cranes is low, because the lava reef buffers disturbance and wet road conditions don’t allow access until late June. Therefore, under Alternatives 2 and 4, there would be no effect to sandhill crane by treatment of this weed occurrence. Under Alternative 6, only the exterior satellites of the weed occurrence would be treated, which are not within the potential crane habitat. There would be no risk to cranes by treatment of this weed occurrence under Alternative 6 as well.

WM009CIAR4 (Canada thistle) - The site includes an old beaver pond, that has sedimented in, surrounded by remnant aspen and scattered lodgepole pine and white fir; this area is tucked in the upper portion of the Mill Creek watershed and does not have potential habitat for nesting cranes (M. Flores, results of aspen monitoring within the area). It was listed as potential crane habitat, because of an artifact in the data set. Therefore, there would be no effect to cranes by the treatment of this occurrence under any alternative.

Of the 236.99 acres within potential sandhill crane habitat that could receive herbicide treatments, 227.19 acres are included within two weed occurrences. Except for five weed occurrences, the remaining 9.8 acres are weed occurrences that are less than 1 acre and the vast majority of these occurrences are 0.1 acres or less. The potential effects to cranes by the treatment of DG059ONAC (Scotch thistle) and DG001ISTI (Dyer’s woad) were discussed above in the paragraphs on occupied habitat. BV309ONAC will not be treated with herbicides under any Alternative. The remaining occurrence near Snag Hill, BV307ONAC (Scotch thistle), has no known occupancy. Any potential effects would be very limited to cranes due to the size any the isolation of this one small reservoir.

Papers have shown that herbicides do drift and can affect wildlife (Ernst et al. 1991). The risk assessment for the re-registration for 2,4-D states plainly that there could be concerns from volatilization and off site deposition of 2,4-D esters (US EPA 2005). The authors of this risk assessment add that the effect of volatility of 2,4-D esters on non-target organisms should be viewed as a source of uncertainty in their assessment. Other authors have found upslope transport of pesticides (LeNoir et al. 1999), and that there may be evidence linking the presence of pesticides with declines in amphibians (Davidson et al. 2001; Davidson et al. 2002). However, the difference between amount of herbicides used and areas to be treated are a factor of 1000 larger in these papers. In addition, these papers do not discuss spot treatments of noxious weeds, but boom applications. Given the small size of the weed occurrences and the type of herbicide application, volatilization and drift are not expected to effect sandhill cranes.

Under the alternatives with Early Detection/Rapid Response activities, wildlife biologists will

review new noxious weed treatment sites prior to implementation. If concerns for sandhill crane surface (including conditions not covered within the analysis for the FEIS), additional Design Standards could be added.

To summarize, there is a small potential for direct effects and no indirect effects to individual cranes by the implementation of Alternatives 2-6. Relatively few acres forest-wide could be treated in occupied or potential habitat and the vast majority of these occurrences are less than 0.1 acre, thereby minimizing the potential consumption of contaminated food. Disturbance would be minimized (hence the need for pre-treatment surveys and the LOP described in Design Standard 10). Therefore, the action Alternatives in the Noxious Weed FEIS may have some minor impacts to individuals, but will not lead trend toward listing. Nor will the weed treatment activities affect sandhill crane populations on the Modoc NF.

Cumulative Effects to Populations

There is one territory out of forty nesting locations where the greatest concentration of weed treatments could occur. There is a significant amount of human activity in the Hackamore Reservoir area based on information from Jim Irvin. (Mr. Irvin has 21 years as a Range Conservationist on the Modoc NF, and is very familiar with this area). Timber harvest activities include both commercial thinning and planting in plantations that are east, south, and west of the reservoir. There was also a prescribed fire south of the Reservoir in 2004; one of the objectives of this burn was to improve elk habitat. Water is drafted from the Reservoir during August and September for sheep use, but may be drafted from late July on if there is road maintenance that is needed. The drafting site is about ½ mile west of the nest site, so there is a low potential for disturbance. Grazing would be considered moderate to heavy; however, the area is in a pasture system, so it is not grazed 2 out of 3 years until after July 15, to promote waterfowl habitat. There are sheep corrals where gathering occurs northwest of the Reservoir. Potential effects to cranes from grazing would be fairly low, because of the timing and location of activities. A low amount of fishing occurs from May until the end of June, so there is minimal potential disturbance to nesting cranes. Waterfowl hunting occurs from October to early January; the cranes usually have migrated outside of the area then, so potential impacts to cranes are light. All activities discussed above are either out of the nesting area or outside of the critical nesting time, and consequently pose little potential disturbance to cranes.

Other herbicide Use on the Forest

Forest-wide, currently there are roughly 3,000 acres of utility corridors and 1,500 acres of communications facilities under permit, where vegetation removal may be conducted by the special use permit holders. The Department of Defense had a radar installation south Doublehead Mountain in open juniper/sage habitats. The area was roughly 1000 acres enclosed by an eight foot fence. The installation is currently being dismantled, and would receive no further vegetation treatments. There is 16 to 20 acre corridor that Bonnevillle Power Utility might spray annually, which flanks Highway 139 outside of crane habitat. Finally, there are communications sites that total roughly an acre of habitats that could be sprayed across the forest. The rest of vegetation treatments involve usually handgrubbing, but may also include the felling of trees beneath telephone lines.

Currently none of the other special use permit holders are spraying herbicides. They will not be able to use herbicides unless they have authorization in writing, from the Forest Service prior to any treatment. The Forest Service would utilize the guidelines outlined in the Noxious Weed FEIS for any herbicide treatments. Given the various design standards, there would be no cumulative effect from consumption of contaminated materials to the sandhill crane distribution on the Modoc National Forest.

There could be a maximum of 1,500 acres sprayed annually on the Modoc NF or 0.089% of the Forest. Under Alternative 6, that number would decrease to a maximum of 522 acres or 0.031% of the Forest. About 16,080 acres could have herbicides in roughly 3.5 million acres (Modoc

NF and surrounding areas), which would be 0.46% of that gross area (see the Noxious Weed BA for more detailed information).

The sandhill cranes are foraging on the Modoc NF away from these weed infestations on private, tribal and other federal lands during the time of active spraying. Once they are utilizing these areas during the staging period for migration, weeds are not usually being treated. Therefore, there are few additional cumulative effects expected to sandhill cranes from herbicides both on and surrounding the Modoc NF.

Relationship of Project-Level Impacts to Forest-Scale Habitat and Bioregional-Scale Population Trends for the Greater Sandhill Crane

The cumulative effects of the Action Alternatives of the Noxious Weeds Project will result in no decrease in forest-wide habitat for greater sandhill crane. Nor is there any potential effect to the sandhill crane population on the Forest. Therefore, implementation of the Noxious Weeds Project will not alter the existing forest-wide trend in habitat, nor will it change the existing bioregional-wide trend population distribution of greater sandhill crane.

Northern Goshawk

The northern goshawk is a terrestrial MIS, a Forest Service Sensitive species as well as a California State Species of Special Concern.

Management Direction: In the Big Valley Sustained Yield Unit, northern goshawks are managed under the direction of the Modoc NF LRMP (1991). This direction includes the maintenance of at least 100 acres of the most suitable habitat around the nest stand as well as Limited Operating Periods to protect nesting birds from disturbance.

Management in the areas of the Modoc NF amended by the SNFPA (2004) is as follows. Establish a series of Protected Activity Centers around northern goshawk nests that have had occupancy since 1990; conduct surveys during planning process according to Regional guidelines protocols to protect the quality of suitable Northern Goshawk nesting habitat not within PACs. (SNFPA Record of Decision (ROD), pages 59, 60, 54, D34.) (USDA 2004).

In the Medicine Lake Highlands, which are managed under the direction of the Northwest Forest Plan (1994), there are no northern goshawk Protected Activity Center land allocations designated as is the case of the lands managed under the direction of the SNFPA (2004). However, northern goshawk management is provided by the direction for the Managed Late Successional Area assessments.

Habitat/Species Relationship

The attributes of northern goshawk nesting habitat are well documented. Research in northern California has shown that territory occupancy is positively correlated with the nest stand size. Occupancy nears 100 percent for stands greater than 151 acres. Occupancy was 75-80 percent at 100 acres (Woodbridge and Detrich 1994). Nest stands have relatively high tree canopy cover and a high density of large trees (Reynolds 1992). Richter (2000) did radio tracking in areas close to this project area and in similar habitat and found an average canopy closure at the nest site of 84 percent. Austin (1993) also concluded that adult goshawks generally avoid open (<40% canopy cover) forest conditions. Desimone (1997) found occupied goshawk territories on the Fremont National Forest to have more closed, mid to late seral forest (>50% crown closure) than territories where goshawks could not be found. On the Lassen National Forest, Rickman (2001) found goshawk roost sites in all seasons to average 74 percent canopy cover. The studies did not all use the same method for quantifying vegetation, but all show relatively high tree canopy densities. Local surveys on the Big Valley District support the density and tree size research, however, there are some instances locally where goshawks will select small inclusions in open habitat that would not be otherwise considered suitable. Ingraldi (1995) also

found a similar trend with goshawks in Arizona where the birds selected larger and taller trees, a nest tree that was part of a clump, and often in the lower third of the slope.

Fewer studies, however, have concentrated on the characteristics of suitable foraging habitat. Information from the Region 3 northern goshawk guidelines, states that the following characteristics are important for foraging stands: portions of the foraging area should have mature to older stands with a minimum of 40% canopy cover, at least 2 large (greater than 18 inches dbh/30 foot tall) snags per acre, at least 3 large downed logs per acre, and a minimum of 3-5 mature and old trees per acre in groups or stringers with interlocking crowns (Reynolds et. al. 1992). The snag dimensions were selected to meet the minimum requirement for prey species (Reynolds et. al. 1992). Initial findings from one study in Arizona echo the Region 3 information indicating that "some goshawks selected for habitats with more and larger trees" (Beier 1995). Locally on the Modoc National Forest, other biologists have noted this trend for goshawks to use the large trees as perches for hunting

(G. Studinski, pers. comm.). Although nest stands tend to have dense overstory canopy, a mixture of habitat types including riparian areas are utilized for foraging. Prey remains under nests found on the Modoc National Forest indicate that these birds take both avian and mammalian prey (Studinski, pers. comm.; Promessi, Matson, and Flores 2004).

Habitat Status and Trend at the Forest Scale

The Modoc National Forest Land and Resource Management Plan (LRMP) (USDA 1991a) selected goshawk as an indicator of old forest ecosystems and it is considered an old forest associated species under the Sierra Nevada Forest Plan Amendment (USDA 2004).

Under the Modoc National Forest direction for goshawk management specifies that the Forest will maintain 100 goshawk territories. Each territory consists of a minimum of 100 acres for primary and alternate nest stands.

The Sierra Nevada Framework direction (USDA 2004), which amended the Modoc LRMP, includes the use of monitoring and the establishment of Protected Activity Centers (PACs) to maintain northern goshawk viability across the Sierra Nevada. These areas increased to 200 acres under this direction (USDA 2004 Record of Decision. Page 38). Limited Operating Periods have also increased to February 15 through September 15 (USDA 2004 Record of Decision. Page 60).

Local surveys on the Big Valley and Warner Mountain Districts support the trend for goshawks to use denser stands as nesting sites with a large tree component; however, there are some instances locally where goshawks will select small inclusions in open habitat that would not be otherwise considered suitable as nesting habitat. Forest Service wildlife biologists have observed goshawks using large trees as perches for hunting (G. Studinski, pers. comm.) locally as well. Although nest stands tend to have dense overstory canopy, a mixture of habitat types including riparian areas are utilized for foraging.

There are approximately 23,600 acres of various vegetation types within northern goshawk PAC's set up during the Sierra Nevada framework analysis process. Vegetation types included within PAC's are as follows: eastside pine, Sierran mixed conifer, white fir, and lodgepole pine with inclusions of sagebrush, montane chaparral, and various minor constituents. There are an additional 96,377 acres of potential goshawk habitat, which includes dense stands of mixed conifer, eastside pine, and white fir.

The trend for goshawk habitat on the Modoc National Forest within the area amended by the Sierra Nevada Framework is stable, since timber harvest is located outside of later successional stands.

Project-level Effects Analysis based on Habitat

Key Habitat Factor(s) for the Analysis: The proposed project, the removal of noxious weeds from Forest System Lands, will have no affect on habitat for northern goshawk; northern goshawk are not directly tied to the noxious weeds for cover or food. The main potential effects are limited to the potential ingestion of contaminated prey and disturbance to nesting birds.

Analysis Area for Project-level Effects Analysis: The analysis area for northern goshawk is limited to the 23,600 acres of occupied habitat and 96,377 acres of potential habitat on the forest. This habitat is clustered on the Warner Mountain and Big Valley Districts, but is also localized on portions of the Modoc NF in later seral coniferous habitat.

Alternative 1 (Current Management)

Direct and Indirect Effects to Habitat The Forest Service currently treats 20 to 30 acres a year by physical methods. Currently, the Forest does not use herbicides to treat noxious weeds.

Implementing weed treatments under Alternative 1 would have no effect on northern goshawk habitat. There will be no change in the current or future amount of large trees or late seral coniferous habitat. Vegetation diversity is expected to remain unchanged. Aspen and meadow habitat, which are prime foraging areas, may be improved in very site specific locations. Therefore, 0 % of the current northern goshawk habitat in the analysis area would be affected by implementation of Alternative 1.

Cumulative Effects to Habitat
Because there is no direct or indirect effect to northern goshawk habitat, there are no cumulative effects to goshawk habitat under this alternative.

Alternatives 2 to 6

Direct and Indirect Effects to Habitat

There is a maximum of 4.48 acres of weeds that could be physically treated and 4.04 acres that could be receive herbicide treatments within occupied goshawk PAC's (Table 13). A total of 11 PAC's could receive treatment, however, the majority of the treatment (3.48 out of 4.04 acres) would be in PAC R05F09D53T07. The weed occurrences in the Medicine Lake Highlands are proposed for physical treatments and are outside of the areas of known goshawk occupancy.

A maximum of 325.07 acres of potential habitat could receive physical treatments and 323.72 acres of herbicide treatments. Therefore, a maximum of 0.34% of the 96,377 acres of potential goshawk habitat forest-wide, could receive herbicide treatment (Table 13).

Table 13. Proposed treatment within Occupied and Potential Northern Goshawk Habitat

Type of Goshawk Habitat	Total Acres of Goshawk Habitat Forest wide	Total Maximum Acres of Physical Treatments *	Total Maximum Acres of Herbicide Treatments *
Occupied	23,600	4.48	4.04
Potential	96,377	325.07	323.72

***This figure includes the maximum, where physical or herbicide methods may be employed**

There would be no direct effect to goshawk nest tree or plucking posts from any type of weed treatment activity in either occupied or potential habitat. Nor would there be any changes to the overstory in late seral coniferous habitat.

Physical (excluding grazing, because none of the thistle sites are large enough to meet the treatment criteria) and herbicide treatments would not affect potential prey habitat in occupied goshawk habitat either forest-wide or in R05F09D53T07. Twelve of the occurrences 14 weed occurrences in occupied goshawk habitat are 0.1 acre or less except for the weed occurrences within R05F09D53T07, which are not a homogeneous. Prey still would have both native plants for food and cover. Although some prey species could utilize weeds for food and cover, no prey species are totally dependent on weed species; native vegetation would provide at least the same degree, if not, far surpassing weeds as prey habitat.

The removal of the weeds should provide improved habitat for small animals. The only weed occurrence that could cause problems to prey habitat in potential goshawk habitat is DH013ITI (Dyer's woad). Subsequent replanting of large bare areas would decrease the potential for reinfestation by weeds and provide better cover for prey (depending on the plant species chosen for revegetation treatments). Therefore, there would be no negative direct or indirect effects to goshawk habitat by the implementation of Alternatives 2-6.

Cumulative Effects to Habitat
Because there are no direct or indirect effects to northern goshawk habitat, there are no cumulative effects to goshawk habitat under these alternatives.

Project-level Effects Analysis based on Populations

Summary of Population Status and Trend at the Forest Scale

The Modoc NF LRMP (as amended by the SNFPA) requires bioregional-scale distribution population monitoring for northern goshawk. The sections below summarize population status and trend data for the goshawk. This information is drawn from the detailed information on population trends in the Modoc National Forest MIS Report (USDA 2007b), which is hereby incorporated by reference.

Population Status and Trend at the Bioregional Scale and Local Scales

Northern goshawk has been monitored within many of the National Forests within California. There is concern that northern goshawk populations and reproduction may be declining in North America and California due to changes in the amount and distribution in habitat quality (various authors in USDA 2001 Volume 3 Chapter 3. Page 113). The trend for the northern goshawk was analyzed by the USFWS in the 1990's. According to the section on the California Region, there was currently not sufficient evidence of a wholesale decline that would warrant listing (USFWS 1998).

The Modoc National Forest initiated goshawk full scale monitoring in 1975 using intensive stand searches and monitoring of historic nest stands. Current surveys are completed per the Regional northern goshawk protocol. At the time of the development of Modoc National Forest

LRMP, the Forest had 81 pairs and territories. The Modoc National Forest currently manages for 143 northern goshawk Protected Activity Centers across the Forest, primarily in pine or mixed conifer stands. The current number of territories exceeds those recognized Modoc LRMP. The distribution of northern goshawk is similar to the pattern found in 1991.

Effects of the Alternatives considered within the Noxious Weeds FEIS

Goshawks could potentially be affected by the ingestion of contaminated prey and disturbance at nest sites. Within occupied habitat, there is little concern for consumption of contaminated prey, because of the small acreage to be treated forest-wide. The largest concentration of work in occupied habitat would be 3.48 acres in PAC RO5F09D53T07, where both WM001ISTI and WM002ISTI (Dyer's woad) could be sprayed under Alternatives 6.

Basically the same is true for potential goshawk habitat. Although there are 325.28 acres of weed occurrences that fall within potential goshawk habitat, the vast majority consists of 321.82 acres in DH013ISTI (Dyer's woad). This habitat was burned under a series of fires and has no known goshawk occupancy. Only the satellites of the weed occurrences would be treated under

Alternative 6. Therefore, treatment under any Alternative is not expected to affect goshawk.

There is little potential risk from raptors eating contaminated mammals; none of the hazard quotients are above 1 (see Table 5 in the spotted owl section of this document). Plus, the weed sites are small enough to make it unlikely that 10% to 100% of the goshawk's diet would contain contaminated prey. Given the small acreage to be treated and low risk associated with these herbicides to raptors, use of herbicides should not impact individual goshawks.

The greatest potential for impacts to all goshawks is from disturbance during the nesting season. Physical and herbicide weed treatments could occur annually. Eleven of the 143 PACs could receive physical or herbicide treatments. Limited Operating Periods are standard clauses for all contracts, because the potential for disturbance to cause abandonment of nests and young. It is vital that annual pre-treatment surveys be conducted, so active nest sites could be protected.

Under the alternatives with Early Detection/Rapid Response activities, wildlife biologists would review new noxious weed treatment sites prior to implementation. If concerns for northern goshawk surface (including conditions not covered within the analysis for the FEIS), additional Design Standards could be added.

To summarize, there are inconsequential direct effects and no indirect effects expected to goshawk by the implementation of Alternatives 2-6. The weed occurrences are small and scattered throughout the Forest. There is a low risk associated with these herbicides to raptors. Pre-treatment surveys and LOPS will protect nesting birds. Therefore, there may be impacts to individuals, but there will be no trend toward listing, nor would there be any effect to goshawk population viability on the Modoc NF.

Cumulative Effects to Populations

Within the potentially affected PACs on all the Districts, there would be a light to moderate amount of activities from recreation, wood cutting, and mineral use. There are rock quarries adjacent to two PACs on the Big Valley District; the potential for disturbance to goshawks is low because of the quarry location and the time of year when materials are accessed. Current timber sales include clauses to implement LOPs where birds are actively nesting. Grazing is light to moderate in many of the PAC's, because of their stand densities (little forage available). There are some areas of more concentrated use near Cary Reservoir and Buck Creek (the Del Pratt territory). However, given the persistence of the territories with

reproduction, grazing does not appear to have affected northern goshawk. Given the rather small acreage forest wide that could be treated, and the use of surveys and LOPs, there are no expected cumulative effects from implementation of Alternatives 2-6 on northern goshawk.

Relationship of Project-Level Impacts to Forest-Scale Habitat and Bioregional-Scale Population Trends for the Northern Goshawk

The cumulative effects of the Action Alternatives of the Noxious Weeds Project will result in no decrease in forest-wide habitat for northern goshawk. Nor is there any potential effect to the goshawk population on the Forest. Therefore, implementation of the Noxious Weeds Project will not alter the existing forest-wide trend in habitat, nor will it change the existing bioregional-wide trend population distribution of northern goshawk.

Sage Grouse

The sage grouse is a terrestrial MIS, a Forest Service Sensitive species as well as a California Species of Special Concern.

Management Direction:

Management direction for sage grouse under the Modoc LRMP (1991) is as follows: Within designated sage grouse habitat, manage big sagebrush and low sagebrush within an eight mile radius of all identified leks (strutting grounds) in accordance with the habitat capability model for sage grouse, at moderate level. Manage meadows, seeps, springs, and riparian areas within a two-mile radius of leks according to the Riparian Area Management Prescription to provide forbs desirable for sage grouse such as dandelion (*Taraxacum*), yarrow (*Achilla*), and aster (*Aster*).

Habitat/Species Relationship

As the name implies, this species is heavily dependent on sagebrush habitats. Sage grouse utilize sagebrush stands as both winter and nesting habitat; leks are often located in open areas surrounding sagebrush (Connelly et. al. 2000). Nesting habitat also appears to contain tall grass cover (Gregg et. al. 1994) and denser shrub cover of intermediate height (DeLong et al. 1995). Many studies have focused on the importance of herbaceous cover as a key influencing the fate of sage grouse nests (various authors in Sveum et al. 1998). Sveum et al. (1998) believed disturbances that damage shrubs, reduce herbaceous cover, and allow exotic plants to invade plant communities', negatively impacted sage grouse nesting habitat.

Sage grouse nesting usually begins in April and may continue into late May or early June in northeastern California and northwestern Nevada (E. Flores, pers. comm.).

Sage grouse diets consist of forbs, sagebrush, and insects (Klebenow and Gray 1968); they rely on sagebrush in the winter (Zeiner et. al. 1990). Sage grouse chicks were dependent on insects, but moved to more forbs as they aged (Klebenow and Gray 1968).

Habitat Status and Trend at the Forest Scale

The distribution, quantity, and quality of sage grouse habitat on the Modoc NF has been affected by factors similar to those across the range of the sage grouse. The encroachment of western juniper into the sage brush steppe has been a major factor, as well as many large fires within the area where the sage grouse leks were concentrated on the Doublehead Ranger District. Other factors affecting sage grouse habitat include the invasion of exotic grasses including cheatgrass and medusa head. According to the Modoc LRMP, major reasons for sage grouse decline include overgrazing before the 1950's, sagebrush control, conversion of habitat to agricultural uses, maturation and decadence of sagebrush communities, juniper encroachment, and indiscriminant hunting (USDA 1991b. Page 3-108).

Modoc NF LRMP direction for sage grouse habitat is as follows. Within designated sage grouse habitat, manage big sagebrush and low sagebrush within an eight mile radius of all identified leks (strutting grounds) in accordance with the habitat capability model for sage grouse, at moderate level. Manage meadows, seeps, springs, and riparian areas within a two mile radius of leks according to the Riparian Area Management Prescription to provide forbs desirable for sage grouse such as dandelion (*Taraxacum*), yarrow (*Achilla*), and aster (*Aster*).

A habitat analysis of the condition of sage grouse habitat was completed for the Clear Lake/Devil's Garden area for inclusion in the "Draft Conservation Strategy for Sage Grouse and Sagebrush Ecosystems Within the Devil's Garden/Clear Lake Population Management Unit", August 15, 2006. Based on this analysis, 27 percent of the Active Management Area of the Population Management Unit (PMU) on National Forest land has the desired species composition to provide adequate cover and forage to meet the seasonal needs of sage grouse, 13.5 percent has the potential to produce sagebrush plant communities that have good understory composition of desired grasses and forbs, but lack adequate sagebrush canopy cover, 11.6 percent with potential to produce sagebrush communities, but which are in transition to juniper woodland, and 44.4 percent which have crossed the threshold from sagebrush plant communities into juniper woodland.

Over the past two years, efforts by a multi-agency Local Sage Grouse Working Group have resulted in a Draft "Conservation Strategy for Sage Grouse (*Centrocercus urophasianus*) within the Devil's Garden/Clear Lake Population Management Unit". This plan sets the stage for cooperative efforts to restore sage grouse habitat within this PMU. Sage grouse habitat restoration projects, involving juniper removal, are currently in progress (2006) adjacent to Clear Lake, both on the Modoc National Forest and on the Clear Lake National Wildlife Refuge. In addition, juniper removal on a larger scale is currently under environmental analysis through the Sagebrush Steppe Ecosystem Restoration Project Environmental Impact Statement.

Project-level Effects Analysis based on Habitat

Key Habitat Factor(s) for the Analysis: The proposed project, the removal of noxious weeds from Forest System Lands, will have no affect on habitat for sage grouse; sage grouse are not directly tied to the noxious weeds for cover or food. The main potential effect is limited to the potential consumption of herbicide contaminated plant and insect materials by grouse.

Analysis Area for Project-level Effects Analysis: Currently occupied sage grouse habitat was modeled utilizing a four mile buffer from the radio telemetry location from collared sage grouse. The analysis area for sage grouse is roughly 53,300 acres of various habitat types within 4 miles of these areas. Scott Gardner, California Department of Fish and Game Sage Grouse Coordinator and Environmental Scientist with the Upland Game Program, recommended this figure would provide a good estimation of potential habitat for this project. The four mile buffer is also greater than the 2 mile figure recommended in Connelly et. al.(2000). Mr. Gardner's recommendation and the Connelly et al (2000) information constitute the most recent recommendations and were followed in lieu of the habitat management recommendation cited in the Modoc NF LRMP (1991) to model occupied sage grouse habitat. It is important to note that 21,080 acres of the analysis area are of water, Clear Lake. The following are the major vegetation types: low sagebrush, juniper, sagebrush, water, annual grassland, and barren ground.

<u>Alternative 1 (Current Management)</u>

Direct and Indirect Effects to Habitat The Forest Service currently treats 20 to 30 acres a year by physical methods. Currently, the Forest does not use herbicides to treat noxious weeds.

Implementing weed treatments under Alternative 1 would have no effect to sage grouse habitat. There will be no change in the current or future amount of sagebrush by the treatment of

noxious weeds. The treatments are not in occupied habitat, therefore there would be no inadvertent decrease of grasses or forbs utilized by these grouse. Therefore, 0 % of the current sage grouse habitat in the analysis area would be affected by implementation of Alternative 1.

Conversely, the effect of not treating the habitat, could cause a significant decrease in the amount of potential food and cover for grouse. Sveum et al. (1998) documented exotic plants (cheat grass and knapweed) negatively impacted sage grouse nesting habitat; they believed that restoring native sagebrush communities would provide better [sage grouse] habitat.

Cumulative Effects to Habitat
Because there is no direct or indirect effect to sage grouse habitat, there are no cumulative effects to sage grouse habitat under this alternative.

Alternatives 2 to 6

Direct and Indirect Effects to Habitat

There are no physical treatments proposed within 4 miles of occupied sage grouse habitat.

(Table 14). However, there are three locations where Canada thistle may be treated using herbicides near locations that radio collared birds have used within the last few years. Each of the treatment areas is 0.10 acre for a total of 0.3 acres of herbicide use within sage grouse habitat. Therefore, a maximum of 0.0009% of the modeled 32,220 acres of sage grouse habitat could be treated.

Table 14. Proposed treatment within Occupied and Potential Sage Grouse Habitat

Type of Sage Grouse Habitat	Total Acres of Sage Grouse Habitat Forest wide	Total Maximum Acres o Physical Treatments *	Total Maximum Acres of Herbicide Treatments *
Occupied	32,220	0.0	0.3
Potential	0.0	0.0	0.0

***This figure includes the maximum, where physical or herbicide methods may be employed**

Herbicides, when utilized to kill sagebrush as has been done in the past, can cause a reduction in the quantity and quality of sage grouse habitat by the decrease in the quantity of sagebrush in treatment blocks (various authors in Connelly et. al. 2000). This activity is not proposed under the Noxious Weed Project FEIS.

The removal of a maximum of 0.3 acres of Canada thistle is anticipated to improve habitat quality for the grouse. Sveum et al. (1998) stated, “Increasing native perennial bunchgrasses and forbs would enhance both cover and food in sagebrush cover types” [for sage grouse]. There will be no removal of sagebrush or preferred grasses and forbs for cover and food. Sage grouse are not known to use noxious weeds as food; therefore, removal of weeds should not decrease the amount of food available to them. The removal of the weeds will not affect insects, since there are ample native plants to provide insect food and cover. Subsequent replanting bare areas would decrease the potential for reinfestation by weeds and provide better cover (depending on the plant species chosen for revegetation treatments). An interesting side note is that two publications recommended the judicious use of several management tools including herbicides to improve sage grouse habitat (DeLong et al. 1995, Connelly et al. 2000). Therefore, there should be no beneficial direct or indirect effects to sage grouse habitat by the implementation of Alternatives 2-6, because there is insufficient treatment to provide a beneficial effect to sage grouse.

Cumulative Effects to Habitat
Because there are no direct or indirect effects to sage grouse habitat, there are no cumulative effects to sage grouse habitat under these alternatives.

Project-level Effects Analysis based on Populations

Summary of Population Status and Trend at the Forest Scale

The Modoc NF LRMP (as amended by the SNFPA) requires forest-scale distribution population monitoring for sage grouse. The sections below summarize population status and trend data for the sage grouse. This information is drawn from the detailed information on population trends in the Modoc National Forest MIS Report (USDA 2007b), which is hereby incorporated by reference.

Population Status and Trend at the Bioregional Scale and Local Scales

Sage-grouse range in California includes portions of the Modoc Plateau and the Great Basin in parts of Modoc, Lassen, Mono and Inyo Counties (Grinnell and Miller 1944). Greater sage grouse in northeastern California are most abundant in eastern Lassen County, north of Honey Lake and east of Eagle Lake, and in the Surprise Valley in northeastern Modoc County. These areas contain approximately two-thirds of all of California's sage-grouse populations. (Hall 1995).

Little published information is available on California sage grouse population trends. According to Connelly et al. (2004), the proportion of active leks in California has remained relatively stable between 1965 - 2003, with 5-year averages varying from 77% to 90% between 1965 and 2003. Modoc County appears to be the exception.

California Department of Fish and Game records indicate there were thousands of sage grouse in northwestern Modoc County in the 1920s. By the 1950s, there were dramatic declines on the Devil’s Garden where local populations were down to 75 to 150 birds. In the vicinity of Clear Lake on the Doublehead District, there were 46 active leks in the late 1940s and only nine active leks as of 1977.

In the remainder of western Modoc County today, areas occupied by sage grouse include one active lek (21 sage grouse in 2006) on the Likely Tables southeast of Alturas, and only anecdotal reports of sage grouse in Big Valley. Recent counts of historic leks in the Big Valley area have turned up negative for sage grouse presence. The largest numbers of sage grouse in Modoc County are in Surprise Valley in the northeast portion of the county. Sage grouse on the Devil’s Garden reached peak population levels in the 1930s, but experienced dramatic declines after the 1960s (CDFG unpublished data).

Count data for the majority of leks on and near the Modoc National Forest were spotty until the 1990’s when regular counts of the lek at Clear Lake began. The only known remaining active sage grouse lek on Modoc NF is near Clear Lake. Based on the lek counts between 1989 and 2004, the estimated population of sage grouse on the Devil’s Garden plateau dropped from a peak during that period of 160 birds in 1990 to 31 in 2004.

Effects of the Alternatives Considered within the Noxious Weeds FEIS

The ingestion and consequent incorporation of some herbicides can harm sage grouse. Blus et. al. 1989 in Connelly et. al. 2000) reported “die offs” of sage grouse that were exposed to methamidiphos and dimethoate. The Noxious Weed FEIS does not propose use of either of these herbicides, nor does it propose treatment of species other than noxious weeds.

However, grouse could consume non-target forbs affected by overspray (Table 15) or contaminated insects (Table 16). Under the scenario for a bird consuming contaminated vegetation, 2,4-D, and triclopyr have hazard quotient ratings above one (Table 15). The herbicide 2,4-D is of greatest concern, because the hazard quotient rating is above one for every application rate. Under the scenarios for 2, 4 –D at the lower levels, only 10% consumption of contaminated vegetation in the animals diet caused potential health effects. Owing to the dearth of studies conducted on wild bird species, there is ambiguity in the extent of the effects due to

ingestion of 2,4-D. Utilizing the mammal information as a proxy for birds from the SERA report on 2,4-D, there could be a chance of some degenerative changes to various organs. Depending on the extent of effect, an individual animal certainly could be at greater risk of predation.

Table 15. Herbicides and their Application Rates for Chronic Exposures to Large Birds (goose sized) Consuming Contaminated Vegetation where there is no Spray Buffer and a Boom Application Method on Site

Herbicide/Application Rate	Exposure Assessment Rate mg/kg/day or mg/kg/event			Hazard Quotient Rating		
	Central	Lower	Upper	Central	Lower	Upper
2,4 - D						
a) 1.5 lbs/ac	2.69	0.896	25.3	3.0	0.9	25
b) 2.0 lbs/ac	3.58	1.19	33.7	4.0	1.2	34
Chlorsulfuron 1.0 oz/ac	0.212	0.0708	2.0	0.002	5×10^{-4}	0.01
Clopyralid 0.25 lb/ac	0.815	0.217	10.0	0.05	0.01	0.7
Dicamba						
a) 1.0 lb/ac	1.16	0.388	11.0	0.09	0.03	0.8
b) 2.0 lbs/ac	2.33	0.776	21.9	0.2	0.06	1.6
Glyphosate 3.75 lbs/ac	16.6	5.53	156	0.2	0.06	1.6
Triclopyr (Acid & BEE) 1.5 lbs/ac	5.92	1.52	75.2	0.6	0.2	8.0
NPE	0.216	0.0576	2.85	0.02	0.006	0.3

For the small bird consuming contaminated insects scenario 2,4-D (alone or in a tank mix), dicamba, and the surfactant NPE all exceed hazard quotient ratings of 1.

Table 16. Hazard Quotient Ratings for a Small Bird eating Contaminated Insects – Acute Toxicity (100% of diet)

Herbicide/Application Rate	Exposure Assessment Rate mg/kg/day			Hazard Quotient Rating		
	Central	Lower	Upper	Central	Lower	Upper
2,4 - D						
a) 1.5 lbs/ac	56.4	56.4	169.0	6.0	6.0	17.0
b) 2.0 lbs/ac	75.2	75.2	226.0	8.0	8.0	23.0
Chlorsulfuron 1.0 lb/ac	2.35	2.35	7.05	0.001	0.001	0.004
Clopyralid 0.25 lb/ac	9.4	9.4	28.2	0.01	0.01	0.04
Dicamba						
a) 1.0 lb/ac	37.6	37.6	113.0	3.0	3.0	8.0
b) 2.0 lbs/ac	75.2	75.2	226.0	6.0	6.0	17.0
Glyphosate 3.75 lbs/ac	141.0	141.0	423.0	0.3	0.3	0.8
Triclopyr (Acid & BEE) 1.5 lbs/ac	56.4	56.4	169	0.1	0.1	0.3 (ACID) 0.4 (BEE)
NPE	62.6	50.0	263.0	6.0	5.0	26.0

Design Standard DS-12a (no 2,4-D or dicamba in occupied sage grouse habitat) limits the types of herbicides that may be used to those with Hazard Quotients less than 1.0 in occupied sage grouse habitat. Under Alternatives 2, 4 and 6, the weeds would be treated with glyphosate or chlorsulfuron, which have a low risk of toxic effects to birds eating contaminated vegetation under the lower to central levels, which would be the most realistic scenarios.

As to the potential effects from NPE, research indicates that surfactants such as NPE can have assorted detrimental effects on various species. Relyea (2005) suggested that the mortality in amphibians associated with Roundup (a brand of glyphosate) was associated with the POEA surfactant found in the formulation. NPE has been documented to induce

reproductive abnormalities in rats, specifically causing oxidative stress in the sperm (Chitra, Latchoumycandane and Mathur 2002). Although the doses in their study were well below what is in the above chart

(1, 10, and 100 micrograms of 98% NPE/kg of animal weight), the rats were dosed for 45 days. The scenario for a small bird consuming contaminated insects assumes that 100% of the diet consists of NPE contaminated materials. Given the small patch sizes of the weed occurrences (0.1 acre each, or 0.0009% of the potential sage grouse habitat); it is unlikely there would enough contaminated insects in the diet to sustain the doses that would cause a risk.

The sage grouse management guidelines developed by Connelly et. al. (2000) (which are the underpinning for sage grouse management efforts throughout the western United States), note that "If 2,4-D or similar herbicides are used, they should be applied in strips such that their effect on forbs is minimized." This advice would indicate that the authors do not appear to have concerns as to risk associated with the herbicides on sage grouse. Given the small size of the weed occurrences, it is unlikely that spraying herbicides would pose a significant problem over time, especially if herbicides other than the three herbicides mentioned above are used.

Treatment of noxious weeds (whether it is physical or herbicide) could cause potential disturbance to birds. Therefore, the District Biologist would be consulted before treatment occurs in any given year in order to conduct surveys that may be needed to protect nesting birds.

Under the alternatives with Early Detection/Rapid Response activities, new occurrences will be reviewed by wildlife biologists prior to implementation; if concerns for sage grouse surface, additional Design Standards could be added if weed treatment areas were outside of the conditions analyzed within the FEIS.

To summarize, there are few direct effects and no indirect effects expected to sage grouse by the implementation of Alternatives 2-6. The three weed occurrences are small and constitute significantly less than 1% (0.0009%) of the habitat. Design Standards will be implemented to further protect the birds. Therefore, there may be impacts to individuals, but there will be no trend toward listing, nor would there be any effect to the sage grouse population on the Modoc NF.

Cumulative Effects to Populations

The following information on the other activities occurring in the area were provided by Jim Irvin, who was associated with the Devil's Garden/Doublehead District and is familiar with the area where the weeds occur. Access is limited near the weed occurrences in sage grouse habitat, so there would be little activity as far as hunting and fishing. There is a moderate amount of grazing by domestic livestock and wild horses in the area. There is both juniper removal and controlled burning to restore sage grouse habitat being planned. There could be a potential disturbance to sage grouse, but this issue would be handled through the Annual Allotment Instructions or project implementation phase (for the juniper removal and the prescribed fire). Therefore, the removal of a maximum of

0.3 acre of Canada thistle is not anticipated to have significant direct, indirect or cumulative effects to grouse under Alternatives 2-6.

Relationship of Project-Level Impacts to Forest-Scale Habitat and Bioregional-Scale

Population Trends for the Sage Grouse

The cumulative effects of the Action Alternatives of the Noxious Weeds Project will result in no decrease in forest-wide habitat for sage grouse. Nor is there any potential effect to the sage grouse population on the Forest. Therefore, implementation of the Noxious Weeds Project will not alter the existing forest-wide trend in habitat, nor will it change the existing bioregional-

wide trend population distribution of sage grouse.

Swainson's Hawk

The Swainson's hawk is a terrestrial MIS, a Forest Service Sensitive, and a California State threatened species.

Habitat/Species Relationship

Nesting habitat for Swainson's hawk includes open habitats in scattered trees or small groves (Zeiner et. al. 1990). Suitable nesting habitat includes the presence of adequate prey, open grasslands and occasional trees that are suitable for nesting (Bloom 1980). Locally, Swainson's hawk have nested in western juniper, ponderosa, elm and sagebrush (Woodbridge et. al. 1995), especially along agricultural fields. Normally found in grassland / forest interface, this species is not common on the Forest. Juniper encroachment may have contributed to a decline in the amount of potential Swainson's hawk nesting and foraging habitat (Bloom 1980).

Swainson's hawk foraging habitats include grasslands, sagebrush, alfalfa fields and hay fields. In Woodbridge et al. (1995), the authors state that cultivated alfalfa appears to have become a critical habitat element replacing the native grasslands. Risebrough et. al. (1989) noted that the replacement of native grasses with sagebrush forming less botanically diverse stands may be a reason for the decline near our area. Woodbridge (1987) found similar species and the use of prey from open habitats; foraging activity in dense sage-steppe grasslands was not observed. Average home ranges in northeastern California were 69 to 2,884 hectares (170 to 7,126 acres) (Woodbridge 1998).

Diets of Swainson's hawks differ markedly between the breeding and non-breeding periods. Over most of the species' range, breeding Swainson's hawks show a strong dependence on ground squirrels, voles, or other abundant small mammal prey. Territory density appears to be positively associated with the availability of specific regional prey such as Richardson's ground squirrel in W Canada (Houston unpub.), montane vole in NE California (Woodbridge 1991), and California vole in central California (Estep 1989). Prey species for the Great Basin area include California vole (*Microtus californicus*), Belding's ground squirrel (*Spermophilus beldingi*), and other various open habitat grassland species of birds and reptiles (Bloom 1980). Insects comprise a large proportion of total individuals, but a negligible proportion of prey biomass during the breeding season.

Following the breeding season, this species shifts from small mammals to insect prey. In NE California, montane voles and Belding's ground squirrels contributed over 70% of prey items identified by Woodbridge (1991). After the young fledge and begin to attain independence, diets begin to shift to insect prey. In NE California, pellets regurgitated by both adult and fledgling Swainson's hawks in August consisted almost entirely of grasshopper (Dichroplus sp.) parts.

Habitat Status and Trend at the Forest Scale

Due to its association with grassland and agricultural fields, Swainson's hawk is not common on the Modoc National Forest. Most of the foraging habitat is privately owned (USDA 1991b. Page 3-107). The known historic concentration of nest sites on the Modoc is in the extreme northwestern portion of the forest on the Doublehead Ranger District where 12 nest sites have been documented. This area is dominated by grasses, including Idaho fescue, bluebunch wheatgrass, Sandberg bluegrass, and Thurber needlegrass. Juniper trees occurring in the area are widely scattered and serve as the nesting substrate.

To approximate occupied habitat for Swainson's hawks on the Forest, a 0.7 mile buffer, which equates to the average home range size of a Swainson's hawk territory in northeastern California (Woodbridge 1998), was placed around each nest site. Based on this model,

approximately 8,300 acres of occupied habitat are estimated to occur on the Modoc National Forest. Vegetation types in occupied habitat include: wet meadows, sagebrush, agricultural fields, bitterbrush, and annual grassland. An additional 230,882 acres of potential habitat for Swainson's hawk nesting and foraging habitat are available based on a vegetation query for juniper woodland with 0 to 9 percent canopy closure, sage, perennial grasslands, alfalfa, fallow fields, and dryland pasture.

Historically, this species was probably much more abundant on the Forest than it is currently. Juniper encroachment, resulting from fire suppression, and heavy livestock grazing in late 1800s and early 1900s, rendered much of the Forest unsuitable for nesting habitat. Removal of small diameter junipers, while leaving the larger trees, would enhance nesting habitat for Swainson's hawks (USDA 1991b. Page 3-107). Juniper removal is currently under environmental analysis through the Sagebrush Steppe Ecosystem Restoration Project Environmental Impact Statement. This planning effort is on a landscape scale and includes National Forest and Bureau of Land Management land in Northeastern California. The Juniper EIS is expected to be finalized in 2007. Because of an increase in herbaceous non-native plant species (including cheat grasses) and juniper on the Forest, the current trend for the habitat is decreasing for Swainson's hawk, since the time of the Modoc LRMP.

Project-level Effects Analysis based on Habitat

Key Habitat Factor(s) for the Analysis: The proposed project, the removal of noxious weeds from Forest System Lands, will have no affect on Swainson's hawk habitat. The potential effect are limited to the consumption of herbicide contaminated prey and disturbance.

Analysis Area for Project-level Effects Analysis: The analysis area for Swainson's hawk consists of the 8,300 acre nest cluster on the Doublehead District and the 238,437 acres potential habitat found elsewhere on the Forest. This habitat is limited to the lower elevations of the Forest mainly in open shrub and juniper stands. In general, these areas are found on the interface between the Forest and the agricultural lands as well as portions of the Doublehead and Devil's Garden Districts. The only known occupied habitat is in the extreme northwestern corner of the Forest on the Doublehead District.

Alternative 1 (Current Management)

Direct and Indirect Effects to Habitat The Forest Service currently treats 20 to 30 acres a year by physical methods. Currently, the Forest does not use herbicides to treat noxious weeds.

Implementing weed treatments under Alternative 1 would have no effect to Swainson's hawk habitat. There will be no change in the current or future amount of nesting or foraging habitat by the treatment of noxious weeds. Therefore, 0 % of the current Swainson's hawk habitat in the analysis area would be affected by implementation of Alternative 1.

Leaving weeds untreated can have some serious effects to Swainson's hawk. Habitats dominated by exotic plant species can reduce prey availability. In northeastern California, weedy ruderal fields and cheatgrass-dominated grazing lands supported low prey populations and received little use by foraging Swainson's hawks (Woodbridge 1991). Estep (1989) reported a similar pattern in the Central Valley of California. Invasion by Russian thistle, cheatgrass and tumble-mustard (*Symbrissum* sp.) also results in increased fire potential, further reducing cover of less fire-resistant native perennial grasses and shrubs.

Cumulative Effects to Habitat
Because there is no direct or indirect effect to Swainson's hawk habitat, there are no cumulative effects to Swainson's hawk habitat under this alternative.

Alternatives 2 to 6

Direct and Indirect Effects to Habitat

There are no weed treatments planned within 15 miles of occupied habitat. There would be a maximum of 23.02 acres of physical treatments and 22.76 acres of herbicide treatments in the 230,882 acres of potential Swainson's hawk habitat. Therefore, a maximum of 0.009% of the 246,737 acres of modeled Swainson's hawk habitat forest-wide could be treated.

Table 17. Proposed Treatments within Occupied and Potential Swainson's Hawk Habitat

Type of Swainson's Hawk Habitat	Total Acres of Swainson's Hawk Habitat Forest wide	Total Maximum Acres of Physical Treatments	Total Maximum Acres of Herbicide Treatments
Occupied	8,300	0.0	0.0
Potential	230,882	23.06	22.76

***This figure includes the maximum, where physical or herbicide methods may be employed**

No nest trees or foraging habitat would be removed under any action alternative. Most of the weed occurrences have native plants within their matrix, therefore there would be native plants left to provide food and cover for potential prey. Based on the information from the previous section, prey habitat should be improved by the removal of noxious weeds. Although there may be beneficial direct or indirect effects to Swainson's hawk habitat under any action Alternative, the extent of this beneficial effect is inconsequential given their location in relation to occupied habitat; therefore, there are no direct or indirect effects to Swainson's hawk habitat.

Cumulative Effects to Habitat

Because there are no direct or indirect effects to Swainson's hawk habitat, there are no cumulative effects to Swainson's hawk habitat under these alternatives.

Project-level Effects Analysis based on Population

Summary of Population Status and Trend at the Forest Scale

The Modoc NF LRMP (as amended by the SNFPA) requires forest-scale distribution population and relative abundance monitoring for Swainson's hawk. The sections below summarize population status and trend data for the Swainson's hawk. This information is drawn from the detailed information on population trends in the Modoc National Forest MIS Report (USDA 2007b), which is hereby incorporated by reference.

Population Status and Trend at the Bioregional Scale and Local Scale

The Swainson's hawk is currently identified as "Imperiled" in California (NatureServe 2006). Imperiled is defined as a result of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province. The Swainson's hawk has been detected on 19 BBS routes in California.

Bloom (1980) reviewed historical records and egg collections to estimate the historical distribution of Swainson's hawks in California, and found that the current range of this species has been reduced dramatically from what it was historically.

Currently, Swainson's hawks are absent from much of their historic breeding range in the central and southern portions of California, and overall may have declined by as much as 90% (Bloom 1980). In the ButteValley in northern California, the population has been stable at 65-

80 pairs since the mid-1980's, however reproductive success has declined post-1992 (Woodbridge unpub.). During the same time period, the adjacent Klamath Basin population declined by approximately 90%; from 40 pairs to <5 pairs (Risebrough et al. 1989). Large numbers of Swainson's hawks still occupy the Central Valley (est. 420-1,000 pairs), but annual losses of territories to residential development and riparian habitat removal, and agricultural intensification are reported (CDFG 1988, Estep 1989). Conversely, Bloom (unpub.) reports apparent recolonization of historic habitats in Los Angeles Co. (Antelope Valley), and population increases in Owens valley, suggesting that the species' populations can respond to improved habitat conditions. Likewise, modest increases in small populations in Lassen County and the east side of the Sierra Nevada are likely linked to expansion of alfalfa cultivation (Bloom unpub.).

The Modoc National Forest and various partners (e.g. Pete Bloom, a raptor expert) collect surveys and incidental sightings data on and adjacent to the Forest. Recent surveys have been conducted in 2001 to 2006 near the agricultural forest interface near Big Valley/Devil's Garden Districts. No nesting birds have been detected on the Forest during these recent surveys.

During the planning phase for the Modoc NF LRMP, there were 11 known nest sites on or immediately adjacent to the Modoc NF (UDSA 1991b. Page 3-107). To date, there are 15 occurrences and 12 nest sites located on the Forest in the extreme northwestern portion of the Doublehead Ranger District. The current Swainson's hawk distribution and relative abundance is basically the same as described in the Modoc LRMP.

Effects of the Alternatives considered within the Noxious Weeds FEIS

The historic Swainson's hawk nests are in the extreme northwest corner of the Forest. There are no weed occurrences planned for treatment within 15 miles of any historic Swainson's hawk nest. Therefore, there is no disturbance to these species expected with implementation of the project. Limited Operating Periods on newly found active nests would further mitigate potential effects.

There would be no potential for consumption of contaminated prey under Alternatives 3 and 5 and the physical treatments under 2, 4 and 6. There is a maximum of 23.06 acres that could receive herbicide treatments within modeled potential habitat under Alternatives 2, 4 and 6. None of those occurrences are near occupied habitat. A maximum of 0.009% of potential Swainson's hawk habitat could be treated with herbicides. The weed occurrences of greatest concern would be BV284ONAC (Scotch thistle), DG019SAAE (Mediterranean sage), WM008LIDA, and WM010LIDA (Dalmatian toadflax).

BV284ONAC (Scotch thistle) – The lower portion of the weed occurrence near the private land provides the best potential Swainson's hawk habitat. There are patches of scotch thistle all the way down the creek to the private land. Very little of the 12.66 acres of the weed occurrence that is located in potential Swainson's hawk habitat would receive herbicides, because most thistle patches are small clumps of plants. The largest patch was roughly .1 acre. Some of the scotch thistle stands were dense, however, there are native and non-native plants outside of these clumps and often within them as well. Under Alternatives 2, 4 and 6, this weed occurrence may be treated with physical or herbicide means (which includes goat grazing under Alternative 6). Because the condition of the weed occurrence is only a small acreage within the entire 12.66 acres, it would be treated, making it unlikely that a Swainson's hawk would consume 100% of its diet in contaminated prey. Therefore, there are no anticipated effects by the implementation of Alternatives 2, 4, or 6 to this species.

There are 5.76 acres of two weed occurrences (WM008LIDA and WM010LIDA, Dalmatian toadflax) near New Pine Creek on steep, timbered slopes that would probably not be used by nesting or foraging pairs. Throughout the Forest and the state, Swainson's hawk foraging habitat is largely confined to the agricultural lands surrounding their nests. It is highly unlikely the birds would ingest a significant portion of their diet in contaminated mammals or insects

from these two sites. Under Alternatives 2, 4, and 6, these occurrences are scheduled for glyphosate. Glyphosate does not have a hazard quotient above 1.0 for either the consumption of contaminated mammals or contaminated insects scenarios. Therefore, treatment of these two occurrences is not expected to affect Swainson's hawk.

There are 2.81 acres of DG019SAAE (Mediterranean sage) within potential Swainson's hawk habitat. This occurrence would only be treated by physical means under Alternatives 2 and 4. It could be treated by either physical or herbicide methods under Alternative 6. It would not be treated with 2,4-D under Alternative 6, because of Design Standard (DS-12b), which limits the size of the weed sites that can be treated with 2,4-D to less than 2 acres. Because the other herbicides have lower hazard quotients, the fact that it is in potential habitat with no history of occupancy, and the size of this occurrence, treatment under Alternative 6 is not expected to affect Swainson's hawk.

The rest of the 1.84 acres of weed occurrences in potential Swainson's hawk habitat are less than one acre and scattered throughout the Forest. It is extremely unlikely that Swainson's hawk will consume 100% of their diet in contaminated prey, where potential effects from herbicides would manifest themselves (i.e. cause harm to the bird).

Under the alternatives with Early Detection/Rapid Response activities, new occurrences will be reviewed by wildlife biologists prior to implementation; if concerns for Swainson's hawk surface, additional Design Standards could be added if weed treatment areas are outside of the conditions analyzed within the FEIS.

Based on the information presented above, there inconsequential direct and no indirect effects to Swainson's hawk by the implementation of any action alternative.

Cumulative Effects to Populations

The four weed occurrences mentioned above have little activity that would contribute to cumulative effects. WM008LIDA and WM010LIDA (Dalmatian toadflax) are on the edge of the Warner Mountain District in an area that does not have grazing, timber harvest, mining or recreation that occurs farther up the canyon (J. Irvin and M. Flores, pers. comm.). DG019SAAE (Mediterranean sage) is located by a quarry. No Forest Service activities occur in the area (J. Irvin, pers. comm.). BV284ONAC (Scotch thistle) is a gated area that is no longer used as a primary timber haul route. The area receives grazing, but otherwise there is only a small amount of hunting outside of the reproductive period. (B. Landoski, Pers. Comm.) Therefore, implementation of Alternatives 2-6 would have no cumulative effects to Swainson's hawk individuals or populations.

Relationship of Project-Level Impacts to Forest-Scale Habitat and Bioregional-Scale Population Trends for the Swainson's hawk

The cumulative effects of the Action Alternatives of the Noxious Weeds Project will result in no decrease in forest-wide habitat for Swainson's hawk. Nor is there any potential effect to the Swainson's hawk population on the Forest. Therefore, implementation of the Noxious Weeds Project will not alter the existing forest-wide trend in habitat, nor will it change the existing bioregional-wide trend population distribution of Swainson's hawk.

Willow Flycatcher

The flycatcher is a terrestrial MIS, a Forest Service Sensitive, and a California State Endangered species.

Management Direction: Protect resource elements (riparian ecosystems and meadows) that provide quality Willow Flycatcher habitat; Willow flycatchers are managed through a combination of surveys, and livestock management. (SNFPA Record of Decision (ROD), page 11, 56-58.) (USDA 2004).

Habitat/Species Relationship

The willow flycatcher is a summer resident of the Sierra Nevada and Cascade Ranges in elevations from 2,000 to 8,000 feet. They are most often associated with broad, open river valleys or large (> 20 acres) mountain meadows. However, they have been documented to use meadows that were an average of 10 acres (Harris et al. 1987) and as small as 0.62 acres (Scully 1995, Kings River Conservation District 1985). On the Modoc National Forest, they have also been detected in narrow riparian canyons (T. Ratcliff, pers. comm.). Dense willow thickets are necessary for cover, nesting, and roosting (Scully 1995, Sedgwick and Knopf 1992, Fowler et al. 1991). Willow stands interspersed with openings are preferred habitat (Sedgwick and Knopf 1992, Fowler et al. 1991); large patches of contiguous willow do not appear to be suitable (Sanders and Flett 1989).

The presence of water appears to be an important component for suitable habitat (Bombay et. al. 2001, Scully 1995). Drier conditions may have reduced or eliminated potential breeding sites for insects in the Sierra Nevada (Bombay et al. 2000). Insects are a primary staple for this species (Zeiner et. al. 1990).

Habitat Status and Trend at the Forest Scale

The Modoc National Forest Land and Resource Management Plan (LRMP) (USDA 1991a) states that application of the Riparian Area Management Prescription will maintain viable populations for this species (page 4-26). During the development of the LRMP, willow flycatchers were selected as an MIS, because they needed not only the presence of willows but also a specific type of structure within riparian areas (USDA 1991b page 3-103). Currently, willows are managed through the implementation of riparian standards and guidelines as amended by the Sierra Nevada Framework (USDA 2004).

Based on the GIS query for willow flycatcher, there are 2,450 acres of occupied/potential willow habitat. This value includes the occupied and potential habitat from the Modoc NF willow flycatcher polygons with an additional fifty-meter buffer. The fifty-meter value approximates a willow flycatcher territory (T. Benson, pers. comm.), so the buffer provided a conservative estimate of willow flycatcher habitat on the forest. The following habitat types were included: wet meadow, sagebrush, juniper, and aspen. The sagebrush and juniper types are an artifact of the query.

The authors of the wildlife sections of the LRMP and its supporting Final Environmental Impact Statement (FEIS) noted that livestock grazing and use of willows by beavers were two threats to willow habitat and subsequently the presence of willow flycatchers (USDA 1991b page 3-103). At the time of the FEIS, willow planting occurred on all of the Districts. Willow form and distribution appears to be stable to increasing on the Warner Mountain and Devil's Garden Districts, in the occupied and emphasis willow flycatcher habitat, since the time of the Modoc LRMP.

Project-level Effects Analysis based on Habitat

Key Habitat Factor(s) for the Analysis: The proposed project, the removal of noxious weeds from Forest System Lands, will have no affect on habitat for willow flycatcher; willow flycatchers are not tied to the noxious weeds for cover or food. The main potential effect is limited to the ingestion of contaminated insects.

Analysis Area for Project-level Effects Analysis: The analysis area for willow flycatcher is 2,450 acres, which includes the occupied, potential and emphasis habitat used during the Sierra Nevada Forest Plan Amendment Project (USDA 2001). This habitat is found mainly on the Warner Mountain District, but occurs in scattered localized patches on the forest.

<u>Alternative 1 (Current Management)</u>

Direct and Indirect Effects to Habitat The Forest Service currently treats 20 to 30 acres a year by physical methods. Currently, the Forest does not use herbicides to treat noxious weeds.

Implementing weed treatments under Alternative 1 would have no effect on willow flycatcher habitat. There will be no change in the current or future amount of willow habitat by the treatment of noxious weeds. Therefore, 0 % of the current willow flycatcher habitat in the analysis area would be affected by implementation of Alternative 1.

Cumulative Effects to Habitat
Because there is no direct or indirect effect to willow flycatcher habitat, there are no cumulative effects to willow flycatcher habitat under this alternative.

Alternatives 2 to 6

Direct and Indirect Effects to Habitat

There will be no treatment within any habitat with previous sightings, although three areas within potential habitat may be treated forest-wide. A maximum of 0.3 acres of the 2,450 acres of potential willow flycatcher habitat forest-wide, could receive physical treatments. Therefore, a maximum of 0.012% of the modeled willow flycatcher habitat forest-wide could be treated.

Table 18. Proposed treatment within Occupied and Potential Willow Flycatcher Habitat

Type of Willow Flycatcher Habitat	Total Acres Willow Flycatcher Habitat Forest wide	Total Maximum Acres o Physical Treatments	Total Maximum Acres of Herbicide Treatments
Occupied	0.0	0.0	0.0
Potential	2,450	0.3	0.0

***This figure includes the maximum, where physical or herbicide methods may be employed**

These birds nest in shrubs; no nesting habitat will be removed under any action alternative. Willow flycatchers are primarily an aerial forager, including both hawking and hover-gleaning (various authors in Sedgwick, J. A. 2000). Therefore, no foraging habitat will be removed with implementation of any action alternative either.

Prey habitat would not be affected, because there are currently no native insects that are reliant on weeds for food or cover. Moreover, sufficient native plants exist outside of the boundaries of the current weed occurrences. Therefore, there should be no negative direct or indirect effects to willow flycatcher habitat by the implementation of Alternatives 2-6.

Cumulative Effects to Habitat
Because there are no direct or indirect effects to willow flycatcher habitat, there are no cumulative effects to willow flycatcher habitat under these alternatives.

Project-level Effects Analysis based on Populations

Summary of Population Status and Trend at the Forest Scale

The Modoc NF LRMP (as amended by the SNFPA) requires monitoring of the bio-regional status and change in distribution for willow flycatcher. The sections below summarize population status and trend data for the willow flycatcher. This information is drawn from the detailed information on population trends in the Modoc National Forest MIS Report (USDA 2007b), which is hereby incorporated by reference.

Population Status and Trend at the Bioregional Scale and Local Scales

Historically, willow flycatchers nested throughout California wherever thickets of riparian deciduous shrubs, primarily willow (*Salix spp*.), occurred. In the last four decades, however, willow flycatcher breeding populations have been extirpated from most of the lower elevation

riparian areas in California and it appears that the species may no longer breed at elevations below 3,000 feet in the Sierra Nevada, in the Central Valley, and in the valleys of the Central Coast. Historic records combined with recent survey efforts indicate a long-term decline of willow flycatchers at elevations above 3,000 feet in the Sierra Nevada as well.

Statewide BBS data, in between 1966 to 2005 on willow flycatcher had a huge positive trend based on BBS' 22 routes. The regional rating is red for meaning there is data with an important deficiency and therefore caution needs to be used in utilizing the data. According to the California Partners in Flight Conservation Plan, there are insufficient data to determine trends in California of any subspecies of willow flycatchers.

The current range of the Sierra Nevada subspecies of willow flycatchers (*Empidonax traillii adastus* and *E. t. brewsteri*) consists of isolated sites at relatively high elevations, between approximately 1,200 and 2,500 m (4,000 and 8,000 ft). Current estimates of the willow flycatcher population in the Sierra Nevada bioregion range between 300 to 400 individuals; the effective population size (number of breeding adults) is likely to be smaller. Records compiled from national forests, researchers, scientific literature, and museum collections dating from 1910 to 2000, document 135 known locations within the bioregion. In most sites, only one willow flycatcher territory is recorded, but other sites have 3, 5, or as many as 32 willow flycatcher territories. In the Province-wide BBS dataset, willow flycatcher has a huge positive trend based on six routes. This regional rating is also red for meaning there is data with an important deficiency and therefore caution needs to be used in utilizing the data. This rating is due in part to, a relative abundance for the 0.09 birds/route; while a regional abundance of less than 0.1 birds/route is considered very low.

Population trends within the Sierra Nevada Demographic study sites indicate that the willow flycatcher population has experienced a significant decline since 1997. Although in the last three years, 2002-2004, the number of territories detected has remained stable (range = 37-39), nesting success has remained lower than other values reported for passerines.

The willow flycatcher data for the Modoc NF has been collected during both province-wide and project specific willow flycatcher surveys, as well as from incidental sightings made by private citizens. This species has nested infrequently on the Modoc National Wildlife Refuge as well. Willow flycatchers have not been detected during any BBS surveys locally.

There are 19 locations throughout the Forest identified as occupied, suitable, or emphasis habitat during the Sierra Nevada Framework (USDA 2004) planning effort for willow flycatcher. Although occasional sightings have been found over time in six locations throughout the Modoc National Forest, there is no stable population of this species on the Forest. The current distribution of willow flycatcher is similar to the pattern described in the Modoc LRMP.

Effects of the Alternatives Considered within the Noxious Weeds FEIS

Under Alternatives 3 and 5, as well as the physical portions of 2, 4 and 6, there would be no potential for willow flycatchers to consume contaminated vegetation. The ingestion of contaminated insects is not expected to affect willow flycatcher for the following reasons for Alternatives 2, 4,

and 6. None of the weed occurrences are in areas that have had occupancy. The two Dyer's woad sites (0.23 acres) on the Doublehead (DH005ISTI and DH007ISTI) are in the road prism and would not affect potential foraging habitat. The birds, if present, would be in the willow thickets along the creek; there is a high potential for willow flycatcher presence in the adjacent willow patches on the creek (P. Buettner, pers. comm.). Under any action alternative, the 0.07 acre weed occurrence on Lassen Creek would be treated by either physical or herbicide means. This weed occurrence is outside of the willow thicket in a draw off the main channel; therefore, it has little potential for foraging willow flycatchers.

Forest-wide 0.3 acres could receive herbicide or physical treatments. For the small bird consuming contaminated insects scenario, 2,4-D (alone or in a tank mix), dicamba, and the surfactant NPE all exceed hazard quotient ratings of 1.0 (Table 16). None of the sites would be treated with 2,4-D under Alternatives 2 and 4, because they all lay within 1,000 feet of water. Under Alternative 6, any of the herbicides could be used. However, the assumption behind this scenario is that 100% of the diet consists of contaminated insects. Given the small size of the weed occurrence and their foraging preferences, this potential effect is unlikely.

Given the location of these sites outside of preferred foraging areas, it is highly unlikely that individual birds would be affected by herbicides. Therefore, there may be an impact to individuals, but no trend toward listing under any action alternative.

Under the alternatives with Early Detection/Rapid Response activities, new occurrences will be reviewed by wildlife biologists prior to implementation; all weed occurrence implementation sites will need to meet water quality standards, and therefore will be limited in acre size as per the BMP's and Design Standards. Consequently, there are inconsequential direct and no indirect effects to willow flycatchers by the implementation of any action alternative.

Cumulative Effects to Populations

A limited amount of hunting and fishing occur near the Lassen Creek weed occurrence. Fishing is regulated along Lassen Creek, due to the presence of red-band trout. The majority of the hunting would be in the fall for deer. The area is grazed under a rotation system developed to protect red-band trout in order to avoid listing of the species. Given light use in the area and no other herbicide use adjacent to the 0.07 acre of potential treatment, there would be no expected additional cumulative effect to willow flycatchers by implementation of any alternative at the Lassen Creek site.

Jim Irvin provided information on activities for the Doublehead sites. Grazing and recreation are the primary activities. The creek is within an exclosure, where grazing was excluded for a number of years. The area is now lightly grazed, but controlled to ensure riparian habitat improvement. There is a light amount of fishing, because this intermittent creek becomes more of a series of pools once the spring flush has occurred. There are inconsequential direct, no indirect, and no cumulative effects expected with treatment at the Doublehead sites under Alternatives 2- 6.

Relationship of Project-Level Impacts to Forest-Scale Habitat and Bioregional-Scale Population Trends for the Willow Flycatcher

The cumulative effects of the Action Alternatives of the Noxious Weeds Project will result in no decrease in forest-wide habitat for willow flycatcher. Nor is there any potential effect to the willow flycatcher population on the Forest. Therefore, implementation of the Noxious Weeds Project will not alter the existing forest-wide trend in habitat, nor will it change the existing bioregional-wide trend population distribution of flycatcher.

VI. Determinations:

In order to clarify, the determinations were put into tabular form. The May Impact cell means, "May impact individuals, but not likely to cause a trend to federal listing or a loss of viability".

SPECIES						
	1*	2	3	4	5	6
American Marten	*No Impact*	*May Impact***	*No Impact*	*May Impact***	*No Impact*	*May Impact***
California Spotted Owl	*No Impact*	*May Impact***	*No Impact*	*May Impact***	*No Impact*	*May Impact***
California Wolverine	*No Impact*	*No Impact*	*No Impact*	*No Impact*	*No Impact*	*No Impact*
Greater Sandhill Crane	*No Impact*	*May Impact*	*No Impact*	*May Impact*	*No Impact*	*May Impact*
Great Gray Owl	*No Impact*	*No Impact*	*No Impact*	*No Impact*	*No Impact*	*No Impact*
Northern Goshawk	*No Impact*	*May Impact***	*No Impact*	*May Impact***	*No Impact*	*May Impact***

SPECIES						
	1*	2	3	4	5	6
Pallid Bat	*No Impact*	*May Impact*	*May Impact*	*May Impact*	*No Impact*	*May Impact***
Sage Grouse	*No Impact*	*May Impact***	*No Impact*	*May Impact***	*No Impact*	*May Impact***
Sierra Nevada Red Fox	*No Impact*	*No Impact*	*No Impact*	*No Impact*	*No Impact*	*No Impact*
Swainson's Hawk	*No Impact*	*May Impact***	*No Impact*	*May Impact***	*No Impact*	*May Impact***
Townsend's Big-eared Bat	*No Impact*	*May Impact*	*May Impact*	*May Impact*	*No Impact*	*May Impact***
Willow Flycatcher	*No Impact*	*May Impact***	*No Impact*	*May Impact***	*No Impact*	*May Impact***

* There would be no impact in the short term, but significant increases in weeds could affect most species

** Minor potential effects to species – only 1 pair, only potential habitat or only small acreages affected

VII. Personal Communications

Teresa Benson. 2005. Personal communication. Previous Region 5 Willow Flycatcher Emphasis Leader. Kernville, California. (Now on Glacier RD, Chugach NF)

Patty Buettner. 2006. Personal communication. Wildlife Biologist. Doublehead Ranger District Modoc National Forest. Tulelake, California.

Elias Flores, Jr. 2006. Personal communication. Wildlife/Fisheries Biologist. Bureau of Land Management, Surprise Field Office. Cedarville, California.

Scott Gardner. 2005. Personal communication. California Department of Fish and Game Sage Grouse Coordinator and Environmental Scientist with the Upland Game Program. Sacramento, California.

Scott Hill. 2007. Personal communication. Wildlife Biologist. California Department of Fish and Game. Redding, California.

Jim Irvin. 2007. Personal communication. District Ranger. Devil's Garden/Warner Mountain Ranger District. Modoc National Forest. (22 years of experience on Devil's Garden District in various positions). Alturas/Cedarville, California.

John Landoski. 2007. Personal communication. District Silviculturist. Big Valley Ranger District. Modoc National Forest. Adin, California.

Dr. William Laudenslayer. 2007. Personal communication. Research Wildlife Ecologist. Pacific Southwest Research Station. Cedarville, California.

Dr. John Matson. 2006. Personal communication. Professor of Biological Sciences and Science Education. San Jose State University. San Jose, California.

Jennifer Purvine. 2004. Personal communication. Previous Wildlife/Fisheries Biologist. Bureau of Land Management, Alturas Field Office. Alturas, California. (Now with US Forest Service, Region 4).

Julie Rechtin. 2007. Personal communication. Wildlife Biologist. Big Valley Ranger District. Modoc National Forest. Adin, California.

Tom Rickman. 2006. Personal communication. Wildlife Biologist. Eagle Lake Ranger District. Lassen National Forest. Susanville, California

George Studinski. 2002. Retired District Wildlife Biologist, Devil's Garden Ranger District. Modoc National Forest. Alturas, California.

Stanley Sylva. 2006. Personal communication. Supervisor. Modoc National Forest. Alturas, California.

Boyd Turner. 2007. Personal communication. District Wildlife Biologist. Big Valley Ranger

District. Modoc National Forest. Adin, California.

Marty Yamagiwa. 2007. Personal communication. Forest Fishery and Wildlife Biologist. Modoc National Forest. Alturas, California.

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Appendix A

Revision History

This document replaces any earlier versions of the Biological Evaluation prepared for the Modoc NF Noxious Weed Treatment Project. Tom Ratcliff began a BA/BE which was near completion in the late 1990's; then the Regional Office requested changes for the project. Therefore, the analysis was completed in a different manner. Tom is now retired from the Forest Service and was not included on the signature page. Allison Sanger, who worked as a Botanist/Wildlife Biologist on the Modoc NF, was instrumental in writing the second BA/BE; she currently works on the Lassen NF, and was also not included on the signature page. Mary Flores and Marty Yamagiwa were directed to complete a BE in 2003, which was prematurely given the new Alternatives. That iteration served as a foundation for the Modoc National Forest Noxious Weed Treatment Project Draft Environmental Impact Statement. The 2007 version of the BE serves as the final version, and reflects the effects of implementation of the activities on Forest Service sensitive species described in the Record of Decision (ROD).

Since the publication of the Draft Environmental Impact Statement (DEIS) for the noxious weed project, the weed Geographical Information System (GIS) coverages (data) have been updated with data through 2004 field season; therefore, these coverages contain updated nest sites and information on the weed occurrences.

This version (dated March 2007) also includes the most current guidance for Management Indicator Species as it relates to Forest Service Sensitive Species. In addition, the format has been totally revamped from the previous versions as per direction for the Interdisplinary Team Leader, where the species account and effects section are combined. In the 2007 document, this information is organized by species with the section discussing the Non-Management Indicator Species first, followed by the Forest Service Sensitive Management Indicator Species.

Appendix V: Terrestrial Wildlife Biological Assessment

Biological Assessment for Terrestrial Wildlife Species

Noxious Weed Treatment Project

Modoc National Forest

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I. Introduction

The following Biological Assessment (BA) has been prepared to document the effects of implementing the actions proposed in the Final Environmental Impact Statement for Modoc National Forest Noxious Weed Treatment Project on federally listed terrestrial species found on the Modoc National Forest. This BA is written in accordance with the requirements set forth under Section 7 of the Endangered Species Act (19 U S C 1536 (c)) and follows standards established in Forest Service Manual direction (FSM 2672.42) (USFS 1991a). Separate BA's were prepared for the federally listed plant and fish species. A terrestrial wildlife Biological Evaluation (BE) was written for Forest Service sensitive wildlife species, and a terrestrial Management Indicator Species Report was prepared for terrestrial harvest and ecological indicator species.

Noxious weeds are spreading on public and private lands throughout the west at an alarming rate. Forest Service lands in the west have about 6-7 million acres of infestation with an annual rate of growth of about 8-12% per year (USDA 1998). Implementation of the activities discussed within the Noxious Weed FEIS could begin in 2008, and may continue up to 10 years.

The project has undergone several revisions and is currently being analyzed through the Environmental Impact Statement (EIS) process, due to public concerns about the use of chemicals on Forest Service lands. Tom Ratcliff and Allison Sanger have both worked on various portions of the BA; however, they have both moved and therefore were not included on the signature page. Mary Flores and Marty Yamagiwa were directed to complete a BA on February 25, 2003. The 2003 iteration served as a foundation for the Modoc National Forest Noxious Weed Treatment Project Draft Environmental Impact Statement. This current version (2008) of the Biological Assessment reflects the effects of implementation of Alternatives 1 through 6 on federally listed species.

The analysis area for this document includes the entire Modoc National Forest. This area encompasses about 1.6 million acres of Forest System lands as well as 337,000 acres of lands administered by other agencies or private landowners. The Forest has an incredibly diverse series of habitats ranging from sagebrush at the lowest elevations to white bark pine at the highest elevations.

The following table documents the federally listed species that are present on the Forest when the most recent effects analysis was done. Although the bald eagle is included in the analysis, the species has been de-listed and is currently considered a sensitive species. However, concurrence by the USDI Fish and Wildlife Service occurred while the species was still listed; therefore, the analysis for the bald eagle has been left in this document, instead of being moved to the Biological Evaluation for the Noxious Weeds Project. The USDI Fish and Wildlife Service (USFWS) species list was downloaded again on June 19, 2008. The new candidate species are discussed in attachment A.

Table 1. Federally Listed Species Occurring On or Downstream of the Modoc National Forest

Common Name	Scientific Name	Status
Bald Eagle	*Haliaeetus leucocephalus*	Threatened
Northern Spotted Owl	*Strix occidentalis caurina*	Threatened

The next phase of the analysis process involved deciding which species to carry forward to the effects section. This process is documented in the following table, which details the status of the species and discloses whether or not they are potentially affected by the Noxious Weeds Treatment Project (Columns 3-5). As can be seen in Table 2, the only terrestrial species potentially affected by the project is bald eagle. The northern spotted owl will not be further discussed, because the project does not directly or indirectly affect the habitat or the forest-level population trend.

Table 2. Federally listed MIS for Project-Level Analysis for the Noxious Weed Treatment Project

Species	Management Indicator Species	Species whose habitat is not in or adjacent to the project area, and would not be affected by the project.	Species whose habitat is in or adjacent to project area, but would not be either directly or indirectly affected by the project.	Species whose habitat would be either directly or indirectly be affected by the project.
Bald Eagle	X			X
Northern Spotted Owl	X		Only physical treatments would occur within northern spotted owl habitat.	

II. Consultation to Date

The Forest and USDI Fish and Wildlife Service, Klamath Falls [Oregon] Fish and Wildlife Office, personnel have conducted ongoing consultation during the course of the planning effort. On June 19, 2008, a species list was downloaded from the Klamath Falls Fish and Wildlife Web site; the analysis found within the BA and FEIS still contain the appropriate species—Endangered, Threatened, Proposed, and Candidate.

US Fish and Wildlife Service correspondences completed for the informal consultation include 1-10-03-I-082, 1-10-98-TA-042, 1-10-99-TA-067, 1-10-01-SP-020, 1-10-03-SP-037, 1-10-03-I-082, 1-10-04-234, 1-10-05-I-021, 1-10-05-SP, and the letter of concurrence dated 8 March 2007. Three meetings between USFS and USFWS have occurred in Klamath Falls at the USFWS office. Mary Flores attended a meeting in Klamath Falls on January 7, 2003 with Leonard Le Captain, Tony Hawkes, and Stewart Reid to discuss the project as it stood at that point in time. On May 20, 2005, Mary Flores, Rick Hardy and Tony Hawkes discussed the weed project, especially in light of the change in the 2,4–D buffer, tank mixes with 2,4-D, and the addition of chlorsulfuron. A final, Request for Concurrence letter was sent to the Klamath Falls Office November 29, 2006; the concurrence letter for the Modoc NF Noxious Weeds Project is in attachment B of the terrestrial wildlife BA.

In addition, Mary Flores (USFS), Leonard Le Captain (USFWS), Rick Hardy (USFWS), and Tony Hawkes (USFWS Contaminants Specialist) and USFWS front desk staff conducted numerous phone consultations, including, but not limited to; October 26, 2000, December 12, 2000, November 18, 2002, November 26, 2002, December 16, 2002, December 18, 2002, January 7, 2003, February 10, 2003, March 31, 2003, December 12, 2003, August 31, 2004, September 14, 2004, November 3, 2004, February 14, 2005, February 15, 2005, March 15, 2005, March 25, 2005, April 5, 2005, August 24, 2005, September 13, 2005, September 19, 2006, and November 13, 2006. Other USFWS offices were contacted on various occasions as well.

III. Management Direction

Management direction and protection measures for bald eagle and its habitat are provided in a general way within the Endangered Species Act (1973), the Bald Eagle Protection Act (1940), and the Migratory Bird Treaty Act (1918) as well as Forest Service Manual. Specific direction is found in the Pacific Bald Eagle Recovery Plan and the Modoc National Forest Land and Resource Management Plan (LRMP) (USFS 1991a).

With respect to the Endangered Species Act (ESA) (1973), “The purposes of this Act are to provide

a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve the purposes of the treaties and conventions … [until] the measures provided pursuant to this Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking."

The Migratory Bird Treaty Act (1918 as amended by PL 99-645 1986) states that, "Except as allowed by implementing regulations, this act makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs, or migratory bird products. Public Law 95-616 also ratified a treaty with the Soviet Union specifying that both nations will take measures to protect identified ecosystems of special importance to migratory birds from pollution, detrimental alterations, and other environmental degradations."

The Bald Eagle Protection Act (1940) imposes criminal and civil penalties on anyone (including associations, partnerships and corporations) in the U.S. or within its jurisdiction who, unless excepted, takes, possesses, sells, purchases, barters, offers to sell or purchase or barter, transports, exports or imports at any time or in any manner a bald or golden eagle, alive or dead; or any part, nest or egg of these eagles; or violates any permit or regulations issued under the Act. A criminal conviction requires that the violator acted knowingly or with wanton disregard of the consequences.

Forest Service Manual direction states that Forests, "… conduct activities and programs to assist in the identification and recovery of threatened and endangered plant and animal species... Through the biological evaluation process, review actions and programs authorized, funded and carried out by the Forest Service to determine their effect on threatened and endangered species and species proposed for listing." The manual also states that, Forests should, "Identify and prescribe measures to prevent adverse modification or destruction of critical habitat and other habitats essential for the conservation of endangered, threatened, and proposed species. Protect individual organisms or populations from harm or harassment as appropriate." (USFS 1991a)

Pacific Bald Eagle Recovery Plan (USDI USFWS 1986) provides explicit direction for habitat management and population goals. Although there is no specific direction concerning noxious weed management in the recovery plan, the following guidelines could pertain to the project.

- Maintain and enhance avian and mammalian food sources (1.312 found on page 46).
- Maintain and enhance wetland areas for waterfowl production (1.3121 found on page 47).
- Restrict human disturbance at eagle use areas (1.33 found on page 52).
- Establish buffer zones around nest sites (1.331 found on page 53).
- Exclude logging, construction, habitat improvement, and other activities during critical periods of eagle use (1.332 found on page 53).
- Prohibit vehicle traffic at sensitive key areas during periods of eagle use (1.334 found on page 54).
- Monitor levels of pollutants and the effects they may have on eagles (2.222 found on page 61).

Finally, the Modoc LRMP (USFS 1991b) direction for the bald eagles from page 4-26 is paraphrased below:

A. Implement the Bald Eagle Recovery Plan as applicable to the Modoc National Forest.

B. Manage habitats according to the Raptor Management Prescription.
C. Survey and manage occupied and potential sites.

IV. Description of the Proposed Action

The following section provides a very brief synopsis of the activities for the Modoc Noxious Weed Treatment Project. See Chapter 2 of the Noxious Weed Treatment FEIS for the detailed description of the alternatives (USFS 2007a).

Table 3. Summary of Treatment Activities by Alternative for Modoc NF Noxious Weeds FEIS

	Alt 1 No Action	Alt 2 Proposed Action	Alt 3	Alt 4	Alt 5	Alt 6
Treatment timeframe	On going	5 years	5 years	10 years	10 years	10 years
Sites to be treated		520	494	520	520	538
Acres treated	20-30	5,995	5,993	5,995	180	241
Sites/acres excluded		5 sites 9 acres	47 sites 916 acres	5 sites 9 acres	5 sites 5515 acres	6567 acres
Sites/acres limited treatment		0 acres	0 acres	0 acres	9 sites 100 acres	3 sites 100 acres
Early Detection- Rapid Response	0 acres	0 acres	0 acres	Up to 200 acres (100 ac max/year)	Up to 200 acres (100 ac max/year)	Up to 200 acres (100 ac max/year)
Treatment Method						
Physical only treatment – hand pulling, hoeing, grubbing	20-30 ac/yr	161 sites 31 acres	494 sites 5,993 acres	161 sites 31 acres	0 acres	0 acres
Treatment by either Physical and/or herbicide		333 sites 5,961 acres	0 acres	333 sites 5,961 acres	0 acres	371 sites 116 acres
Herbicide only, treatment		42 sites 907 acres	0 acres	42 sites 907 acres	0 acres	46 sites 65 acres
Limited treatment		0 acres	0 acres	0 acres	9 sites 100 acres	3 sites 100 acres
Goat grazing		0 acres	0 acres	0 acres	5 sites 41 acres	5 sites 41 acres
Total potential acres treated with herbicides		355 sites 6,868 acres	0 sites 0 acres	355 sites 7,068 acres	0 sites 0 acres	425 sites 522 acres

* Physical plus includes clipping seed head or plant, weed eater, mulch/tarp

- Base program inventory and monitoring activities apply to all alternatives.
- Water quality monitoring and soil profile examinations apply to alternative 2, 4 and 6.
- Appropriate LOPs for wildlife will be instituted for all alternatives.
- Annual Work Plans will specify treatments by site for any given year.
- Notification signs will be placed at herbicide treatment sites.
- Buffers for the chemicals for TES animals and plants.

V. Existing Environment

Modoc National Forest is located in northeastern corner of California. There are four Ranger Districts: the Warner Mountain/Devil's Garden Districts (Eastside Zone) and the Big Valley/Doublehead Districts (Westside Zone). Elevations range from about 4,000 feet to over 10,000 feet. The Warner Mountain and western Big Valley areas are steep and dotted with numerous perennial streams, while Devil's Garden and Doublehead are relatively flat and dissected by many ephemeral drainages with few perennial streams. The Forest supplies water to the Pit and the Klamath Rivers. The Forest has about 35,000 acres of developed wetlands, primarily on Devil's Garden District.

Common vegetation types on the forest include: various sagebrush communities, Jeffrey and ponderosa pine, western juniper, mixed conifer, lodgepole pine, as well as white and red firs. Aspen stands are common on the Warner Mountains and less common elsewhere. Dry grassy meadows are scattered throughout the Forest. Although noxious weed occurrences exist in all habitat types, they are focused primarily in sage/juniper and disturbed coniferous sites (i.e. landings, plantations, barrow pits, roadsides).

VI. Species Accounts

Many of the bald eagle nests across the Forest are monitored annually. The entire premise for a "May affect, not likely to adversely effect" determination for bald eagle hinges on the fact that District Wildlife Biologists are provided an annual plan of work, so they can conduct surveys prior to ground disturbing activities to protect actively nesting birds by utilizing survey timed appropriately (Design Standard DS-01). Subsequent annual Level 1 consultation between the Modoc National Forest and the Klamath Falls USFWS will be conducted as part of the terms of the Biological Assessment process. If birds are actively nesting, a maximum ½-mile line of site Limited Operating Period (LOP) will be instituted, where no activities will occur until young have successfully fledged (Design Standard DS-10).

Since the publication of the Draft Environmental Impact Statement (DEIS) for the Noxious Weed Treatment Project, Geographical Information System (GIS) coverages (data) have been updated with data through the 2004 field season; consequently, these coverages contain updated distribution information for federally listed species and weed occurrences. Therefore, there will be differences in the information provided between the DEIS and FEIS as well as the supporting documentation.

The following section provides a very brief account of current distribution and status of bald eagle, the characteristics of suitable habitat for bald eagle, and the amount of the distribution and types of habitat on the Forest. The 1997 Forest eveg data files (mdf_eveg97_04) were utilized for quantifying the habitat for two reasons. First, there was no change between the 1997 and 1999 data submitted for the Forest (S. Redar, pers. comm..). Second, we hoped to maintain as much consistency between the DEIS and FEIS, realizing there are numerous changes in all aspects of the project including number of weed occurrences, locations of animals, and proposed activities.

Bald eagle - The Modoc NF has bald eagle nest sites dispersed across the Forest based on data from April 2005. The territories are usually near lakes or streams with abundant fish and waterfowl food supplies. The trend for bald eagle has increased to the point that the US Fish and Wildlife Service is in the process of delisting this species. In certain areas within northeastern California, bald eagle nesting territories have exceeded recovery plan goals (J. Purvine and S. Clay, pers. comm.). There are five bald eagle territories that have the potential for noxious weed treatment on the Forest.

Suitable habitat for bald eagles includes large trees for perching and nesting near lakes and large rivers. Polite et al (1990) state that 87% of bald eagle nest sites in California are within 1 mile of water, and that bald eagles require "large bodies of water, or free-flowing streams with abundant fish..." for feeding. Shimamoto (1981) suggests that bald eagles require their food supply to be within a mile of their nest. According to Shimamoto and Newman (1981), a suitable feeding site is usually within 12 miles of bald eagle roosts; and winter roosts have not been found greater than 20 miles from nest sites. Winter roosts are isolated stands of late seral habitat on prominent topography near abundant winter food, which includes waterfowl and carrion. There are about 21,200 acres of occupied nesting habitat forest-wide, based on the Forest eveg data layer; there are 1,100 additional acres of potential habitat utilizing the same vegetation data.

Foraging habitat on the Modoc National Forest often includes lakes, reservoirs, and streams as part of the nest stand. Often agricultural lands such as Jess Valley are close by. Bald eagles are

frequently seen utilizing carrion (e.g. dead cows), waterfowl, and fish, however, ground squirrel and snake remains have also been found under active nests.

One of the threats to bald eagle has been the ingestion of poisonous substances (USDA 2007b). Between 1947 and 1970, reproduction in most bald eagle populations had declined drastically (various authors in USFWS 1986). Research in the late 1950's through the 1960's indicated that certain organochlorine pesticides (e.g. DDE the environmental form of DDT) caused excessive eggshell thinning thereby interfering with productivity (various authors in USFWS 1986). This trend has reversed with the decrease of these pesticides in the environment; however, there is still concern about potential effects to bald eagles from environmental contaminants (USFWS 1986).

Noise and potential harassment of eagles from management activities is also a concern. The most intensive disturbance would come from crews treating the weeds. In a model that assess the effects of disturbance on breeding bald eagles, researchers found eagles responded differently to stimuli depending on the type and duration of disturbance (Grubb and King 1991). Their findings indicated that pedestrian activities near active nests provided the greatest amount of disturbance and aircraft provided the least. They also found, the distance to the disturbance was the most important aspect of human disturbance. Many studies on eagle and human disturbance have recommended buffers be placed around eagles. The width of these buffers varies with time of the year and the type of disturbance. Grubb and King (1991) recommended that a minimum buffer of 600 meters be instituted around breeding bald eagles. Values of 500 meters (Fraser et al. 1985) and 450 meters (Knight and Knight 1984) for nesting eagles and feeding eagles, respectively, have also been recommended. The restriction used in the Modoc Land and Resource Management Plan (LRMP) exceeds these recommendations. The LRMP direction is to institute a limited operating period within a ¼ (no line of sight to nest) to ½ mile (line of sight to nest) radius around active nest trees from November to mid August; this period equates to nest maintenance, courtship, incubation, rearing, and fledging of young.

VII. Effects of the Proposed Action

Detailed information on Management Indicator Species (MIS) for the Modoc NF is documented in the Modoc National Forest MIS Report (USDA 2007b), which is hereby incorporated by reference. The information for bald eagle is found in the section below. The potential effects from the proposed weed treatment activities on habitat are addressed first and the potential effects to populations follow.

Bald eagle

The bald eagle is a terrestrial MIS as well as a federally listed species. Its California status is Endangered (1971, revised 1980) and Fully Protected.

Key Habitat Factor(s) for the Analysis: The proposed project, the removal of noxious weeds from Forest System Lands, will have no affect on large nest trees, pilot trees, or foraging habitat for bald eagle; bald eagle are not directly tied to the noxious weeds food cover or food. The potential effects consist of the potential ingestion of contaminated prey and disturbance to nesting birds.

Analysis Area for Project-level Effects Analysis: The analysis area for bald eagle is limited to the 22,300 acres of occupied and potential habitat on the forest. This habitat is mainly located on the Devil's Garden and Big Valley Ranger Districts with scattered location on the rest of the forest near suitable water bodies.

Alternative 1 (Current Management)

Direct and Indirect Effects to Habitat

The Forest Service currently treats 20 to 30 acres a year by physical methods. Currently, the Forest does not use herbicides to treat noxious weeds.

Implementing weed treatments under Alternative 1 would have no effect on bald eagle habitat. There will be no change in the current or future amount of nest or pilot trees by the treatment of noxious weeds. Habitat for prey would remain the same or potentially improve. Therefore, 0 % of the current bald eagle habitat in the analysis area would be affected by implementation of Alternative 1.

Cumulative Effects to Habitat. Because there is no direct or indirect effect to bald eagle habitat, there are no cumulative effects to bald eagle habitat under this alternative.

Alternatives 2 to 6

Direct and Indirect Effects to Habitat

GIS runs indicate that there are six noxious weed locations within ½ mile of bald eagle nests and one noxious weed occurrence within potential habitat on Forest Service lands. There is a maximum of 4.74 acres of physical treatments and a maximum 4.73 acres of herbicide treatments within occupied bald eagle habitat (Table 4). Chemical treatments could be significantly less if the 3.84 acres of Mediterranean sage occurrence is treated using physical methods.

There is an additional 0.08 acres of weeds that could be sprayed in areas typed as potential bald eagle habitat. The Canada thistle (WM009CIAR4) occurrence consists of a series of old beaver ponds that are mostly sedimented into meadow habitat and do not contain fish (M.Yamagiwa, pers. comm.). They were typed as potential bald eagle habitat, due to an artifact in the data set. Therefore, there will be no effect to bald eagle or its habitat by the treatment of this weed occurrence.

Table 4. Weed Treatments by Alternative in Occupied Bald Eagle Habitat

ID_Number	Weed Name	Acres	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
DG018SAAE	Mediterranean sage	0.53	physical	physical	physical	physical	P/H
DG019SAAE	Mediterranean sage	3.84	physical	physical	physical	physical	P/H
BV186ONAC	Scotch thistle	0.09	P/H	physical	P/H	physical	P/H
BV185ONAC	Scotch thistle	0.09	P/H	physical	P/H	physical	P/H
BV194ONAC	Scotch thistle	0.09	P/H	physical	P/H	physical	P/H
DG006CIAR4	Canada thistle	0.09	none	none	none	physical	herbicide
Total Herbicide			**0.27**	**0**	**0.27**	**0**	**4.73**
Total Physical			**4.64**	**4.64**	**4.64**	**4.74**	**4.64**

There will be no direct effects to bald eagle habitat by physical or chemical removal of weeds. No potential nest or pilot trees will be affected by this project.

Terrestrial prey habitat will not be affected by the treatment of current weed occurrences. The largest weed occurrence, the 3.84 acre site of Mediterranean Sage DG019SAAE, is along the river and the highway. It is not a homogenous patch of weeds, so there will be other plants that will remain on site once the areas are treated (B. Raymond and C. Beyer, pers. comm.). All the other weed occurrences are small enough that there will be sufficient prey for eagles to utilize. Using spray buffers that protect Threatened and Endangered Species (TES) aquatic species, as well as water quality should minimize potential contamination of fish.

There may be a beneficial effect to prey habitat by weed removal. Although bald eagles on the Modoc tend to forage on fish, waterfowl, and carrion, there have been remains of ground squirrels and other animals found under active nests. Eliminating weeds, thereby allowing native plants to

thrive, could improve potential cover and food for some types of prey.

Under Early Detection/Rapid Response management under Alternatives 4-6, additional weed occurrences could be treated. The Forest Service must consult with USFWS before treatment of any new sites in occupied bald eagle habitat is undertaken in order to mitigate potential negative effects. Therefore, there are no direct or indirect effects to bald eagle habitat expected by the implementation of any Alternative.

Cumulative Effects to Habitat Because there are no direct or indirect effects to bald eagle habitat, there are no cumulative effects to bald eagle habitat under this alternative.

Summary of Population Status and Trend at the Forest Scale
The Standards and Guidelines for bald eagle management found in the Modoc NF LRMP (as amended by the SNFPA 2001) focus on the implementation of the Pacific Bald Eagle Recovery Plan as well as monitoring nesting and wintering bald eagle status. The sections below summarize population status and trend data for the bald eagle. This information is drawn from the detailed information on population trends in the Modoc National Forest MIS Report (USDA 2007b), which is hereby incorporated by reference.

Population Status and Trend at the Bioregional Scale and Local Scales
Population monitoring data is collected by the Modoc NF as well as state and federal partners. The CDFG has coordinated annual, statewide breeding surveys since 1973 (CDFG 2006). During 1996, 1997, and 1998, 32 new bald eagle breeding territories were reported in California, resulting in a total of 180 territories known to have been occupied at sometime in the 1990s (Table 5) (CDFG 2006). The breeding range has expanded from portions of eight counties in 1981 to 27 of the California's 58 counties currently. In addition to a constant upward trend in population, productivity data for the past ten years show that the recovery plan target fledgling rate has been met and relatively constant over this period (SNFPA 2001). Bald eagles have been monitored on Breeding Bird Survey (BBS) routes throughout California. California-wide BBS data for the period of 1966-2004 classifies bald eagle as “Definitely increasing” (Siegel and DeSante 1999) with a significant increase of 12.3% (range 9.2 to 15.3) per year.

Table 5. Bald Eagle Breeding Population Data for California, 1990 - 1999

Year	No. of Known Territories	No. of Territories Surveyed	No. of Territories Occupied	No. of Young Produced	No. of Young Fledged Per Territory
1990	107	102	94	95	1.1
1991	111	105	90	82	1.0
1992	120	110	99	82	1.1
1993	127	116	102	103	1.1
1994	142	129	116	120	1.1
1995	146	129	105	89	0.9
1996	160	144	124	128	1.1
1997	171	160	142	140	1.1
1998	180	168	148	125	0.9
1999	188	180	151	138	1.0

At the Sierra Nevada scale for the period of 1966-2004, bald eagles were detected at two BBS routes within the Sierra Nevada with a non-significant increase of 52.3% (range 5.5 to 99.2%) per year. Although the Regional Credibility ranking is "Red", due to small sample size and low abundance, this increasing trend is consistent with the trends observed at the State and Survey-wide scales.

Locally, bald eagles have increased as well. Before the Modoc National Forest LRMP was finalized, there were 10 active bald eagle territories on the Forest. During the planning phase for the Modoc LRMP, a recovery goal of 21 territories of bald eagle was established (USDA 1991b). As of 2005, there were 33 territories found on the Modoc National Forest (Table 6). For more specific information on territories, see attachment C. The current amount of viable territories is well above the recovery plan and Forest LRMP goals. In the last 5 years, 31 out of 33 territories have produced off spring, often annually. The distribution for bald eagle has expanded since the time of the Modoc LRMP.

Table 6. Status of Bald Eagle Territories as of April 2006

Modoc National Forest Bald Eagle Breeding Territory Summary	
Number of BE territories before LRMP was finalized in 1991	10
Forest Recovery Goal for the # of BE territories per the LRMP Final EIS, pg. 3-98	21
Current Number of BE territories on Modoc National Forest as of 2005	33
Number of BE territories with documented nesting activity from 2000-2005	32
Number of BE territories which have produced young from 2000-2005	31

Effects of the Alternatives Considered within the Noxious Weeds FEIS.
Alternatives 3 and 5, as well as the physical portions of 2, 4, and 6 will have no effect to bald eagles for the following reasons. There will be no chemicals utilized to treat weeds; therefore there will be no chance of ingestion of contaminated prey. In addition, any weed sites to be treated in a given year will be surveyed in order to determine reproductive status. If nesting eagles are present, a Limited Operating Period will be instituted up to ½ mile line of sight around active nest sites to minimize disturbance to nesting birds.

Four out of thirty-three territories currently have weed occurrences that include the use of herbicides under Alternatives 2, 4, and 6. Assuming a maximum of 4.73 acres (0.02%) out of 22,300 acres of occupied and potential habitat forest-wide could be treated with herbicides.

As can be seen by the table below, the only chemical of concern for bald eagle is 2,4-D, which has hazard quotient ratings above 1.0 for a predatory bird consuming contaminated fish scenario. This table was generated based on information provided by Syracuse Environmental Research Associates, Inc. and given to the Modoc National Forest for their use in this project by David Bakke, Region 5 USFS Pesticide-Use Specialist and Invasive Plants Coordinator. No other herbicides at the rates proposed for treatment, have hazard quotient ratings over 1.0 for either consumption of contaminated fish or mammals (Table 7).

Table 7. Risk Assessment Values and Hazard Quotient Ratings for Acute Toxicity Levels for the Consumption of Contaminated Fish and Contaminated Small Mammals by a Predatory Bird by Chemical. (Acute scenario assumes the consumption of contaminated fish by piscivorous bird after an accidental spill of the pesticide into a pond.)

Chemical/Application Rate	Exposure Assessment Value mg/kg/day or mg/kg/event			Hazard Quotient Rating*		
	Central	Lower	Upper	Central	Lower	Upper
2,4 – D contaminated fish						
a) 1.5 lbs/ac	21.8	7.72	40.9	2.0	0.8	4.0
b) 2.0 lbs/ac	29.1	10.3	54.5	3.0	1.0	5.0
2,4 – D contaminated mammals						
a) 1.5 lbs/ac	4.8	4.8	4.8	0.5	0.5	0.5
b) 2.0 lbs/ac	6.46	6.46	6.46	0.4	0.4	0.4

Chemical/Application Rate	Exposure Assessment Value mg/kg/day or mg/kg/event			Hazard Quotient Rating*		
	Central	Lower	Upper	Central	Lower	Upper
Chlorsulfuron contaminated fish						
a) 1.0 oz/ac	0.059	0.02	0.1	4×10^{-5}	1×10^{-5}	6×10^{-5}
Chlorsulfuron contaminated mammals						
a) 1.0 oz/ac	0.2	0.2	0.2	1×10^{-4}	1×10^{-4}	1×10^{-4}
Clopyralid contaminated fish						
a) .25 lb/ac	0.09	0.03	0.1	1×10^{-4}	5×10^{-5}	3×10^{-4}
Clopyralid contaminated mammals						
a) .25 lb/ac	0.8	0.8	0.8	1×10^{-3}	1×10^{-3}	1×10^{-3}
Dicamba contaminated fish						
a) 1.0 lb/ac	0.24	0.08	0.4	0.02	6×10^{-3}	3×10^{-2}
b) 2.0 lbs/ac	0.4	0.17	0.899	0.04	0.01	0.07
Dicamba contaminated mammals						
a) 1.0 lb/ac	3.23	3.23	6.46	0.2	0.2	0.2
b) 2.0 lbs/ac	6.46	6.46	6.46	0.5	0.5	0.5
Glyphosate contaminated fish						
a) 3.75 lbs/ac	0.7	0.2	1.3	1×10^{-3}	5×10^{-4}	2×10^{-3}
Glyphosate contaminated mammals						
a) 3.75 lbs/ac	12.1	12.1	12.1	0.02	0.02	0.02
Triclopyr (Acid) contaminated fish						
a) 1.5 lbs/ac	0.452	0.16	0.848	8×10^{-4}	3×10^{-4}	2×10^{-3}
Triclopyr (Acid) contaminated mammals						
a) 1.5 lbs/ac	4.8	4.8	4.8	9×10^{-3}	9×10^{-3}	9×10^{-3}
Triclopyr (BEE) contaminated fish						
a) 1.5 lbs/ac	0.45	0.16	0.848	1×10^{-3}	4×10^{-4}	2×10^{-3}
Triclopyr (BEE) contaminated mammals						
a) 1.5 lbs/ac	4.85	4.85	4.85	0.01	0.01	0.01
NPE contaminated fish **	0.6	0.3	0.9	0.06	0.03	0.09

* Hazard Quotient is a value used to measure risk; values above 1 means there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.
** No contaminated mammal values available

The largest concentration of weeds that could be sprayed in one territory is 4.37 acres along Highway 299. These occurrences of Mediterranean Sage (DG018SAAE and DG019SAAE) do not have a history of foraging use, so ingestion of potentially contaminated materials in this territory is unlikely.

There are 0.36 acres remaining forest-wide in occupied bald eagle habitat that could be treated using herbicides. There is no concern for treating the 0.36 acres in occupied bald eagle habitat under Alternatives 2 and 4, because none of the weed occurrences use 2,4-D under either alternative. Under Alternative 6, only 0.27 acres forest-wide could be treated with 2,4-D either by itself or in a tank mix. Canada thistle (DG006CIAR4) is within 25 feet from the water's edge. Based on information from Tony Hawkes, USFWS, a no-spray buffer of 25 feet from the water's edge is used as the buffer distance for a "Not likely to adversely effect" determination and would be sufficient for bald eagle protection, especially given our spot treatment of weeds (Design Standard DS-13). It is unlikely to the point of being discountable that bald eagles could consume sufficient amounts of contaminated prey to cause any direct or indirect effects to these birds.

There is little potential of a spill effecting bald eagles on the remaining 0.27 acres forest-wide in an occupied bald eagle habitat for the following reasons. Weed occurrence of Scotch thistle (BV0186ONAC) is not within 100 feet of a stream, thereby negating the likelihood that a spill would reach fish bearing waters. The remaining 0.18 acres of weed occurrences are at least 25 feet from water; the buffer utilized under Design Standard DS-13 should minimize the potential for contamination of fish. Even using a worst case scenario, where the two weed occurrences of 0.09 acres (or 0.03% to 0.018% of a territory) in two separate bald eagle habitats had spills, it is not realistic that 100% of an eagles' diet would contain contaminated prey. Therefore, treatment of weed occurrences within occupied bald eagle habitat is not expected to effect bald eagle individuals

or the population of bald eagles on the Modoc NF.

Since nests are located within ½ mile of weed occurrences, there is a potential for disturbance to nesting birds. The largest concentration of weeds that could be sprayed in one habitat is 4.37 acres along Highway 299; it is at the edge of that particular territory and would not pose additional significant amount of disturbance. Other sites will be reviewed annually to determine potential for disturbance. Any potential disturbance will be mitigated by the use of a Limited Operating Period (LOP), if needed (DS 10). Annually, a program of work will be presented to biologists, so they can survey nests to determine if the nests are active and require LOPs to protect the bald eagle pair.

In light of the information presented above, it is unlikely that there will be direct or indirect effects to individual birds ("Not likely to adversely affect"); there will be no direct or indirect effects to the bald eagle population on the Modoc NF.

Cumulative Effects to Populations
Because there are no direct or indirect effects to the bald eagle population, there are no cumulative effects to bald eagle population under any action alternative.

Relationship of Project-Level Impacts to Forest-Scale Habitat and Bioregional-Scale Population Trends for the Bald Eagle

The cumulative effects of the Action Alternatives of the Noxious Weeds Project will result in no decrease in forest-wide habitat for bald eagle. There is no potential effect to the population on the Modoc NF. Therefore, the impact of the Noxious Weeds Project will not alter the existing forest-wide trend in habitat, nor will it change the existing bioregional-wide trend population distribution of the bald eagle.

VIII. Cumulative Effects from Other Lands

The following section provides additional cumulative effects analysis outside of a forest perspective, since the Project Area encompasses the entire Modoc National Forest. The information is from 2005 unless otherwise noted.

The two potential cumulative effects to bald eagles include: 1) disturbance to nesting birds and 2) a risk of contamination. There are no known bald eagle nests on agricultural lands in Modoc County; the bald eagle use in the valleys (Surprise Valley and the areas surrounding Alturas and Davis Creek) basically occurs in the winter. Physical and chemical treatments on federal lands would have Limited Operating Periods to protect nesting birds. Therefore, there would be no cumulative effect from disturbance for bald eagles.

There is a mixture of jurisdictions governing the lands that flank the Modoc National Forest. The Modoc National Forest abuts the Klamath and Shasta-Trinity National Forests on the western flank. The Lakeview, Alturas, and Surprise Field Offices (BLM) surround the Forest on the north, east and south flanks. The Modoc National Wildlife Refuge is close, but does not share a common boundary. Klamath Basin National Wildlife refuge has jurisdiction over several units including the Clear Lake National Wildlife Refuge, which is an inholding on the Doublehead District; the Tule Lake and Lower Klamath units lie at the northwestern corner of the Modoc National Forest. The rest of the areas consist of parcels of private lands, which include ranches and residences. The following paragraphs document the weed treatments on those various types of lands.

Klamath National Forest - Goosenest District: Currently, they are not conducting weed control activities in the areas directly adjacent to the Modoc National Forest (Medicine Lake Highlands), since there currently are no weed occurrences in these areas.

Lassen National Forest – Hat Creek District: This District treats 12.4 acres of noxious weeds with manual methods (hand pulling, weed wackers, and shovels) on the areas adjacent to the Modoc National Forest. There are 11 species targeted, including but not limited to: Dyer's woad, perennial pepperweed, Mediterranean sage, scotch thistle, Klamath weed, spotted knapweed, yellow starthistle, and squarrose knapweed.

Shasta-Trinity National Forest – Mc Cloud District: There are .4 acres of manual treatment for noxious weed control occurring on the portion of the District administered by the Lassen National Forest. The species include Klamath weed, scotch thistle, and yellow starthistle.

Klamath Basin National Wildlife Refuge - There is currently no treatment for weeds on the Clear Lake and Upper Klamath units. There were 1,240 acres treated on the Tule Lake Unit for treatment of a variety of weeds; herbicides included 2,4-D, Banvel, and Glyphosate (Aquaneat and Roundup). There were 935 acres treated on the Lower Klamath Unit in order to control pepperweed and poison hemlock; the herbicides used included Telar, 2,4-D, Banvel, Transline, and glyphosate (Roundup).

Modoc National Wildlife Refuge - In 2005, refuge personnel treated 400 acres to control whitetop, Canada thistle, Mediterranean sage, scotch thistle, and hemlock. The refuge uses Transline, 2,4-D, Telar, Rodeo, and Roundup. In addition, they do a limited amount of hand grubbing.

BLM-Alturas: - There were an estimated 100 acres of ground-based treatment in Modoc, Lassen, and Shasta Counties and 16 acres of aerial spraying in Modoc and Lassen Counties in 2005. The following weed species were treated: scotch thistle, yellow starthistle, squarrose knapweed, Dyer's woad, and Dalmatian toadflax. The chemicals used included: Telar, Transline, Garlon, dicamba, and 2,4-D (Weedone LV4). There are roughly 10 acres of noxious weeds controlled by hand; there are about 10 weeds species that are treated. In addition, they burned 470 acres of medusa head.

BLM- Surprise Valley - BLM personnel treated a total of 481 acres in 2005 by both chemical and hand grubbing on the 1.4 million acres on the Field Office lands. There were 107 acres treated on BLM; about 25 acres were hand-grubbed and the rest were sprayed with a combination of herbicides. Approximately 15 acres in California were sprayed with herbicides. Only herbicides approved for California were used on the lands directly adjacent to the eastern edge of the Forest. There were 350 acres of private inholdings that were treated in Nevada; about 75% of those areas were sprayed. Finally, there were 24 acres treated by hand on the Ft Bidwell tribal lands under BLM direction. Since the vast majority of the treatment areas are in Nevada (roughly 15 acres are in California), there would be no incremental affect on animals or habitats on the Modoc National Forest.

Lava Beds National Monument - Weed treatments on the Lava Beds National Monument consist of a combination of manual and chemical treatment using Round Up. The Park personnel treated 473 acres, spraying approximately 10% of the area. The main weed species of concern are mullein, hoarhound mint, bull thistle, and sweet clover.

BLM-Lakeview - This Resource Area uses both manual and chemical means to treat various noxious weeds. Twenty gross acres are sprayed annually along a common boundary with the Forest. The Field Office uses glyphosate to treat the following weed species: hoary cress, Mediterranean sage, Canada thistle, and leafy spurge.

Modoc County - There is roughly 10,000 acres a year that are treated with herbicides on private, commercial farm ground, and private forests for noxious weed treatment within Modoc County as a whole (Joseph Moreo, pers. comm.). In addition, 1,000 acres of regulatory noxious weed control occurs.

Pit River Tribe – There are 2 acres of scotch thistle that was treated by hand. Using Telar and Induce, 23 acres of scotch thistle, Canada thistle, Dyer's woad and 1 perennial pepperweed plant were treated. Yellow starthistle and Mediterranean sage were also treated with bio-controls in the form of insects.

Table 8. Summary of Approximate Annual Acres of Noxious Weed Treatment by Jurisdiction

	Modoc NF	Other Federal	Tribal*	Private	Total
Pre-Modoc FEIS					
Hand treatments	30	505	26	87	**648**
Herbicide treatments	0	2,753	23	11,263	**14,580**
Post Modoc FEIS					
Hand treatments	1,500**	505	26	87	**2,118**
Herbicide treatments	1,500***	2,753	23	11,263	**16,080**

* This data includes Ft. Bidwell and Pit River lands
** Maximum treated under Alternative 3
*** Maximum treated under Alternatives 2 and 4; Alternative 6 is a maximum of 522 acres/year

The majority of the bald eagles nesting on the Modoc NF forage on the forest, although there is some use of areas such as Goose Lake. Physical treatments obviously will not cause any potential poisoning issues. The agricultural fields become more important to foraging eagles in the winter when spraying does not occur.

There could be a maximum of 1,500 acres sprayed annually on the Modoc NF or 0.089% of the Forest. Under Alternative 6 that number would decrease to a maximum of 522 acres or 0.031% of the Forest. About 16,080 acres could have herbicides in roughly 3.5 million acres (Modoc NF and surrounding areas), which would be 0.46% of that gross area.

Given the fact that most eagle foraging occurs away of the weed infestations during the time of active spraying, the small percentage of the area that is treated, and the Design Standards that protect eagles on the Forest specific to the Noxious Weed Treatment Project, there are no cumulative effects expected to bald eagles with implementation of activities in the Noxious Weed Treatment Project in light of other jurisdictions.

IX. Determination

Based on the analysis of effects of the project, it is our determination that on this project:

Implementation of the Alternative 1 will have "No Effect" on the bald eagle or its habitat.

Implementation of the Alternatives 2, 4, and 6, "May affect, but is not likely to adversely affect" the bald eagle or its habitat.

Implementation of Alternatives 3 and 5 and the physical treatments under 2, 4, and 6 will have a "No Effect" determination, if appropriate surveys and LOPs are followed for actively nesting birds.

X. Management Requirements and Constraints

A. Any spills of herbicide or materials shall be immediately contained and removed from the site, including any contaminated soil. Removal shall be monitored by a certified Hazardous Materials Specialist.

B. At the beginning of the season, District Biologists will review the location of all weed occurrences targeted for treatment in order to determine bald eagle occupancy. If a Limited Operating Period (LOP) is needed, activities will not be allowed between November 2 to August 15,

within ½ mile line of sight of any nesting bald eagle (as per USFWS mitigation, LRMP direction (page 4-26), and/or Bald Eagle Recovery Plan direction).

XI. Personal Communications

Cheryl Beyer. Forest Botanist, Modoc National Forest. Alturas, CA.

Steven Clay. Refuge Manager, Modoc National Wildlife Refuge, U S Fish and Wildlife Service. Alturas, CA.

Joseph Moreo. Modoc County Agricultural Advisor. Alturas, CA.

Jennifer Purvine. District Biologist, Challis Ranger District, Salmon Challis National Forest. Challis, ID.

Barbara Raymond. Range Conservationist, Big Valley Ranger District. Adin, CA

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Attachment A

United States Fish and Wildlife Service candidate species

Pacific fisher – Pacific fisher (*Martes pennanti*) was dismissed from analysis for the Modoc National Forest Noxious Weeds Project based on information located in the Sierra Nevada Forest Plan Amendment (2001) Final Environmental Impact Statement, Volume 3, Chapter 3, part 4.4, page 4, stating the Modoc National Forest is not within the distribution for this species. The assessment conducted for the Sierra Nevada Forest Plan Amendment was based on the vast amount of work conducted by Dr. William Zielinski, USDA Forest Service, Region 5 Forest Carnivore Expert, and others.

Yellow-billed cuckoo – The yellow-billed cuckoo (*Coccyzus americanus*) occurs on the USFWS species list for Modoc County, however, there has been no record of this species for the Modoc National Forest in any of the data sets available to the Forest. First, there are no records in the FAUNA database, although a search was initiated for all birds found on the Modoc National Forest bird list. Second, the distribution for cuckoo does not include the Modoc National Forest in the EBIRD, BBS, and NatureServe databases found at their respective websites. Third, Modoc County was not included in the historical distribution of cuckoos for California in the petition to list this species dated 25 July 2001. Finally, cuckoos have not been detected during recent riparian bird surveys conducted in the most similar habitat to where it has been found. Point Reyes Bird Observatory and Great Basin Bird Observatory personnel conducted surveys on Bureau of Land Management lands from 1997 to 1999 and from 2002 to 2004. Cuckoo has not been detected during Breeding Bird Surveys conducted in Surprise Valley, where a historic account noted their presence.

In California, the yellow-billed cuckoos' presence is limited to the breeding season. Habitat for this species includes dense stands of various riparian species including willow (*Salix sp.*) and cottonwood (*Populus sp.*). Patch size of habitat inhabited by cuckoos along the Sacramento River was 25 acres and greater (Gaines 1974 and Laymon et al 1993 in listing package) and 99 acres (Halterman 1991 in the listing package). Home ranges on the south fork of the Kern River were roughly 42 acres (Laymon et al 1993 in the listing package).

If one were to assume that cuckoos did inhabit the Forest, the best potential habitat would have been modeled under the yellow warbler query. Under that query, roughly 53,000 acres of willow habitat in conjunction with perennial creeks occurs on the Forest. Of that acreage, 0.2 acres could be treated (0.1 acres each) under the alternatives analyzed in the FEIS.

Yellow-billed cuckoos are primarily insectivorous and forage mainly on tree and shrubs branches (Hughes 1999). Based on a study conducted in California, the birds most frequently foraged above 3 meters (Laymon 1980 in Hughes 1999). Therefore, it would be unlikely, to the point of being discountable, that cuckoos would consume sufficient quantities of contaminated insects to sustain any effect.

Given the lack of compelling presence data, the miniscule amount of habitat potentially treated and the fact that individual birds would not sustain any effects from treatment activities, there is a "No effect" determination for this species.

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ATTACHMENT C

Modoc National Forest Bald Eagle Territories through April 2006

Bald Eagle Territory Data for the Modoc National Forest Data Includes Results through the 2005 Bald Eagle Breeding Season					
Ranger District	**Territory**	**Year Territory Discovered**	**Last Year Occupied**	**Last Year Active (Most Recent Nesting Attempt)**	**Last Year With Young**
DG	Avanzino Reservoir	1995	2005	2005	2005
DG	Baseball Reservoir	2000	2005	2005	2005
DG	Beeler Reservoir	1981	2005	2005	2000
DG	Big Sage	1992	2005	2003	2003
DG	Duncan South Platform	1992	2005	2005	2005
DG	Fairchild Swamp	2000	2001	2000	Unknown
DG	Lost Valley	1996	2004	2004	2004
DG	Meteorite Stock Tank	1987	2005	2005	2004
DG	Reservoir F	1983	2005	2005	2004
DG	Sally's Camp	1995	2005	2003	2003
DG	Weed Valley *	2004	2005	2005	2005
DG	Wildhorse Reservoir	1973	2005	2005	2003
DH	Lost River	1994	2005	2005	2004
DH	Medicine Lake	1920s	2004	2004	2004
DH	Red Lake	2001	2005	2005	2005
DH	Willow Creek	1977	2005	2005	2003
BV	Ash Creek	1988	2005	2005	2005
BV	Canby Bridge	2000	2005	2005	2004
BV	Gerig Spring	2003	2005	2005	2005
BV	Hanging Rock	1989	2005	2002	2002
BV	Little Egg Lake	1976	2005	2004	2004
BV	Said Valley Reservoir	1994	2003	2003	2001
BV	Stone Cole Bridge	1994	2005	2005	2004
BV	Upper Roberts Reservoir	1975	2005	2005	2005
BV	Warm Springs	1991	2005	2005	2005
BV	White Reservoir	1994	2005	2005	2005
WM	Blue Lake	1988	2005	2001	2001
WM	Briles Reservoir	1997	2005	2005	2005
WM	Clear Lake/Mill Creek	2000	2005	2005	2001
WM	Cottonwood Creek **	1996	U	U*	U
WM	Parker Creek	2002	2005	2005	2005
WM	West Valley Reservoir	2005	2005	2005	2005
WM	Willow Creek	2002	2005	2005	2005

***** Weed Valley – The first active nest for this territory was found in 2004. In 1981, the area was first recognized as bald eagle territory by Doug Thayer, California Department of Fish and Game Biologist, during aerial eagle surveys, although it was considered as unoccupied bald eagle at that time. The area has been monitored through 1985, and no nesting activity was detected until 2004.
****** Cottonwood Canyon – The nest site has been checked several years since it was last active; however, thorough check of canyon has not completed to date.

Appendix V: Terrestrial Wildlife Management Indicator Species

Terrestrial Management Indicator Species Report

Noxious Weed Treatment Project

Modoc National Forest

Prepared By _____ Date: _____

Mary Flores
Zone Biologist
Warner Mountain/Devil's Garden Ranger District

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1. Introduction

The purpose of this report is to evaluate and disclose the impacts of the Noxious Weed Treatment Project on the Management Indicator Species (MIS) identified in the Modoc National Forest (NF) Land and Resource Management Plan (LRMP) (USDA 1991a). This report documents the effects of six alternatives for the Noxious Weed Treatment Project on the habitat of selected terrestrial MIS. Detailed descriptions of the Noxious Weed Treatment Project alternatives are found in Chapter 2 of the Noxious Weed Treatment Project Final Environmental Impact Statement (FEIS) (USDA 2007a).

MIS are animal species identified in the Modoc NF LRMP (USDA 1991a, Pages 4-25 to 4-29), which was developed under the 1982 National Forest System Land and Resource Management Planning Rule (1982 Planning Rule) (36 CFR 219). Guidance regarding MIS set forth in the Modoc NF LRMP directs Forest Service resource managers to (1) at project scale, analyze the effects of proposed projects on the habitats of each MIS affected by such projects, and (2) at the national forest (forest) or bioregional scale, monitor populations and/or habitat trends of forest MIS, as identified by the LRMP.

1.a. Direction Regarding the Analysis of Project-Level Effects on MIS

Project-level effects on MIS are analyzed and disclosed as part of environmental analysis under the National Environmental Policy Act (NEPA). This involves examining the impacts of the proposed project alternatives on MIS habitat by discussing how direct, indirect, and cumulative effects will change the quantity and/or quality of habitat in the analysis area.

These project-level impacts to habitat are then related to broader scale population and/or habitat trends (generally national forest, but in some cases the bioregional scale). The appropriate approach for relating project-level impacts to broader scale trends depends on the terms in the LRMP. Under the 2005 National Forest System Land Management Planning Rule (2005 Planning Rule) (70 Federal Register 1060, January 5, 2005), national forests with LRMPs developed under the 1982 planning rule (including the Modoc NF) “may comply with any obligations relating to MIS by considering data and analysis relating to habitat unless the plan specifically requires population monitoring or population surveys for the species” (36 CFR 219.14(f)).

Hence, where the Modoc NF LRMP requires population monitoring or population surveys for a MIS, the project-level effects analysis for that MIS must be informed by population monitoring data, which are gathered at the forest or bioregional scale. Population monitoring and survey data are not generally gathered for site-specific projects, consistent with the 2005 Planning Rule, which states, “Site-specific monitoring or surveying of a proposed project or activity area is not required, but may be conducted at the discretion of the Responsible Official” (36 CFR 219.14(f)). For certain MIS, the Modoc NF LRMP does not require population monitoring or surveys; for these MIS, project-level MIS effects analysis can be informed by forest-scale habitat monitoring and analysis alone. The Modoc NF LRMP requirements for MIS analyzed for the Noxious Weed Treatment Project are summarized in Section 3 of this report.

Therefore, adequately analyzing project effects to MIS (including Threatened, Endangered, and Sensitive (TES) species that are also MIS) involves the following steps:

- Identifying which MIS have habitat that would be either directly or indirectly affected by the project alternatives; these MIS are potentially affected by the project.

- Identifying the LRMP forest-level or bioregional-level monitoring requirements for this subset of forest MIS.
- Analyzing project-level effects on habitats or habitat components for this subset of forest MIS.
- Discussing forest or bioregional scale habitat and/or population trends for this subset of forest MIS.
- Relating project-level impacts on MIS habitat to habitat and/or population trends for these MIS at the forest or bioregional scale.

These steps are described in detail in the Pacific Southwest Region's draft document "MIS Analysis and Documentation in Project-Level NEPA, R5 Environmental Coordination" (USDA 2006a). The Management Indicator Species (MIS) Report for the Modoc NF Noxious Weeds FEIS documents application of the above steps to select and analyze potential effects to MIS from the implementation of activities for this project.

1.b. Direction Regarding Monitoring of MIS Population and Habitat Trends at the Forest or Bioregional Scale

Forest or bioregional scale monitoring requirements for the Modoc NF's MIS are found in two documents. The first is the Monitoring Plan of the LRMP (USDA 1991, Chapter 5, pages 5-16 to 5-20); the second is in Appendix E of the Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement (FEIS) (USDA 2001), as adopted by the 2004 Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD) (USDA 2004).

Habitat Status and Trend

The Modoc NF LRMP (USDA 1991a) requires forest-scale monitoring of habitat status and trend for select Management Indicator Species (MIS) on the Modoc NF; for MIS with habitat potentially affected by the Noxious Weed Treatment Project, these habitat monitoring requirements are summarized in Table 1 of this report. Habitat status is the current amount of habitat on the Modoc NF. Habitat trend is the direction of change in the amount of habitat between the time the LRMP was approved and the present. Specific habitat models were developed for each species and are explained under the section "3b. How MIS Monitoring Requirements are Being Met".

Habitats are the vegetation types (e.g. mixed conifer forest) and/or other features (e.g. lakes, cliffs, snags) required by a MIS for breeding, cover, and/or feeding. For each terrestrial wildlife MIS, habitat relationship models were developed utilizing a combination of sources including Geographical Information Systems data, California Wildlife Habitat Relationship (CWHR)(Zeiner et al 1990 Volumes II and III) as well as scientific literature. These habitat models include spatial ecological and vegetation layers created from remote-sensing imagery obtained at various points in time, which are verified using photo-imagery, on-the-ground measurements, and tracking of vegetation-changing actions or events.

Population Status and Trend

Population monitoring requirements for the MIS of the Modoc NF are identified in either Appendix E of the Sierra Nevada Forest Plan Amendment (SNFPA) FEIS (USDA 2001), as adopted by the 2004 Sierra Nevada Forest Plan Amendment Record of Decision (ROD) (USDA 2004) and the Monitoring Plan of the LRMP (USDA 1991a, Chapter 5, pages 5-16 to 5-20).

For Modoc NF MIS that are listed in Appendix E of the SNFPA FEIS (USDA 2001), population monitoring requirements **have been changed from those found in the Modoc NF LRMP** (USDA 1991a) **to those identified in Appendix E of the SNFPA**. The population monitoring requirements for the MIS with habitat potentially affected by the Noxious Weed Treatment Project are summarized in Table 1 of the Modoc Noxious Weeds MIS report. All population monitoring data are collected and/or compiled at the forest or bioregional scale, which is consistent with the LRMP direction as amended by the SNFPA and the 2005 Planning Rule; this direction states that "site specific monitoring or surveying of a proposed project or activity area is not required".

Population status is the current condition of the MIS related to the type of monitoring data (population measure) required in the LRMP for that MIS. Population trend is the direction of change in that population measure over time.

As discussed in Appendix E of the 2001 SNFPA (USDA 2001), there is a wide range of monitoring data that can be used to describe the status and trend (or change) of populations. This data ranges from describing changes in distribution based on presence data to describing changes in population structure. A distribution population monitoring approach is identified for most MIS listed in Appendix E (Tables E-9 to E-11). Distribution population monitoring consists of collecting presence data for the MIS across a number of sample locations; over time, changes in the distribution of the MIS can be identified and tracked. Presence data are collected using a number of direct and indirect methods including but not limited to: population surveys, bird point counts, and tracking number of hunter kills.

Presence data for MIS are collected and consolidated by the Modoc NF in cooperation with State and Federal agency partners (including the California Department of Fish and Game and USDI Fish and Wildlife Service) or conservation partners (e.g. Partners in Flight). The Modoc NF's MIS monitoring program for species typically hunted, fished, or trapped was designed to be implemented in cooperation with California Department of Fish and Game (CDFG), consistent with direction in the 1982 Planning Rule to monitor forest-level MIS population trends in cooperation with state fish and wildlife agencies to the extent practicable (36 CFR 219.19(a)(6)). To be biologically meaningful for wide-ranging MIS, presence data are collected and tracked not only at the forest scale, but may also be followed at the range-wide, state, province (Sierra Nevada), or important species management unit levels (for example, Deer Assessment Unit). Population data collected at various scales are important to both assess and provide meaningful context for population status and trend at the forest scale.

For MIS such as American marten, Appendix E of the 2001 SNFPA FEIS and Chapter 2 of the 2004 SNFPA SEIS identify other population monitoring requirements. For these species, population data are collected, compiled, and reported at the bioregional (Sierra Nevada) scale, <u>not</u> the forest-scale (USDA 2006b).

2. Selection of Project level MIS

Management Indicator Species (MIS) for the Modoc NF are identified in the Modoc NF LRMP (USDA 1991a, pages 4-25 to 4-29). Because the Noxious Weed Treatment Project includes the entire Forest as the Project Area, all of the MIS identified in the Modoc NF LRMP are analyzed either in this document or the associated Biological Assessment or Biological Evaluation prepared for the Noxious Weed Treatment Project.

3. LRMP Monitoring Requirements for Terrestrial MIS Selected for Project-Level Analysis

3.a. MIS Monitoring Requirements

Monitoring requirements for Modoc NF terrestrial MIS are located in two separate documents: the Modoc NF LRMP (USDA 1991a, Chapter 5, pages 5-16 to 5-21) and Appendix E of the Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement (USDA 2001), as adopted by the 2004 Sierra Nevada Forest Plan Amendment ROD (USDA 2004). As discussed in the introduction to this report, forest-scale habitat monitoring requirements are the same listed in the Monitoring Plan of the Modoc NF LRMP (USDA 1991a). However, the population monitoring requirements have been amended from those found in Chapter 5 of the Modoc LRMP to the requirements outlined Appendix E of the SNFPA FEIS (USDA 2001).

The foundation of the Noxious Weeds FEIS MIS analysis is found in the Modoc National Forest Management Indicator Species Report and its associated species accounts (USDA 2007b). The information on habitat and population status pertinent to the Noxious Weeds FEIS is summarized below for the terrestrial non-TES MIS, who may be potentially affected by the implementation of various weed treatments (Table 1). For potential effect to federally listed terrestrial wildlife species, see the terrestrial wildlife Biological Assessment prepared for this project. For information concerning terrestrial wildlife Forest Service sensitive species, see that Biological Evaluation for this project.

Table 1. Modoc NF LRMP MIS Requirements for the Selected Project-Level MIS for the Noxious Weeds Project (USDA 1991a as amended by SNFPA 2004)

MIS	MIS MONITORING REQUIREMENTS	
	Habitat [b]	Population [a]
Blue/Sooty Grouse	Vegetation mapping and application of Modoc LRMP standards for vegetation diversity, dead and downed materials, and the Riparian Area Management Prescription (specifically aspen management)	Distribution population
Canada Goose	Livestock utilization measurements and through the application of the Riparian Area Management Prescription	Distribution population
Golden Eagle	Habitat utilization assessment and management of nest sites	Distribution population
Hairy Woodpecker	Snag, down log transects; vegetation mapping as well as the application of standards for snags and vegetation diversity	Distribution population
Mallard	Livestock utilization measurements and through the application of the Riparian Area Management Prescription	Distribution population
Mule Deer	Vegetation sampling and mapping as well as managing cover to forage ratios, forage requirements, and water developments	Distribution population
Osprey	Habitat utilization assessment and maintain large trees and snags near nest sites and at the water's edge	Distribution population
Pileated Woodpecker	Snag transects, down log transects, vegetation mapping and manage habitats for late seral characteristics including snags	Distribution population
Prairie Falcon	Habitat utilization assessment	Distribution population
Pronghorn	Habitat surveys including ecological condition (e.g. vegetation mapping, condition and trend, etc.) and manage forage and fences to meet pronghorn needs	Distribution population

MIS	MIS MONITORING REQUIREMENTS	
	Habitat [b]	Population [a]
Red-breasted Sapsucker	Vegetation sampling, photo points and through the application of the Riparian Area Management Prescription	Distribution population
Red-naped Sapsucker	Vegetation sampling, photo points and through the application of the Riparian Area Management Prescription	Distribution [c]
Western Gray Squirrel	Vegetation mapping and manage habitat by Forest Standards and Guidelines, particularly for oaks.	Distribution population
Yellow Warbler	Vegetation sampling, photo points and through the application of the Riparian Area Management Prescription	Distribution population

[a] Sierra Nevada Forest Plan Amendment, Appendix E

[b] Modoc NF LRMP (USDA Forest Service 1991a)

[c] Monitoring requirements are in essence the same as the "Distribution population" data

3.b. How MIS Habitat and Population Monitoring Requirements are Met

Detailed information habitat suitability and condition for MIS is found in the Modoc NF Modoc National Forest MIS Report and associated species accounts (USDA 2007b), which are hereby incorporated by reference. Habitat for various species was modelled using the 1997 Forest eveg data files (mdf_eveg97_04). Although the 1999 vegetation data is the most current data, the 1997 coverage was utilized, because there was no appreciable change between the 1997 and 1999 vegetation data (S. Redar, pers. comm.).

Blue/Sooty Grouse

The habitat trend on the Modoc NF for blue grouse, now known as sooty grouse, was determined by querying the following vegetation types: mixed conifer (both the MF and MP types), white fir and red fir, size classes 3 to 6 and densities 3 to 7. Since 1991, blue grouse habitat has been stable to increasing. During the queries made in 1991 for the Modoc LRMP (USDA 1991a), biologists estimated that there were 112,000 acres of nesting habitat. The query of 1997 estimated that there were approximately 161,000 acres of nesting and roosting habitat on the Forest.

The population monitoring requirements for blue grouse are based on distribution. The data comes from work by the state as well as incidental sightings from forest personnel. The California Department of Fish and Game regularly assesses the population status and trend to provide documentation of the potential environmental impacts of continuing hunting of resident game birds in California, including blue grouse (CDFG 2004). This analysis is based on hunter surveys and blue grouse research. CDFG determined that "the removal of individual animals from resident game bird populations statewide will not significantly reduce those populations and will, therefore, not have a significant environmental impact on resident game birds" (CDFG 2004, page 7). They further concluded that annual production and survival of young replaces the individuals removed by natural forces and hunting (Ibid). Based on the information from various sources, the distribution on the Modoc NF appears to be the same now as in 1991 with blue grouse found in coniferous stands throughout the Forest.

Canada Goose and Mallard

The Modoc has had an extensive wetland development program across the Forest for the last 30 years including the construction of nesting islands and structures. Currently, potential habitat for Canada goose on the Modoc National Forest includes 280 wetlands covering approximately

35,000 surface acres. This program has led to an upward trend in both habitat availability and number of successful nesting pairs.

There are approximately 19,000 acres of potential nesting habitat on the Modoc National Forest that can support Canada goose. This information comes from querying the mdflakes87_2 layer and clipping the eveg layer at 50 yards from the water's edge. We then subtracted the water value to retain the vegetation types. The dominant vegetation types included, but are not limited to: juniper, wet meadows and sedges, eastside pine, and sagebrush.

The population monitoring requirements for Canada goose are based on distribution. The data comes from flights by the USFWS as well as surveys and incidental sightings from forest personnel. Based on the information from various sources, the distribution for Canada goose on the Modoc NF appears to have expanded since the time of the Forest Plan, because of the wetland development program.

As the case with Canada goose, mallard habitat has also expanded on the Modoc NF. Based on an analysis of current vegetation and water impoundments, there are 54,292 acres of potential mallard nesting habitat on the Forest (111,037 total acres modeled-56,449 acres of water). This information comes from querying the mdflakes87_2 layer and clipping the eveg layer at 400 feet. The water value was subtracted to display just the vegetation types. A 400 foot buffer was used to address Richard Shinn's (the local California Department Fish and Game Biologist's) observations that hens are nesting further than the 100 yard figure cited in Bellrose (1980). Dominant habitats include: juniper, eastside pine, sage, and wet meadows.

The population monitoring requirements for mallard are also based on distribution. Information is collected simultaneously for geese and ducks during surveys. Mallard data comes from work by the USFWS as well as surveys and incidental sightings from forest personnel. Based on the information from various sources, the distribution for mallard on the Modoc NF appears to have expanded since the time of the Forest Plan, because of the wetland development program.

Golden Eagle and Prairie Falcon

Occupied habitat for golden eagles on the Forest was determined by quantifying the vegetation types within 0.5 mile of each known nest site using GIS. Based on this model, roughly 28,014 acres of occupied habitat is present on the Modoc NF. Within 0.5 mile of golden eagle nest sites, the dominant vegetation types are sagebrush, eastside pine, juniper, and mixed conifer. To approximate potential habitat, the raptor management land allocation polygons (per the Modoc LRMP, USDA 1991a) were queried for acreage of potentially suitable foraging and nesting habitat for golden eagles. Using this query, there are an additional 65,870 acres of potential golden eagle habitat on the Modoc NF. The dominant vegetation types comprising potential habitat are eastside pine, juniper, sagebrush, and bitterbrush. Since implementation of the Forest Plan in 1991, habitat for the golden eagle has been generally stable.

The population monitoring requirements for golden eagle are based on distribution. The Modoc NF uses data collected on and adjacent to the Forest for project and forest level planning, because of the large home range of the species. Modoc NF staff started monitoring golden eagles as early as 1974, and has continued through the present. Monitoring is conducted annually for sites that are near planned projects. Monitoring has involved checking known breeding territories for occupancy and production in addition to intensive stand searches in areas of golden eagle sightings. At the time of the FEIS, there were 17 active territories on the Modoc NF (USDA

1991b page 3-105). As of 2006, there have been 31 golden eagle breeding territories identified across the Modoc NF. The golden eagle distribution has maintained stable since the time of the LRMP, although there are more known active nest sites.

Prairie falcons are found uncommonly throughout the Modoc NF in cliff and scarp habitats. There are 5,678 acres within ½ mile of nest sites. Dominant vegetation includes big and low sagebrush, eastside pine, and western juniper. Potential nesting habitat (aka cliffs) could not be modeled utilizing the best data currently available, the Digital Elevation Models (DEM). The following explanation is from Sean Redar, Modoc NF GIS Coordinator based on his modeling attempts. The accuracy of the forest DEM is 10 meters square resolution (300 feet by 300 feet), which is too gross to find the steep cliff faces. In addition, the elevation data consists of a set of sums not discrete values, so the cliff faces would be masked within cells. Based on the first set of queries, the derived model did not capture the known prairie falcon nest locations. When additional queries were made, the model generated showed almost the entire Forest contained suitable cliff data, which is not true. Therefore, the Forest does not have the data required to model cliff faces/potential habitat at this time. Regardless of the outcome of the modeling, the amount of occupied or potential nesting habitat has not been altered by any projects or recreational activities forest-wide. Therefore, habitat for the prairie falcon has been stable on the Forest since the time of the LRMP.

The population monitoring requirements for prairie falcon are based on distribution. Monitoring has been conducted annually for some sites, especially those eyries that are near planned projects. Monitoring has involved checking known breeding territories for occupancy and production. During the time of the LRMP, there were 21 active eyries on the Modoc; the majority of these sites were located on the WMRD. There were an additional 38 potential nest sites scattered throughout the Forest with the highest concentration on the WMRD. Forest personnel conducted a helicopter monitoring program in conjunction with the proposed cross fostering program for peregrine falcon right after the LRMP was released. Currently, monitoring is restricted to project planning and incidental sightings. There are currently 13 nest sites that are tracked on the Modoc National Forest; however, the distribution of prairie falcon has not changed since the time of the LRMP.

Hairy and Pileated Woodpeckers

The habitat trend on the Modoc NF for hairy woodpecker was determined by querying the following vegetation types: mixed conifer, white fir, red fir, and aspen; size class 3-5, and density 2-4. The query of 1997 vegetation data estimated that there were approximately 153,200 acres of nesting habitat on the Forest. Since 1991, hairy woodpecker habitat has been stable.

The population monitoring requirements for hairy woodpecker are based on distribution. Data for hairy woodpecker comes from a variety of surveys: turn of the century surveys of avi-fauna (data from the University of California, Berkeley Natural History Collection), Breeding Bird Survey routes, project generated stand searches and point counts as well as the Pacific Southwest Research Station (PSW) cavity nesting bird study (Laudenslayer 2002). The distribution on the Modoc NF appears to be the same now as in 1991.

The habitat trend on the Modoc NF for pileated woodpecker was determined by querying the following vegetation types: mixed conifer, white fir and red fir, size classes 3 to 6 and densities 4 to 8. The query from 1997 vegetation data estimated that there were approximately 173,500 acres

of nesting habitat on the Forest. Since 1991, pileated woodpecker habitat has been stable in areas amended by the SNFPA to potentially decreasing due to wildfires and insect outbreaks.

The population monitoring requirements for pileated woodpecker are based on distribution. Data for pileated woodpecker consists of presence information from Forest Service point counts and various individual observers' incidental sightings. Pileated woodpeckers were not detected during any of the BBS stations run in or adjacent to the Modoc NF, but the Modoc NF was included in the range for CWHR (Zeiner et al. 1990a). The distribution on the Modoc NF appears to be the same now as in 1991.

Mule Deer and Pronghorn Antelope

Modeling for mule deer was based on taking the vegetation layer and subtracting water and barren polygons, which would not provide foraging habitat or cover for deer. There are 1,587,564 acres of potential deer habitat on the Modoc NF, which includes all vegetation types. Grazing, fire suppression, and timber management contributed to the decline in habitat capability (USDA 1991b. Page 3-111).

The population monitoring requirements for mule deer are based on distribution. Population monitoring data for deer is tracked by the California Department of Fish and Game. The Forest also uses incidental sightings in tracking deer distribution across the Forest. The distribution of deer is the same as was reported in the Modoc LRMP. However, numbers on the trend line for the data show a downward trend, although not the significant downward trend as indicated by the r^2 value near 0.5. The counts do show fluctuation in annual numbers that vary from +30% to -35% from the median value for the period. Therefore, the trend thus appears to fluctuate, but does not show a sustained strong downward or upward movement.

Modeling for pronghorn antelope was based on polygons of suitable habitat from the California Department of Fish and Game, Modoc NF, and Bureau of Land Management. The vegetation layer was clipped to the boundary of these polygons. There are 791,867 acres of potential pronghorn antelope habitat on the Modoc NF. The dominant habitat types include various sage and shrub types, eastside pine, as well as juniper. Current habitat trend is stable to decreasing. Encroachment of junipers into open areas and the increasing density of trees in general on the Forest have resulted in decreased habitat for pronghorn.

The population monitoring requirements for pronghorn antelope are based on distribution. Data on pronghorn numbers are based on input from California Fish and Game surveys in addition to incidental sightings made from US Forest Service personnel. The distribution of antelope is the same as reported in the Modoc LRMP. Since the 1992-93 winter kill, the antelope population has not increased, but has stabilized in the last few years.

Osprey

Osprey habitat includes both occupied and potential habitat. The occupied habitat was derived by buffering the nest sites by one-half mile, and then clipping the vegetation layer to the nest circles. Potential habitat modeling for osprey consisted of buffering the lakes by 1,300 feet and selecting for conifer stands that were size class 4 and 5. There are about 13,238 acres of occupied habitat within .5 miles of nest sites and an additional 1,419 acres of potential habitat on the Modoc National Forest. Increased retention of large trees has provided improved nest site selection. Enhancing range and fisheries conditions has improved potential foraging habitats. In general, habitat has improved for this species since the 1991 Modoc LRMP was prepared.

The population monitoring requirements for osprey are based on distribution. Osprey have been recorded from at least 5 of the 19 BBS routes on or adjacent to the Forest. Additional information comes from Modoc NF project specific intensive stand searches and monitoring of known territories. There were seven active nesting territories at the time of preparation of the Forest LRMP FEIS (USDA 1991b). Currently, there appear to be at least 14 territories or twice the number than occurred in 1991 with the distribution expanding since the time of the LRMP.

Red-breasted and Red-naped Sapsuckers

There are 107,300 acres of potential habitat on the Modoc National Forest that can support red-breasted sapsuckers. This query includes aspen, eastside pine, and mixed conifer.

The population monitoring requirements for red-breasted sapsucker are distribution monitoring. Red-breasted sapsuckers have been detected from 1910 to the present during various surveys. Historical records of specimens collected from the Modoc National Forest at the Berkeley Natural History Museum date back to 1910 and the 1940's. More recently, red-breasted sapsucker presence on the Modoc National Forest has been noted under the following efforts: project generated stand searches conducted for various species, the Pacific Southwest Research Station (PSW) cavity nesting bird study (Laudenslayer 2002), and during province and forest level surveys for willow flycatcher. The current distribution of red-breasted sapsucker is similar to the pattern described in the Final Environmental Impact Statement of the Modoc LRMP (USDA 1991b).

Potential vegetation for red-naped sapsuckers has been modeled utilizing eveg data and distance parameters to create buffers in ARCMAP. According to the parameters in the query, there are 45,600 acres of potential habitat on the Modoc National Forest including eastside pine, lodgepole pine, and mixed conifer polygons, adjacent to aspen habitats. Between management efforts and the protection for riparian hardwood vegetation under the Sierra Nevada Forest Plan Amendment (USDA 2004), the future trend for aspen is stable to potentially increasing on the Modoc National Forest.

The population monitoring requirements for red-naped sapsucker are distribution monitoring. Red-naped sapsuckers are encountered infrequently on the Modoc National Forest; the majority of the sightings are on the Warner Mountain Ranger District. Red-naped sapsucker presence on the Modoc NF has been noted under the following efforts: project generated stand searches conducted for various species, the Pacific Southwest Research Station (PSW) cavity nesting bird study (Laudenslayer 2002), and during forest level surveys for willow flycatcher. In addition, there are historical records of specimens collected from the Modoc National Forest at the Berkeley Natural History Museum. Finally, Thayer Birding Software – Birder's Diary included two locations on the Modoc National Forest. According to the FEIS for the Modoc National Forest Land and Resource Management Plan, red-naped sapsuckers were found only on the Warner Mountain Ranger District (USDA 1991b. Page 3-110). The current distribution of red-naped sapsucker has expanded from the Modoc LRMP FEIS with a few scattered sightings found further west of the Warner Mountains as well.

Western Gray Squirrel

Western gray squirrels have a limited distribution across the Modoc National Forest. Oak is a common, but minor component of ponderosa pine stands and lower elevation mixed conifer stands on the Big Valley and the Devil's Garden District in the Washington Mountain area. There are 1,447 acres of oak and an additional 125,473 acres of low incidence squirrel habitat in

mixed conifer stands on the Modoc NF that could support western gray squirrels. Although habitat suitability had been decreasing at the time of the LRMP (LRMP FEIS page 3-111), the SNFPA (USDA 2004) amended the Modoc LRMP with nine new standards for hardwood management. These standards should increase the prevalence, widen the extent, and improve the health of hardwoods on the Forest. In addition, the large tree component will be retained in other areas on the Forest that currently have sporadic squirrel sightings providing a stable to increasing trend in those habitats.

The population monitoring requirements for western gray squirrel are distribution monitoring. These squirrels utilize the lower elevation habitats on much of the Big Valley Ranger District, and are sporadically observed on the other Ranger Districts. Presence data for gray squirrels are almost entirely from oak habitat with the exception of a few sightings in pine and mixed conifer habitats (Modoc NF FAUNA database 2006; George Studinski and Ken Romberger, pers. comm. and M. Flores). Although the current distribution is the same as the time of the Modoc LRMP, the western gray squirrel populations are expected to increase as oak stands are enhanced.

Yellow Warbler

To determine potential suitable habitat for yellow warbler forest-wide a series of GIS queries were developed. The query for yellow warbler included various vegetation types near perennial streams, which had the highest potential for shrubby habitats. Using this query, there are roughly 53,000 acres of potential habitat forest-wide. Based on annual range monitoring data, the trend for riparian habitat is stable to increasing since the time of the Modoc LRMP, due to the implementation of the riparian standards and guidelines.

The population monitoring requirements for yellow warbler are distribution monitoring. Yellow warblers have been sighted on the Modoc National Forest from 1910 to the present. Presence data has been collected as part of surveys for avi-fauna conducted in the early part of the century, a series of incidental sightings by biologists and technicians, surveys conducted for the Tuscarora Pipeline Project, and during riparian point counts run for willow flycatcher. Yellow warblers appear to be distributed in various areas across the Forest, which is the same pattern inferred by the selection of yellow warbler as a riparian MIS in the Modoc LRMP back in 1991.

Wildlife Risk Assessment Methods and Definitions

The analysis of potential effects to wildlife from the ingestion of herbicides was completed using various sources of information. Syracuse Environmental Research Associates, Inc. (SERA) risk assessments authored by Dr. Patrick Durkin, PhD under contract to the Forest Service formed a basis for the narratives and tables. David Bakke, USDA Forest Service Region 5 Pesticide Use Specialist, developed the worksheets, which contain these tables; they are found within the Project File for the Modoc NF Noxious Weeds Project. In addition, peer reviewed journal articles provided insights to the potential effects of herbicides on wildlife conducted in field situations (as opposed to laboratory experiments) as well as the potential effects of noxious weeds on wildlife species and their habitats.

In essence, this pesticide risk assessment consists of an estimate of the potential doses that different types of wildlife may be exposed to from the application of herbicides under various scenarios (e.g. large bird consuming herbicide contaminated vegetation). These doses are then compared against the lowest sub-chronic or chronic “No Observable Effect Level” (NOEL) or the

"No Observable Adverse Effect Level" (NOAEL) for a comparable species. The ratio of the dose ingested to the NOEL/NOAEL is called a Hazard Quotient (HQ). The lowest NOEL or NOAEL is based on data from experiments on surrogate species (e.g. rats, dogs, ducks) instead of the species of interest themselves (spotted owls, marten, etc). By using the lowest NOEL/NOAEL regardless of the species, some of the interspecies variability is undoubtedly taken into account.

This analysis includes a variance found within the application rate or the applied concentration of an herbicide, which may change based on local conditions. In addition, some variability occurs in the various scenarios including the percentage of an animals' diet containing contaminated materials (insects, vegetation, fish, small mammals) or a spill of a chemical into water. In either case, exposure depends on the amount of chemical hypothetically ingested or absorbed by a type of animal (e.g. predatory bird eating contaminated fish, small bird eating contaminated insects, carnivorous mammal eating prey).

The risk is expressed as a central estimate bounded by lower and upper levels. Because of the need to encompass many different types of exposure as well as the need to express the uncertainties in the assessment, this risk assessment involves numerous calculations. These calculations are contained in worksheets in the project file for this FEIS, and are based on the SERA risk assessments for the various herbicides proposed for use in the FEIS. The acute scenarios discussed within the Biological Assessment, the Biological Evaluation, and the Management Indicator Species Report assume that 100% of the diet contains contaminated materials. For the chronic levels (on-site), the lower level consists of 10%, the central level consists of 30%, and the upper level consists of 100% of the diet in contaminated materials.

As described in worksheets, exposure rates are expressed in milligrams (mg) of absorbed dose per kilogram (kg) of body weight per day. For the acute exposure scenario, the estimated residue level is taken as the product of the application rate and the residue rate. For the longer-term exposure scenario, a duration of 90 days is used and the dissipation on the vegetation is estimated based on the estimated or established foliar halftimes.
The quantitative risk characterization is expressed as the Hazard Quotient, which is the ratio of the estimated exposure doses to the lowest NOEL/NOAEL. The hazard quotient provides a way to relate the risk of the use of the various herbicides, so the decision maker can make an informed decision. Hazard Quotients greater than 1.0 are expressed in standard decimal notation and smaller numbers are expressed in scientific notations - e.g., 7 E-7 equivalent to 7×10^{-7} or 0.0000007.

There are Hazard Quotients for each of the herbicides proposed for use within the Noxious Weed Project FEIS. Additives to the formulations that might be used when herbicides are applied are not considered quantitatively in this risk assessment with the exception of surfactants containing nonylphenol polyethoxylate as an active ingredient.

Acute exposure -- A single exposure or multiple exposures occurring within a short time (24 hours or less).

Chronic exposure -- Long-term exposure. Lab studies extend over the average lifetime of the species (for a rat, exposure is 2 years).

No Observable Effect Level" (NOEL) – The dose of a chemical at which no statistically or biologically significant increases in frequency or severity of adverse effects were observed between the exposed population and its appropriate control. Effects may be produced at this dose, but they are not considered to be adverse to the organism.

No Observable Adverse Effect Level" (NOAEL) - The dose of a chemical at which no treatment related effects were observed.

4. Effects of Proposed Project on MIS

Detailed information on MIS for the Modoc NF is documented in the Modoc National Forest MIS Report (USDA 2007b), which is hereby incorporated by reference. The information for each species or combination species will be self contained within a single section. Basic habitat preferences are summarized first; the potential effects from the proposed weed treatment activities to habitat and populations follow.

4.a. Blue Grouse (now known as Sooty Grouse)

The blue grouse is a terrestrial MIS as well as a game species in California.

4.a.1. Habitat/Species Relationship

Blue grouse have a patchy distribution throughout the Forest in various coniferous habitats. Information on blue grouse distribution is based mostly from incidental sightings, however, California Department of Fish and Game has conducted bag checks, hoot count transects, and habitat surveys sporadically since the 1950's.

Blue grouse use open to mature stands of conifer types that are interspersed with openings and water (Zeiner et. al. 1990a). Blue grouse use dense conifer cover for roosting. They nest on the ground in an area that has cover either next to a log or in brushy areas. They will brood their young in grass and forb stands. Locally on the Modoc National Forest, they are also frequently found in conjunction with aspen stands.

Blue grouse consume mostly plant materials (conifer needles; buds, fruits, flowers, and seeds of various plants), but will also eat insects, snails, and spiders (Zeiner et. al. 1990a). They pluck conifer needles from trees; however, they will also eat forbs and glean insects from vegetation and the ground. In Montana, the average summer home range size was 126 acres, and the average territory size was 7 acres.

4.a.2. Project-level Effects Analysis Based on Habitat

Key Habitat Factor(s) for the Analysis: The proposed project, the removal of noxious weeds from Forest System Lands, will have no affect on habitat for blue grouse; blue grouse are not directly tied to the noxious weeds for cover or food. The main potential effect is limited to the potential consumption of herbicide contaminated plant and insect materials by grouse.

Analysis Area for Project-level Effects Analysis: The analysis area for blue grouse is limited to the 161,000 acres of potential habitat on the forest. This habitat is limited to the upper elevations of the forest that have mixed conifer, white fir, and red fir. In general, the areas include the Warner Mountain Ranger District, the Medicine Lake Highlands, roughly half of the Big Valley District, and localized portions of the Devil's Garden District.

Alternative 1 (Current Management)

Direct and Indirect Effects to Habitat The Forest Service currently treats 20 to 30 acres a year by physical methods. Currently, the Forest does not use of herbicides to treat noxious weeds.

Implementing weed treatments under Alternative 1 would have no effect on blue grouse habitat. There will be no change in the current or future amount of dead and downed materials by the treatment of noxious weeds. Vegetation diversity is expected to remain the same or very site specifically, be improved on the 30 acres; the same is true for aspen and meadow habitat. Therefore, 0 % of the current blue grouse habitat in the analysis area would be affected by implementation of Alternative 1. Conversely, the effect of not treating the habitat could cause a significant decrease in the amount of potential food sources for grouse.

Cumulative Effects to Habitat

Because there is no direct or indirect effect to blue grouse habitat, there are no cumulative effects to blue grouse habitat under this alternative.

Alternatives 2 to 6

Direct and Indirect Effects to Habitat. The Forest Service could spray a maximum of 39.25 acres or 0.024% of potential blue grouse habitat each year under this alternative. Physical treatments could occur on a maximum of 35.55 acres each year, which equals 0.025% of the total forest-wide potential blue grouse habitat. There are a total of 161,000 acres of potential blue grouse habitat forest-wide. (Table 2)

Table 2. Proposed Treatment within Potential Blue Grouse Habitat

Total Acres of Potential Habitat - Forest wide	Total Maximum Acres of Physical Treatments*	Total Maximum Acres of Herbicide Treatments*
161,000	39.55	39.25

*** This figure includes the maximum, where physical or herbicide methods may be employed.**

Implementing weed treatments under Alternatives 2 through 6 would have no effect on blue grouse habitat. There will be no change in the current or future amount of dead and downed materials or vegetative diversity by the treatment of noxious weeds. Although the condition of aspen stands and meadows could be enhanced by decreasing the competition to native species from weeds, currently there would not be a discernable benefit to sooty/blue grouse habitat on a forest-wide scale, because the proposed treatments blocks are small and scattered. Therefore, there are no direct or indirect effects to sooty/blue grouse habitat by the implementation of Alternatives 2-6.

Cumulative Effects to Habitat

Because there are no direct or indirect effects to blue grouse habitat, there are no cumulative effects to blue grouse habitat under these alternatives.

4.a.3. Summary of Population Status and Trend at the Forest Scale

The Modoc NF LRMP (as amended by the SNFPA) requires forest-scale distribution population monitoring for blue grouse. The sections below summarize population status and trend data for the blue grouse. This information is drawn from the detailed information on population trends in the Modoc National Forest MIS Report (USDA 2007b), which is hereby incorporated by reference.

Population Status and Trend at the Bioregional Scale and Local Scales

Population monitoring data collected by the Modoc NF and partners at the bioregional scale indicate that blue grouse have an "increasing tendency" for the Sierra Nevada (Siegel and DeSante 1999). The distribution for blue grouse appears to be the same on the Modoc NF as the one in 1991, when the LRMP was released.

Effects of the Alternatives considered within the Noxious Weeds FEIS.

Physical treatments under any Alternative would cause no risk of ingestion of contaminated vegetation. Blue grouse could ingest both contaminated plants and animals under Alternatives 2, 4 and 6. It is unlikely that the blue grouse would ingest sufficient herbicides to reach the acute toxicities scenario listed in Table 3 for any alternative for the following reasons.

First, the scenarios were developed for a boom application; the action alternatives would spot treat noxious weeds. Although there may be some overspray, the entire area would not receive a complete blanket of herbicide. Second, very little of the potential grouse habitat would be treated and most of those weed occurrences are small blocks. Within the 161,000 acres of potential blue grouse habitat, there could be a total of 39.55 acres or **0.025%** forest-wide habitat affected by herbicides. Third, the majority of the weed occurrences within potential blue grouse habitat are less than 1 acre parcels (the majority are 0.1 acre) except for the following: [Dyer's woad] WM001ISTI (5.9 acres), WM002ISTI (5.78 acres), WM003ISTI (1.82 acres), WM004ISTI (6.51 acres), WM005ISTI (5.26 acres), WM008ISTI (2.02 acres) as well as WM009CIAR4 [Canada thistle] (5.84 acres).

For the acute scenario, there appears to be no effect to the blue grouse population on the Modoc NF for the following reasons. Treating the largest occurrence (5.9 acres) in potential blue grouse habitat would cover 4.68% of the total 126-acre home range. The assumption is that 100% of the birds' diet would consist of contaminated vegetation or insect materials. The likelihood of a grouse ingesting 100% of its diet on these small areas is remote. In addition, Dyer's woad is found in many areas in the County and on the Forest; therefore, these six occurrences are not high priorities for treatment. The WM009CIAR4 (Canada thistle) is scheduled to receive clopyralid, which has hazard quotient ratings below 1.0, and therefore, is not considered a risk (Tables 3 and 4). In addition, all of these weed occurrences are localized in the northern Warner Mountain District, so the remaining blue grouse forest-wide would be unaffected.

Table 3. Hazard Quotient Ratings for Acute Toxicity, Small Bird Eating Contaminated Insects (100% of diet)

Herbicide/Application Rate	Exposure Assessment Rate mg/kg/day			Hazard Quotient Rating		
	Central	Lower	Upper	Central	Lower	Upper
2,4-D						
a) 1.5 lbs/ac	56.4	56.4	169.0	6.0	6.0	17.0
b) 2.0 lbs/ac	75.2	75.2	226.0	8.0	8.0	23.0
Chlorsulfuron 1.0 lb/ac	2.35	2.35	7.05	0.001	0.001	0.004
Clopyralid 0.25 lb/ac	9.4	9.4	28.2	0.01	0.01	0.04
Dicamba						
a) 1.0 lb/ac	37.6	37.6	113.0	3.0	3.0	8.0
b) 2.0 lbs/ac	75.2	75.2	226.0	6.0	6.0	17.0
Glyphosate 3.75 lbs/ac	141.0	141.0	423.0	0.3	0.3	**0.8**
Triclopyr (Acid & BEE) 1.5 lbs/ac	56.4	56.4	169	0.1	0.1	0..3 (ACID) 0.4 (BEE)
NPE	62.6	50.0	263.0	6.0	5.0	26.0

The chronic scenario for ingestion of vegetation has a greater probability of reality. Under the lower and central scenario, the assumption is that the birds' diet is 10% and 30% contaminated vegetation, which is realistic at the sites that are greater than 5 acres or in the same general location (the cluster of sites T47N, R15E, in occupied grouse habitat). At the lower or central rate of applications, the only herbicide with a hazard quotient rating above 1.0 for the chronic ingestion of contaminated vegetation (on site) is 2, 4-D (either alone or in a tank mix) (Table 4).

Table 4. Herbicides and Their Application Rates for Chronic Exposures to Large Birds (Goose Sized) Consuming Contaminated Vegetation Where There is No Spray Buffer and a Boom Application Method on Site

Herbicide/Application Rate	Exposure Assessment Rate mg/kg/day or mg/kg/event			Hazard Quotient Rating		
	Central	Lower	Upper	Central	Lower	Upper
2,4 - D						
a) 1.5 lbs/ac	2.69	0.896	25.3	3.0	**0.9**	25
b) 2.0 lbs/ac	3.58	1.19	33.7	4.0	**1.2**	34
Chlorsulfuron 1.0 oz/ac	0.212	0.0708	2.0	0.002	5×10^{-4}	0.01
Clopyralid 0.25 lb/ac	0.815	0.217	10.0	0.05	0.01	0.7
Dicamba						
a) 1.0 lb/ac	1.16	0.388	11.0	0.09	0.03	**0.8**
b) 2.0 lbs/ac	2.33	0.776	21.9	0.2	0.06	1.6
Glyphosate 3.75 lbs/ac	16.6	5.53	156	0.2	0.06	1.6
Triclopyr (Acid & BEE) 1.5 lbs/ac	5.92	1.52	75.2	0.6	0.2	8.0
NPE	0.216	0.0576	2.85	0.02	0.006	0.3

Under Alternatives 2 and 4, there is no concern for the use of 2,4-D, because all of these weed occurrences are within 1000 feet of water; therefore, 2,4-D will not be used to treat them. Under Alternative 6, Design Standard DS 12b lessens the potential effect by limiting the size of a weed occurrence that could receive 2,4-D to 2 acres and less. Only one 1.82 acre Dyer's woad polygon that is in potential blue grouse habitat, which could receive 2,4-D. This area would constitute 1.4% of a 126-acre territory making it unlikely that grouse could consume sufficient amounts of 2,4-D to cause adverse effects. Given the implementation of Design Standards to minimize the potential risk to grouse and the use of spot treatments of noxious weeds (as opposed to boom sprayers), the use of herbicides will have little chronic effect to single grouse and will have no effect on the distribution of blue/sooty grouse on the Modoc National Forest.

Under the alternatives with Early Detection/Rapid Response activities, wildlife biologists would review new noxious weed treatment sites prior to implementation. If concerns for blue grouse surface (including conditions not covered within the analysis for the FEIS), additional Design Standards could be added.

The sooty/blue grouse is well distributed across the Modoc NF. Because only a few individual birds could be affected in localized in the northern Warner Mountain District, implementation of Alternatives 2-6 would have no impact on the distribution of sooty/blue grouse on the Modoc NF. Nor would there be any direct or indirect effects to the whole population of sooty/blue grouse on the Modoc NF.

Cumulative Effects to Populations

Since there are no direct or indirect effects to the sooty/blue grouse population on the Modoc NF, there would be no cumulative effects.

4.a.4. Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the Blue Grouse

The cumulative effects of Alternatives 2-6 of the Noxious Weeds Project will result in no decrease in forest-wide habitat for sooty/blue grouse. The potential effect to the population is that no one potential home range would be affected by herbicides, although small portions of three potential home ranges could be. Therefore, the impact of the Noxious Weeds Project will not alter the existing forest-wide trend in habitat, nor will it change the existing forest-wide population distribution trend for sooty/blue grouse.

4.b. Canada Goose and Mallard

The Canada goose and mallard are terrestrial MIS as well as a game species in California.

4.b.1. Habitat/Species Relationship

Canada geese have a patchy distribution throughout the Forest focused near lakes and streams; they use the Modoc NF for nesting and brood rearing activities. Nest sites include: scrapes in dense herbaceous vegetation, cliffs, platform nests in trees, hollows in trees, and on nesting islands (various authors in Bellrose 1980, Frost 1988). Although Canada geese will use a variety of nest substrates, there are three characteristics of nests sites that are fairly consistent: a close proximity to water, cover for the nest, and an uninterrupted view for the incubating bird (Bellrose 1980). About 90% of the nest sites were located within 50 yards of water (Bellrose 1980).

Both adult and young Canada geese are primarily grazers (Cadieux, Gauthier, and Hughes 2004, Sedinger 1986). Canada geese feed on agricultural crops and wild grasses and forbs (Zeiner et. al. 1990a).

Mallards have the same patchy distribution throughout the Forest as Canada geese; according to Bellrose (1980), the results of most studies show that the majority of mallard nests are within 100 yards of water. Mallards also use the Modoc NF for nesting and brood rearing. Typical nesting habitat for mallards, consist of scrapes in upland herbaceous vegetation in proximity to water (Drilling, Titman and McKinney 2002). Both seasonal and permanent water bodies are utilized (Drilling, Titman and McKinney 2002). Cover surrounding the nests in herbaceous vegetation is usually dense and about 24 inches in height (Bellrose 1980). Brood habitat for mallards includes riparian areas with a mixture of open water with emergent vegetative cover.

Mallards are mainly herbivorous utilizing domestic grains, forb seeds, and aquatic plants; they will however, also consume insects, invertebrates, tadpoles and small fish (Zeiner et. al. 1990). Hatchlings basically feed on insects, but shift to seeds by six weeks (Chura 1961 in Zeiner et. al. 1990a). Territory sizes varied from 163 acres to 1,797 acres (Zeiner et. al. 1990a).

4.b.2. Project-level Effects Analysis based on Habitat

Key Habitat Factor(s) for the Analysis: The proposed project, the removal of noxious weeds from Forest System Lands, will have no affect on habitat for Canada geese or mallards; neither species is directly tied to the noxious weeds for cover or food. Tall whitetop has been shown to out compete grasses, thereby decreasing waterfowl food resources (Bossard, Randal, and Hoshovsky 2000). Weeds provide less cover and may lead to greater predation. Mallard nests that are in poor cover, routinely fail on the Modoc National Forest (G. Studinski and M. Flores, pers. comm.). The main potential effect of the implementation of the Noxious Weed FEIS is

limited to the potential consumption of herbicide contaminated plant and insect materials by geese and mallards.

Analysis Area for Project-level Effects Analysis: The analysis area for Canada goose is 19,264 acres of potential nesting habitat on the Modoc National Forest (75,713 total acres modeled-56,449 acres of water). This habitat occurs to a large extent on the reservoirs on Devil's Garden and Doublehead Ranger Districts with small inclusions on habitat scattered on the rest of the Forest.

The analysis area for mallard is 54,292 acres of potential mallard nesting habitat on the Modoc National Forest (111,037 total acres modeled-56,449 acres of water). This area is basically the same as the goose except that it expands further from the water's edge.

Alternative 1 (Current Management)

Direct and Indirect Effects to Habitat The Forest Service currently treats 20 to 30 acres a year by physical methods. Currently, the Forest does not use herbicides to treat noxious weeds.

Implementing weed treatments under Alternative 1 would have no effect on Canada goose and mallard habitat. There will be no change in the current or future wetland habitat, because most of the work is outside of riparian habitats. Therefore, 0 % of the current habitat for either species on the Forest would be affected by implementation of Alternative 1. Conversely, the effect of not treating the habitat could cause a significant decrease in the amount of potential food and cover for Canada goose and mallard.

Cumulative Effects to Habitat

Because there is no direct or indirect effect to Canada goose or mallard habitat, there are no cumulative effects to habitat for either species under this alternative.

Alternatives 2 to 6

Direct and Indirect Effects to Habitat

Physical treatments could occur on a maximum of 31.06 acres out of 19,264 acres or 0.016% of potential goose habitat forest-wide. There could be 119.31 acres of physical treatments out of 54,292 acres or 0.22% of potential mallard. A maximum of 30.46 acres out of 19,264 acres or 0.16% of potential habitat forest-wide for goose habitat could be treated with herbicides; there would be 118.20 acres out of 54,292 acres or .22% potential mallard habitat sprayed forest-wide (Table 5).

Table 5. Proposed Treatment Acres within Potential Canada Goose and Mallard Habitat

Species	Total Acres of Potential Habitat Forest-wide	Total Maximum Acres of Physical Treatments*	Total Maximum Acres of Herbicide Treatments*
Canada goose	19,264	31.06	30.46
Mallard	54,292	119.31	118.20

***This figure includes the maximum, where physical or herbicide methods may be employed.**

Noxious weeds do not provide optimal nesting or foraging cover. Nests located in poor cover routinely fail. In addition, revegetation of bare areas could provide cover currently being taken up by the weeds.

Although treatment of noxious weeds would benefit both Canada goose and mallard foraging and nesting habitat, the potential beneficial effects on less than 0.5% of the habitat would not be discernable to Canada goose or mallard habitat by the implementation of Alternatives 2-6 on a forest-wide scale (see paragraph above). Therefore, there are no direct or indirect effects to Canada goose and mallard habitat by the implementation of Alternatives 2-6.

Cumulative Effects to Habitat

Because there are no direct or indirect effects to Canada goose or mallard habitat, there are no cumulative effects to habitat for either species under these alternatives.

4.b.3. Summary of Population Status and Trend at the Forest Scale

The Modoc NF LRMP (as amended by the SNFPA), requires forest-scale distribution population monitoring for Canada goose and mallard. The sections below summarize population status and trend data for the both of these species. This information is drawn from the detailed information on population trends in the Modoc National Forest MIS Report (USDA 2007b), which is hereby incorporated by reference.

Population Status and Trend at the Bioregional Scale and Local Scales

Population information for Canada goose has been obtained both by Modoc NF personnel and various state and federal partners. Based on California-wide BBS data for the period of 1966-2004, Canada goose is classified as “Likely increasing” (Siegel and DeSante 1999), with a non-significant increase of 3.2% (range -7.2 to 13.5) per year over the 39 routes. At the Sierra Nevada scale, for the period of 1966-2004, Sierra Nevada-wide BBS data classifies Canada goose as “increasing tendency” (Siegel and DeSante 1999) with a non-significant increase of 10.8% (range -5.8 to 27.4%) per year.

Brood counts were conducted for geese and ducks for the Devil’s Garden District in 1975 to 1989, 1991, 1993, 2002, 2003, and 2006. Other information for the Forest consists of incidental sightings. According to Modoc NF data, Canada geese have expanded on the Forest since the time of the LRMP.

The mallard is the most abundant waterfowl species in the Sierra Nevada. Population information for Canada goose has been obtained both by Modoc NF personnel and various state and federal partners. Sierra Nevada-wide BBS data for the period of 1966 -2004 classifies mallard as “Definitely increasing” (Siegel and DeSante 1999), with a significant increase of 15.5% (range 5.6 to 25.4%) per year over 12 routes. The 2005 Midwinter Waterfowl Survey index for all ducks in California was 3.8 million, an increase of 18 percent from 2004 and 20 percent above the 10-year average. Generally, there was an upward trend among duck species such as mallard.

Brood counts were conducted for all ducks including mallard on the Devil’s Garden District in 1975 to 1989, 1991, 1993, 2002, 2003, and 2006. Other information for the Forest consists of incidental sightings. Monitoring results documented in the LRMP FEIS indicate each nesting island annually produces 5-6 ducklings (USDA 1991b. Page 3-105). Based on brood count data, mallard production trends appear to have been stable to increasing on the Modoc National Forest since the time of the LRMP. Data from the adjacent Modoc National Wildlife Refuge for the past decade indicate that locally mallard populations are stable (barring drought cycles) (S. Clay, pers. comm.).

Effects of the Alternatives Considered within the Noxious Weeds FEIS

Physical treatments under any Alternative would cause no ingestion of contaminated materials. Canada geese and mallards could potentially ingest both contaminated plants and animals under Alternatives 2, 4 and 6.

The vast majority of the weed occurrences in potential Canada goose habitat are less than 1.0 acres (30 occurrences of the total 32 occurrences on the Forest); all but 6 out of 32 occurrences are less than 0.1 acre. The weed occurrences of greatest concern are to Canada goose are BV006LIDA (Dalmatian toadflax) and WM009CIAR4 (Canada thistle).

BV006LIDA (Dalmatian toadflax) – The majority of the area is lava reef country with open conifer stands. The entire weed occurrence is roughly 850 acres. In the area adjacent to Lava Lake, the toadflax has a patchy distribution consisting of small clumps of plants that are less than .001 acre in size. No toadflax occurrences were observed in the riparian margin of the lake. A lava reef surrounds the lake, so there is no chance of direct spray of any MIS, nor is there a chance of drift. The chance of disturbance to nesting waterfowl is low, because of the lava reef buffer as well as the delayed accessibility into the area (the native surface roads don't allow access until late June). Under Alternatives 2 and 4, the entire occurrence could be treated. There are 22.32 acres of potential Canada goose habitat that fall within the entire 850 acre weed occurrence; however, based on a site visit, no weeds will be treated in this potential habitat. Under Alternative 6, only the exterior satellites of the weed occurrence would be treated, which are not within the potential Canada goose habitat. Therefore, there would be no risk to Canada goose by treatment of this weed occurrence under any Alternative.

WM009CIAR4 (Canada thistle) – This site consists of a heavily disturbed meadow, fringed by aspen and mixed conifer. The combination of the effects from beaver, livestock grazing, and the road system have lead to an infestation of weeds in the meadow and along the road. Although the site was modeled as potential Canada goose habitat, the reality of the situation is the area consists of a series of old beaver ponds, which are sedimented in to become meadows. The area does not have open water to act as potential Canada goose habitat. Therefore, there would be no effect to Canada goose by the treatment of this occurrence under any alternative.

The vast majority of the weed occurrences in mallard habitat are 0.1 acre or less (44 occurrences of the total 53 occurrences on the Forest). There are nine occurrences that are larger than 0.1 acre. Two of these occurrences are 0.13 and 0.75 acres, four of these occurrences are 1.0 acre, and one weed occurrence is 1.28 acres. Mallard territory sizes encompass hundreds of acres; therefore, it is very unlikely that a mallard would consume 10 to 30 percent of their diets in contaminated vegetation or insects (even in a weed occurrence up to 1.23 acres). The largest two weed occurrences, where their treatment provides the greatest potential risk to mallards are BV006LIDA (Dalmatian toadflax) and WM009CIAR4 (Canada thistle). As stated above, the riparian would not be treated in BV006LIDA (Dalmatian toadflax) under any alternative. The WM009CIAR4 (Canada thistle) is not considered potential mallard habitat. Therefore, treatment of either weed occurrences under any alternative would not affect mallard.

Under the alternatives with Early Detection/Rapid Response treatments, new occurrences will be reviewed by wildlife biologists prior to implementation; all weed occurrence implementation sites would need to meet water quality standards, and therefore will be limited in acre size as per the Best Management Plan's (BMP's) and Design Standards. Additional Design Standards could be added, if weed treatment areas were outside of the conditions analyzed within the FEIS.

Canada goose and mallard are well distributed across the Modoc NF in riparian habitats. Because there is a low potential for weed treatments to affect individual birds, implementation of Alternatives 2-6 would have no impact on the population or the distribution of Canada goose and mallard on the Modoc NF.

Cumulative Effects to Populations

Because there are no direct or indirect effects to Canada goose or mallard populations, there are no cumulative effects to the population of either species under any alternative.

4.b.4. Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the Canada Goose and Mallard

The cumulative effects of the Action Alternatives of the Noxious Weeds Project will result in no decrease in forest-wide habitat for Canada goose or mallard. There is no potential effect to the population of either species. Therefore, the impact of the Noxious Weeds Project will not alter the existing forest-wide trend in habitat, nor will it change the existing forest-wide population distribution trend for Canada goose or mallard.

4.c. Golden Eagle and Prairie Falcon

The golden eagle and prairie falcon are both terrestrial MIS as well as Species of Special Concern in California. In addition, the golden eagle is listed as fully protected by California.

4.c.1. Habitat/Species Relationship

Golden eagles nest in open to semi open habitat from sea level to 3630 meters (Kochert et al. 2002). Preferred nesting habitat on the Modoc National Forest includes large trees (typically Ponderosa pine) and cliffs within eastside pine, western juniper, and sagebrush habitat types (USDA 1991b. Page 3-105). Golden eagles observed on and adjacent to the Modoc NF typically forage in open habitats such as grassland, shrub lands, and agricultural fields. Territory sizes ranged from 22 miles^2 in Idaho to 48 miles^2 in northern California (Zeiner et al 1990).

Golden eagles typically forage in open habitats such as grassland and shrub lands (Kochert et al. 2002). An early study from central California showed that mammals made up 77 percent of golden eagle diets (specifically ground squirrels, jackrabbits, and black-tailed deer fawn), although there was also an assortment of birds (including turkey vulture), snakes, and a few fish (Carnie 1954). Golden eagles have been known to take pronghorn fawns as well (Dunbar et. al. 1999) or forage in riparian areas on waterfowl, marmots, and rock doves, if sagebrush and hence jackrabbits were limited (Marzluff et. al. 1997).

Prairie falcons are found uncommonly throughout the Modoc National Forest in cliff and scarp habitats. They use open terrain for foraging interspersed with cliffs, canyons, and rock outcrops for nesting (Zeiner et al. 1990). The prairie falcon generally nests on cliffs that are 30 to 400 feet in height. Migration is limited to elevational changes with season; the birds migrate to the lower elevations in the winter (USDA 1991b. Page 3-106).

They forage in open rangeland vegetation such as western juniper, sagebrush, east-side pine, and grasslands. These birds foraged over 300 km^2 in southwestern Idaho (roughly 74,000 acres) (Marzluff et al. 1997). Marzluff et al (1997) reported that ground squirrels were prairie falcons

primary prey, but would increase the amount of reptiles and birds, when ground squirrels were unavailable. Steenhof (1998) notes that falcon young forage on the ground and talus slopes for insects and lizards. In a study conducted in northeastern Wyoming, the authors found that prairie falcons selected foraging areas near their nest sites in areas of open grassland (Squires et al. 1993); preferred prey included ground squirrels and small passerines. These authors also noted that falcons could tolerate low levels of disturbance at their foraging sites as long as their eyries were protected from disturbance.

4.c.2. Project-level Effects Analysis based on Habitat

Key Habitat Factor(s) for the Analysis: The proposed project, the removal of noxious weeds from Forest System Lands, will have no affect on habitat for golden eagle or prairie falcon; neither species is directly tied to the noxious weeds for cover or food. Golden eagles use, large trees (typically ponderosa pine) or cliffs as nest sites. Prairie falcons utilize cliffs as nest substrate. The potential effects from activities discussed in the FEIS are from disturbance at the nest site and the potential consumption of herbicide contaminated prey by eagles or falcons.

Analysis Area for Project-level Effects Analysis: The analysis area for golden eagle consists of 93,884 acres of occupied and potential habitat on the forest. There are 28,014 acres of occupied habitat within 0.5 miles of nest sites and 65,870 acres of potential golden eagle habitat forest-wide. This habitat is focused on the outer fringes of the various Districts and within central portions of the Devil's Garden and Doublehead Districts.

Prairie falcons are found sporadically throughout the Forest, where suitable nesting cliffs are found. The Domelands, the Pit River corridor, and the eastern scarp of the Warner Mountains provide the bulk of the concentrations of suitable habitat, although there are scattered cliffs throughout the Forest. The analysis area consists of concentric rings around known nest sites; there are 5,678 acres of habitat within 0.5 miles of known nest sites.

Both species forage in open habitats across the forest, so they could encounter contaminated prey at numerous locations. However, the territory sizes are enormous (75,000 acres and greater); there would be no scenario under the posed under the FEIS, where either species could consume 10% of their diet in contaminated prey.

<u>Alternative 1 (Current Management)</u>

Direct and Indirect Effects to Habitat The Forest Service currently treats 20 to 30 acres a year by physical methods. Currently, the Forest does not use herbicides to treat noxious weeds.

Implementing weed treatments under Alternative 1 would have no effect on golden eagle or prairie falcon habitat. There will be no change in the current or future amount of cliffs or large trees by the treatment of noxious weeds. Therefore, 0 % of the current golden eagle or prairie falcon habitat in the analysis area would be affected by implementation of Alternative 1.

Cumulative Effects to Habitat

Because there is no direct or indirect effect to golden eagle or prairie falcon habitat, there are no cumulative effects to habitat for either species under this alternative.

<u>Alternatives 2 to 6</u>

There are a maximum of 5.7 acres or 0.02% out of 28,014 acres forest-wide that could receive physical treatments and 4.7 acres or 0.017% of herbicide treatments in occupied golden eagle

habitat (Table 6). Within potential golden eagle habitat, 10.86 acres or 0.016% of 65,879 acres forest-wide could receive physical treatments and 9.58 acres or 0.015% could receive treatments with herbicides.

There are 4.74 acres (0.083%) that could receive physical treatments out of 5,678 acres of occupied prairie falcon habitat forest-wide; there are 4.64 acres (0.082%) forest-wide that could receive herbicide treatments (Table 6). Potential habitat was not modeled for prairie falcon, because of difficulties with the DEM model.

Table 6. Proposed treatment within Golden Eagle and Prairie Falcon Habitat

Species	Total Acres of Habitat Forest -wide	Total Maximum Acres of Physical Treatments*	Total Maximum Acres of Herbicide Treatments*
Golden - occupied	28,014	5.7	4.7
Golden - potential	65,870	10.86	9.58
Prairie falcon - occupied	5,678	4.74	4.64

*** This figure includes the maximum, where physical or herbicide methods may be employed**

No eagle or falcon nesting habitat would be affected under any action alternative. According to the Modoc LRMP (1991a), the Forest is to maintain or improve habitat for potential prey species of the golden eagle. Removal of weeds is expected to improve cover and forage for a variety of eagle and falcon prey species including birds, deer, jack rabbits, and ground squirrels. Regardless, the weed occurrences still contain native plants within or adjacent to them, so there would be no change in foraging habitat for golden eagle or prairie falcons adjacent to nest sites.

Cumulative Effects to Habitat

Because there are no direct or indirect effects to golden eagle or prairie falcon habitat, there are no cumulative effects to habitat for either species under any alternative.

4.c.3. Summary of Population Status and Trend at the Forest Scale

The Modoc NF LRMP (as amended by the SNFPA) (USDA 2001), requires forest-scale distribution population monitoring for golden eagle and prairie falcon. The sections below summarize population status and trend data for these species. This information is drawn from the detailed information on population trends in the Modoc National Forest MIS Report (USDA 2007b), which is hereby incorporated by reference.

Population Status and Trend at the Bioregional Scale

According to the California Department of Fish and Game, golden eagles were once a common permanent resident throughout the open areas of California; numbers are now reduced near human population centers (e.g. San Diego County), where they declined from an estimated 85 pairs in 1900 to 40 occupied territories in 1999, due to extensive residential development. In general, however, populations seem stable. Approximately 500 pairs are estimated to nest in California. California-wide BBS data for the period of 1966-2004 classifies the golden eagle as “Likely increasing” (Siegel and DeSante 1999) with a non-significant increase of 1.5% (range -1.6 to 4.5) per year over the 49 routes.

Historically, the prairie falcon was also a common permanent resident throughout California, except for the humid northwest coast and higher mountains. California-wide BBS data for the

period of 1966-2004 classifies this falcon as "Possibly increasing" (Siegel and DeSante 1999), with a non-significant increase of 2.1% (range -1.5 to 5.7) per year over the 26 routes. In addition, results of Christmas Bird Counts seem to indicate an overall trend has been stable to increasing with quite a bit of annual fluctuation in numbers.

Effects of the Alternatives Considered within the Noxious Weeds FEIS

According to LRMP direction, eagle nests will be managed to minimize disturbance during the nesting season and to protect the nest tree; prairie falcon direction is to protect nesting birds from disturbance. Disturbance at active nest sites, as with all of the raptors, is the greatest source of concern. Modoc LRMP allows for ¼ to ½ mile Limited Operating Period's (LOPs) around active nests sites for both of these species. Utilizing these LOPs in Design Standard DS-10 should ensure that there would be no direct effect to golden eagles or prairie falcons.

A maximum of 0.017% of the occupied golden eagle habitat could have herbicides and 0.015% of the potential habitat is scheduled for herbicide treatments on the Forest. A maximum of 0.082% of the areas around prairies falcon nest sites have the potential for herbicide treatments. Both of these species forage widely; eagles have minimum territories of 22 square miles and prairie falcons have been known to forage over 74,000 acres. There is very little chance that predatory bird species that range as widely as these two do could ingest a 10 to 100% of their diet in sprayed mammals to cause any toxicological effects. In addition, none of the herbicides at the rates proposed for use have Hazard Quotients over 1.0, therefore, there is little risk of herbicide effects to predatory birds ingesting contaminated mammals. There was no herbicide risk scenario for a predatory bird ingesting contaminated birds; this scenario is not realistic because birds would flush before being sprayed in the course of weed treatment in response to their innate "Fight or Flight" response. Therefore, treatment of noxious weeds under any alternative will have no effect on golden eagle or prairie falcon populations on the Modoc NF.

Under the alternatives with Early Detection/Rapid Response treatments, wildlife biologists would review new weed occurrences prior to implementation; if concerns for golden eagle or prairie falcon surfaced, additional Design Standards could be added if weed treatment areas were outside of the conditions analyzed within the FEIS.

Cumulative Effects to Populations

Because there are no direct or indirect effects to golden eagle or prairie falcon populations, there are no cumulative effects to populations for either species under any alternative.

4.c.4. Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the Golden Eagle and Prairie Falcon

The cumulative effects of the Action Alternatives of the Noxious Weeds Project will result in no decrease in forest-wide habitat for golden eagle or prairie falcon. Nor will there be any potential effect to the population for either species. Therefore, the impact of the Noxious Weeds Project will not alter the existing forest-wide trend in habitat, nor will it change the existing forest-wide population distribution trend for golden eagle or prairie falcon.

4.d. Hairy and Pileated Woodpeckers

Both the hairy and pileated woodpeckers are terrestrial MIS as well as non-game species in California.

4.d.1. Habitat/Species Relationship

Habitat for hairy woodpeckers includes mixed conifer and riparian habitats with large trees present; tree canopy covers vary from sparse to intermediate (Zeiner et al. 1990a). Locally on the Modoc National Forest they have been observed in eastside pine as well (K. Romberger, pers. comm.). Hairy woodpeckers basically feed on insects; however, a small percentage of their diet includes acorns, pine nuts, and sap (Zeiner et. al. 1990a). They have been reported to forage at sapsucker wells (Ehrlich and Daily 1988), and glean materials off the edges exposed by pileated woodpeckers (Maxson and Maxson 1981). Hairy woodpeckers forage mainly in the crevices of the bark of live and dead trees as well as in logs and stumps (Zeiner et. al. 1990a). Home range size, which equated to a territory, varied from 6 to 8 acres in central Oregon (Zeiner et al. 1990). Territories measured during nesting should be considered minimal areas (Jackson et al. 2002).

Habitat for pileated woodpecker consists of mature coniferous stands with numerous large snags, logs and stumps (Zeiner et. al. 1990a). According to the bird conservation plan developed for pileated woodpecker (Robinson 2000), they will also nest in aspen and other hardwoods. During development of the Modoc NF LRMP, the authors noted that pileated woodpeckers were found on the Modoc National Forest in mixed conifer and red fir types (USDA 1991b. Page 3-109). Pileated woodpeckers concentrate mostly on animal material; however, they will also use nuts, berries, and other fruit (Zeiner et. al. 1990a); this species forages on decayed live and dead trees, logs and stumps. Home range size varies from 320 to 600 acres (Zeiner et al 1990).

4.d.2. Project-level Effects Analysis based on Habitat

Key Habitat Factor(s) for the Analysis: The proposed project, the removal of noxious weeds from Forest System Lands, will have no affect on habitat for either woodpecker species. Both species utilize snags and logs for foraging and nesting and are not directly tied to the noxious weeds for cover or food. The main potential effect is limited to the potential consumption of herbicide contaminated insect and plant materials.

Analysis Area for Project-level Effects Analysis: The analysis area for hairy woodpecker is limited to the 153,200 acres of potential habitat on the forest; these conifer stands are scattered throughout the forest.

The analysis area for pileated woodpecker is limited to the 173,500 acres of potential habitat on the forest. Habitat is limited to the upper elevations of the forest that have mixed conifer, white fir, and red fir. In general, the areas include the Warner Mountain Ranger District, the Medicine Lake Highlands, roughly half of the Big Valley District, and localized portions of the Devil's Garden District.

<u>Alternative 1 (Current Management)</u>

Direct and Indirect Effects to Habitat The Forest Service currently treats 20 to 30 acres a year by physical methods. Currently, the Forest does not use of herbicides to treat noxious weeds.

Implementing weed treatments under Alternative 1 would have no affect on habitat for either woodpecker. There will be no change in the current or future amount of dead and downed materials from the treatment of noxious weeds. Coniferous vegetation diversity, especially in the later seral stage coniferous stands for pileated woodpecker, is expected to remain the same or be improved on micro-sites in the coniferous stands; the same is true for aspen and meadow habitat. Therefore, 0 % of the current hairy or pileated habitat in the analysis area would be affected by implementation of Alternative 1.

Cumulative Effects to Habitat

Because there is no direct or indirect effect to hairy or pileated woodpecker habitat, there are no cumulative effects to habitat for either species of woodpecker under this alternative.

Alternatives 2 to 6

Direct and Indirect Effects to Habitat There are a maximum of 60.69 acres (0.04%) forest-wide of proposed physical treatments and a maximum of 56.22 acres (0.037%) with herbicide treatments within potential hairy woodpecker habitat (Table 7). There are a maximum of 51.35 acres (0.03%) out 170,000 acres with physical and 50.81 acres (0.03%) with herbicide treatment within potential pileated woodpecker habitat forest-wide (Table 7).

Table 7. Proposed Treatment within Potential Hairy and Pileated Woodpecker Habitat

Species	Total Acres of potential Habitat Forest-wide	Total Maximum Acres of Physical Treatments*	Total Maximum Acres of Herbicide Treatments*
Hairy woodpecker	153,200	60.69	56.22
Pileated woodpecker	173,500	51.35	50.81

*** This figure includes the maximum, where physical or herbicide methods may be employed.**

Implementing weed treatments under Alternatives 2 through 6 would have no effect on hairy or pileated woodpecker habitat. There would be no change in the amount of snags and logs, therefore, no nest or forage trees for either species will be removed under any action Alternative. There will be no change in the current or future amount of dead and downed materials by the treatment of noxious weeds. There will be no change to the overstory tree matrix by the implementation of noxious weed treatments, so there would be no change in vegetative diversity to effect either species.

Although both hairy and pileated woodpeckers will take seeds and fruits (Jackson et al 2002 for hairy woodpecker and Bull and Jackson for pileated woodpecker 1995), neither species is known to consume noxious weeds. Aspen and meadow habitat could be stable to increasing by the implementation of any action alternative, because the treatment decreases the competition to native species by noxious weeds in very small localized areas. Therefore, 0% of the current hairy or pileated habitat in the analysis area would be negatively affected by implementation of any action Alternative. Therefore, there will be no direct or indirect effects to hairy or pileated woodpecker habitat under any action Alternative.

Cumulative Effects to Habitat

Because there are no direct or indirect effects to hairy or pileated woodpecker habitat, there are no cumulative effects to habitat for either woodpecker species under these alternatives.

4.d.3. Summary of Population Status and Trend at the Forest Scale

The Modoc NF LRMP (as amended by the SNFPA) requires forest-scale distribution population monitoring for both species of woodpecker. The sections below summarize population status and trend data for these species. This information is drawn from the detailed information on population trends in the Modoc National Forest MIS Report (USDA 2007b), which is hereby incorporated by reference.

Population Status and Trend at the Bioregional Scale Population monitoring data collected by various partners at the bioregional scale indicate that hairy woodpeckers are "definitely stable" for California and the Sierra Nevada (Siegel and DeSante 1999).

Hairy woodpeckers are seen fairly frequently throughout the Modoc National Forest. They have been detected from 1910 to the present during a variety of surveys: turn of the century surveys of avi-fauna (data from Natural History Collection for the University of California, Berkeley), Breeding Bird Survey routes, project generated stand searches and point counts as well as the Pacific Southwest Research Station (PSW) cavity nesting bird study (Laudenslayer 2002). The distribution for hairy woodpecker appears to be the same on the Modoc NF as the one in 1991, when the LRMP was released.

Population monitoring data collected by various partners at the bioregional scale indicate that pileated woodpeckers are "definitely stable" for California and "Possibly decreasing with a non-significant decrease of -1.8% per year" for the Sierra Nevada (Siegel and DeSante 1999).

Pileated woodpeckers have been sighted infrequently on the Modoc National Forest. Data for pileated woodpecker consists of presence information from 1981 to the present, from Forest Service point counts, and various individual observers' incidental sightings. The distribution for pileated woodpecker appears to be the same on the Modoc NF as the one in 1991, when the LRMP was released.

Effects of the Alternatives Considered within the Noxious Weeds FEIS

There is an insignificant chance of either species eating contaminated vegetation under any alternative. Alternatives 3 and 5 propose no herbicide treatments. The discussion below focuses on the herbicide portions of Alternatives 2, 4 and 6.

There is little chance for ingesting contaminated materials for hairy woodpecker (i.e. prey species habitat), because they do not forage in weeds; they forage on snags, logs, and occasionally on a sapsucker well or on fruit. Therefore, the vast majority of their foraging areas would be uncontaminated. In northern California (near Truckee), "they (black-backed and hairy woodpeckers) foraged mostly on dead trees and drilled for their prey rather than gleaned." (Raphael and White 1984).

There are a five weed occurrences of sufficient size, where a significant amount of potentially contaminated insects could be ingested. The following section discusses occurrences within potential hairy woodpecker habitat.

BV006LIDA (Dalmatian toadflax) – The majority of the area is lava reef with open conifer stands. The entire weed occurrence is roughly 850 acres. In the area adjacent to Lava Lake, the toadflax has a patchy distribution consisting of small clumps of plants that are less than .001 acre in size. Under Alternatives 2 and 4, the entire occurrence could be treated. There are 4.55 acres of potential hairy woodpecker habitat that could be treated, where insects could climb onto an adjacent snag and be potentially ingested. This could equate to roughly 1 territory or .003% of the potential hairy woodpecker habitat on the Forest. Given the hairy woodpeckers' feeding preferences and the hairy woodpecker habitat condition in this weed occurrence, it is unlikely that there would be any effect to hairy woodpeckers by implementation of Alternative 2 or 4. Under Alternative 6, only the exterior satellites of the weed occurrence would be treated, so there would be no risk to hairy woodpecker under this Alternative.

BV001CRVU2 (Crupina) – The area along Post Canyon has crupina present along the road into conifer at various levels of infestation. The largest concentrations are at the lower end of the canyon in the open sage habitats. Other plants, both native and exotic, are within the matrix. In Alternatives 2 and 4, the entire occurrence could be treated. Cumulatively, there are 16.11 acres of potential hairy woodpecker habitat that could have herbicide treatments within the entire 158 acre weed occurrence. The entire 16 acres equates to roughly two territories. The insects that would be found on herbaceous plants probably would not be the type that are found and consumed on snags and logs (R. Borys and D. Cluck, pers. comm.). In addition, crupina does not provide a fruit that would be ingested. Therefore, given the hairy woodpecker's feeding preferences and the condition of the site, implementation of Alternatives 2 or 4 are not expected to affect hairy woodpecker. Under Alternative 6, only the exterior satellites would be treated, so there would be no risk to hairy woodpecker for this weed occurrence.

WM003LIDA (Dalmatian toadflax) – The site is basically a large, contiguous matrix of native plants with small clumps of weeds (the patches of weeds are very small with most of them roughly 10 feet by 10 feet). Although the entire weed occurrence encompasses roughly 40 acres, the weeds are actually distributed in small clumps found in lava rock talus, an old road bed, and along old, dry, rocky streambeds. There were no toadflax plants along the main channels of Lassen Creek. There are 20.26 acres of potential hairy woodpecker habitat within the weed occurrence, but about one acre total of potential hairy woodpecker habitat would be treated. Consequently, the chance of a hairy woodpecker consuming 10 to 30% of their diet in contaminated insects would be improbable to the point of being discountable under Alternatives 2, 4 or 6.

WM009CIAR4 (Canada thistle) – This site consists of a heavily disturbed meadow, fringed by aspen and mixed conifer. The combination of the effects from beaver, livestock and the road system has lead to an infestation of weeds in the meadow and along the road. Although there are 5.36 acres of potential hairy woodpecker habitat that could receive treatment, given the situation at the site, only an insignificantly small portion of the potential hairy habitat would be treated. The weeds are basically not within the coniferous stand therefore, the potential for insects to be contaminated while on an herbaceous plant and show up in the diet of a species known for foraging on snags and logs is so low, to the point of being discountable, in this weed occurrence. Therefore, there would be no effect to hairy woodpecker by the treatment of this occurrence under any alternative.

DH0131ISTI (Dyer's woad) – There are 3.53 acres of potential hairy woodpecker habitat that could be treated within this roughly 5,500 acre occurrence. The area is largely unsuitable for hairy woodpecker and it is extremely improbable to the point of insignificance that hairy woodpecker would ingest 10 to 30% of their diet in contaminated insects given their habitat and food preferences and the conditions of the vegetation under Alternatives 2 and 4. Only the satellite weeds would be treated under Alternative 6, so there would be no effect to hairy woodpecker under Alternatives 2, 4 and 6.

Under the alternatives with Early Detection/Rapid Response activities, wildlife biologists would review new noxious weed treatment sites prior to implementation. If concerns for hairy woodpecker surface (including conditions not covered within the analysis for the FEIS), additional Design Standards could be added.

To summarize, there would be no direct or indirect effects to hairy woodpeckers by the implementation of Alternative 6. It is highly unlikely there would be any direct or indirect effects to hairy woodpeckers under Alternatives 2 and 4 given their preferences for foraging on snags and logs (which is what they are an indicator for on the Modoc National Forest), and the small amount of potential hairy woodpecker habitat to be treated even in the largest weed occurrences.

Cumulative Effects to Populations

Because there are no direct or indirect effects to hairy woodpeckers, there are no cumulative effects to hairy woodpecker under any alternative.

These following paragraphs discuss occurrences within potential pileated woodpecker habitat and potential effects to pileated woodpeckers by their treatment.

WM001ISTI, WM002ISTI, WM004ISTI, WM005ISTI, and WM008ISTI (all are Dyer's woad) are located in the northwestern corner of the Warner Mountain District. There are a total of 37.18 acres of Dyer's woad in potential pileated woodpecker habitat that could be treated with herbicides. These occurrences could be located within 1 potential pileated woodpecker territory, which ranges from 320 to 600 acres in size. However, pileated woodpeckers primarily consume carpenter ants (wood boring ants) and other insects (Bull and Jackson 1995). Assuming that these occurrences are in one territory, about 9% of the area would be treated (using the smallest potential territory size and the largest concentration of weeds to be treated). Even combining these weed occurrences, the effect is improbable that 10 to 30% of a woodpecker's diet would contain contaminated insects, because pileated woodpeckers do not forage on dyer's woad and the contaminated insects would have to migrate to preferred foraging structures; as stated above, insects that prefer herbaceous plant species generally do not migrate to conifers. Therefore, there will be no effect to pileated woodpecker by the implementation of any alternative for these weed occurrences.

WM009CIAR4 (Canada thistle) **–** As stated above in the hairy woodpecker section, the majority of the weeds are outside of the conifer stand that could support pileated woodpecker. A total of 5.84 acres out of 320 to 600 acres within a potential territory could be treated. Even assuming that all of the insects in the area would be consumed only 0.98% to 1.8% of the potential territory would be affected. The impact is so small that the effect can be discounted as insignificant. Therefore, treating this occurrence under any alternative would not affect pileated woodpeckers.

To summarize, given their preference for foraging on woody plants and the effects are localized in one area on the Warner Mountain District, there would be no direct or indirect effects to pileated woodpecker distribution or population by the implementation of any Alternative.

Under the alternatives with Early Detection/Rapid Response activities, wildlife biologists would review new noxious weed treatment sites prior to implementation. If concerns for pileated woodpecker surface (including conditions not covered within the analysis for the FEIS), additional Design Standards could be added.

Cumulative Effects to Populations

Because there is no direct or indirect effect to pileated woodpeckers, there are no cumulative effects to pileated woodpecker under any alternative.

4.d.4. Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the Hairy and Pileated Woodpecker

The implementation of the Noxious Weeds Project will not alter the existing forest-wide trend in habitat, nor will it change the existing forest-wide population distribution trend for hairy or pileated woodpeckers.

4.e. Mule Deer and Pronghorn Antelope

Both the mule deer and pronghorn antelope are terrestrial MIS as well as a game species in California. Deer were selected as Management Indicator Species for the Forest, because it needs and prefers diverse habitats (USDA 1991b. Page 3-111). Antelope were selected as indicators of rangeland condition (USDA 1991b. Page 3-115).

4.e.1. Habitat/Species Relationship

Mule deer utilize almost every acre on the Modoc National Forest for winter, transition, and summer range as well as fawning areas with the exception of the barren areas like the Burnt Lava Flow or large bodies of water like Clear Lake. Habitat for deer includes early to intermediate successional forests and brushlands; they prefer a mosaic of various aged vegetation that provides woody cover, meadow and shrubby openings and free water (Zeiner 1990b). According to the Fish and Game publication, "Report to the Fish and Game Commission: An assessment of mule and black-tailed deer habitats and populations in California with special emphasis on public lands administered by the Bureau of Land Management and the United States Forest Service."
(California Dept. Fish and Game 1998), foraging habitat is a limiting factor for mule deer in northeastern California.

Pronghorn utilize the lower elevation sage habitats mainly on the Devil's Garden and Doublehead Districts. Pronghorn prefer open rangeland types that support a variety of vegetative types (Lee et al. 1998). Areas with low shrubs typify summer habitat with a diversity of native grasses and forbs (Gregg et. al. 2001, Lee et al. 1998). According to Lee, et al (1998), forbs were preferred, and "Thus, management decisions favoring the abundance of forb species are desirable to the welfare of pronghorn."

4.e.2. Project-level Effects Analysis based on Habitat

Key Habitat Factor(s) for the Analysis: The proposed project, the removal of noxious weeds from Forest System Lands, will have no negative affect on habitat for either mule deer or pronghorn; neither species is tied to the noxious weeds for cover or food. In fact, the removal of weeds on rangelands has been shown to benefit big game species. See the General Wildlife section of the Noxious Weeds FEIS for a discussion of the effects of noxious weeds on wildlife. The main potential effect is limited to the potential consumption of herbicide contaminated plant materials.

Analysis Area for Project-level Effects Analysis: The analysis area for mule deer is 1,587,564 acres, which includes cover, foraging and fawning habitats. This area covers most of the land on the Forest.

The analysis area for pronghorn antelope is 791,867 acres of mainly lower elevation habitat. The concentration areas include the Devil's Garden District, the eastern and northern half of the Doublehead District, and the outer fringes of the Warner Mountain and Big Valley Districts.

Alternative 1 (Current Management)

Direct and Indirect Effects to Habitat The Forest Service currently treats 20 to 30 acres a year by physical methods. Currently, the Forest does not use of herbicides to treat noxious weeds.

Implementing weed treatments under Alternative 1 would have no effect on habitat for mule deer or antelope. There will be no change in the current or future amount of preferred forage by the treatment of noxious weeds. There will be no change in the amount of cover. Therefore, 0 % of the current mule deer and pronghorn habitat in the analysis areas would be affected by implementation of Alternative 1. Conversely, allowing weeds to increase in deer and pronghorn habitat would decrease habitat suitability.

Cumulative Effects to Habitat

Because there is no direct or indirect effect to mule deer or antelope habitat, there are no cumulative effects to habitat for either species under this alternative.

Alternatives 2 to 6

Direct and Indirect Effects to Habitat

Deer are found on almost every acre of the Modoc NF; therefore, most of the Modoc NF is considered as occupied habitat. There are 1.74 acres of physical treatments and 1.6 acres of herbicides that **would not** occur forest-wide in deer habitat. Conversely, there is a maximum of 5,991.26 acres (0.38%) of physical treatments and 6,866.4 acres (0.43%) of herbicide treatments that could occur in deer habitat forest-wide. These figures do not include the Early Detection Rapid response acres, which are discussed below.

There is a maximum of 1,964.04 acres (0.25%) that could receive physical treatments and 1,960.02 acres (0.25%) that could receive herbicide treatments in potential pronghorn habitat forest-wide (Table 8). The acreages includes both occupied and potential pronghorn habitat.

Table 8. Proposed Treatment Acres within Potential Mule Deer and Pronghorn Habitat

Species	Total Acres of Potential Habitat Forest-wide	Total Maximum Acres of Physical Treatments*	Total Maximum Acres of Herbicide Treatments*
Mule deer	1,587,564	5,991.26	6,866.4
Pronghorn	791,867	1,964.04	1,960.02

*** This figure includes the maximum, where physical or herbicide methods may be employed**

Since deer or pronghorn do not rely on noxious weeds as food or cover, there would be no change in the quantity of habitat by implementation under any Alternative for mule deer or pronghorn. Studies have shown that noxious weeds displace native herbaceous plants, thereby modifying the habitat suitability for various wildlife species or changing species interactions within ecosystems (e.g. grasslands can be modified to forb-dominated communities) (Belcher and Wilson 1989; Trammel and Butler 1995). Cheatgrass (*Bromus tectorum*) provides a classic example of this problem; cheat grass is an introduced annual grass that has changed fire regime, decreased above and below ground plant biomass, and altered ecosystem function (native grasses maintain live

shoots into the summer that deer and antelope rely on, whereas cheatgrass does not) (Ogle et al. 2003)).

Mule deer use of favored foraging habitat on the Theodore Roosevelt National Park was reduced by 70 percent after invasion by leafy spurge (Trammel and Butler 1995). Results of a study conducted in Montana showed that mule deer did not use spotted knapweed, although it was common on their winter range (Guenther 1989 in Beck 1994). A study in Montana on Russian knapweed showed that areas heavily infested with knapweed displaced both wildlife and native plant species, which resulted in a loss of rangeland biodiversity (Kurz 1995 in Laufenberg et al. 2005). This loss of rangeland diversity would directly affect both deer and pronghorn, which are rangeland MIS.

Revegetation of large bare areas can improve habitat for deer and antelope. Design Standards DS-20 and DS-21 allow for the site specific assessment in order to determine, if revegetation is needed depending on the amount of bare area post-treatment.

Although the removal of noxious weeds may benefit individual deer and antelope, the increase in habitat from the implementation of any alternative would not be large enough to discern a change in the amount of habitat forest-wide, because of the small percentages of habitat proposed for treatment. Therefore, there would be no direct or indirect effect to the amount of deer or pronghorn habitat by the implementation of Alternatives 2-6.

Cumulative Effects to Habitat

Because there are no direct or indirect effects to mule deer or pronghorn habitat, there are no cumulative effects to habitat for either species under any action alternative.

4.e.3. Summary of Population Status and Trend at the Forest Scale

The Modoc NF LRMP (as amended by the SNFPA) requires forest-scale distribution population monitoring for mule deer and pronghorn. The sections below summarize population status and trend data for both species. This information is drawn from the detailed information on population trends in the Modoc National Forest MIS Report (USDA 2007b), which is hereby incorporated by reference.

Population Status and Trend at the Bioregional Scale

Mule deer is “S5- secure” (“demonstrably widespread, abundant, and secure”) in California (NatureServe 2006). Deer herds in California are tracked by Hunt Zones and by 11 Deer Assessment Units (DAUs), which include multiple Hunt Zones. California Department of Fish and Game assesses mule deer population status and trend by both Hunt Zones and DAUs as part of their Environmental Documentation for the hunting program. Annual variation in deer population estimates may be high due to annual changes in environmental conditions, and varies geographically.

Table 9. Mule Deer Population Trend for DAUs covering the Eldorado, Lassen, Modoc, Plumas, Sierra, and Stanislaus NFs. [1]

DAU No.	Name	Hunting Zones	Forests	Population Trend[1]
DAU 4	Cascade, Northern Sierra	C4	Lassen	Declining
DAU 5	Central Sierra Nevada	D3 to D7	Stanislaus, Sierra, Eldorado,	Increasing

DAU No.	Name	Hunting Zones	Forests	Population Trend[1]
			Plumas (western)	
DAU 6	South Sierra	D8 to D10	Sierra, Stanislaus	Stable
DAU 9	Northeast California	X-4 and X-3a	Lassen, Modoc	Stable[2]
DAU 10	Northeast Sierra	X-6a and X-6b	Lassen, Plumas	Stable[2]

[1] CDFG 2003.
[2] Eastside deer populations (DAUs 9, 10) occupying Great Basin habitats experienced significant declines during 1990-1996. However, these populations appear to have stabilized based on recent trend estimates (CDFG 2003).

The Modoc National Forest is contained within Deer Assessment Unit 9. Deer are counted during the spring along fixed transects in order to provide an index to population trend within the DAU. The trend line for the data shows a downward trend, although not as significant downward trend as indicated by the r^2 value near 0.5. The counts do show fluctuation in annual numbers that vary from +30% to -35% from the median value for the period. The trends thus appear to fluctuate, but do not show a sustained strong downward or upward trend.

Pronghorn is "S4- secure" ("demonstrably widespread, abundant, and secure") in California (NatureServe 2006). Historically, the pronghorn was the most abundant big game animal in California, and inhabited the valley and foothill regions of much of the State. The northeastern population is managed for a desired population of 5,600 to 7,000 animals. Population numbers declined to approximately 2,000 animals prior to 1960. After 1960, the statewide pronghorn population gradually increased until 1992 when California supported more than 8,000 animals. Population numbers declined as a result of severe weather conditions in northeastern California during the 1992/1993 winter. Although population numbers have not yet increased to their 1992 levels, the current population is well above levels recorded during the 1950s. Since the 1950s, the state-wide pronghorn numbers have more than doubled.

The population monitoring requirements for pronghorn antelope are based on distribution. Data on pronghorn numbers is based on input from California Fish and Game surveys in addition to incidental sightings from Forest Service personnel. The distribution of antelope is the same, as during the time of the Modoc LRMP. Since the 1992-93 winter kill, the antelope population has not increased, but has stabilized in the last few years.

Effects of the Alternatives Considered within the Noxious Weeds FEIS

Under Alternatives 3 and 5, as well as the physical treatment aspects of Alternatives 2, 4, and 6, there would be no potential ingestion of contaminated vegetation.

Mule deer and pronghorn could ingest contaminated plants under Alternatives 2, 4 and 6. However, the greatest concern for potential toxic effects would only be in the largest weed occurrences. The assumptions for the scenarios developed to quantify hazard quotients, which provide a measure of risk, are as follows.

- Large mammal eating contaminated vegetation (acute) - 100% for the diet Lower, Central and Upper levels
- Large mammal eating contaminated vegetation (chronic on-site) - The diet would consist of contaminated materials 10% for the Lower, 30% Central and 100% Upper levels.

Table 10. Herbicides and Their Application Rates for Acute Exposures to Large Mammals, Consuming Contaminated Vegetation, Where There is no Spray Buffer and a Boom Application Method

Herbicide/Application Rate	Exposure Assessment Rate mg/kg/day or mg/kg/event			Hazard Quotient Rating		
	Central	Lower	Upper	Central	Lower	Upper
2,4 - D						
a) 1.5 lbs/ac	25.8	25.8	72.8	3.0	3.0	7.0
b) 2.0 lbs/ac	34.4	34.4	97.1	3.0	3.0	10.0
Chlorsulfuron 1.0 oz/ac	1.07	1.07	3.04	.01	.01	0.04
Clopyralid 0.25 lb/ac	4.3	4.3	12.1	.06	.06	0.2
Dicamba						
a) 1.0 lb/ac	17.2	17.2	48.6	0.4	0.4	**1.1**
b) 2.0 lbs/ac	34.4	34.4	97.1	0.8	0.8	2.0
Glyphosate 3.75 lbs/ac	64.5	64.5	182	0.4	0.4	**1.0**
Triclopyr (Acid & BEE) 1.5 lbs/ac	25.8	25.8	72.8	0.3	0.3	0.7
NPE	28.7	23.0	113	3.0	2.0	11.0

Table 11. Herbicides and Their Application Rates for Chronic Exposures (on site) to Large Mammals Consuming Contaminated Vegetation Where There is no Spray Buffer and a Boom Application Method

Herbicide/Application Rate	Exposure Assessment Rate mg/kg/day or mg/kg/event			Hazard Quotient Rating		
	Central	Lower	Upper	Central	Lower	Upper
2,4 - D						
a) 1.5 lbs/ac (on site)	1.72	0.572	16.2	1.7	0.6	16.0
b) 2.0 lbs/ac	2.29	0.763	21.5	2.0	0.8	22.0
Chlorsulfuron 1.0 oz/ac	0.136	0.0452	1.28	0.03	0.009	0.3
Clopyralid 0.25 lb/ac	0.521	0.138	6.39	0.03	0.009	0.4
Dicamba						
a) 1.0 lb/ac	0.744	0.248	7.00	0.02	0.006	0.2
b) 2.0 lbs/ac	1.49	0.496	14.0	0.03	0.01	0.3
Glyphosate 3.75 lbs/ac	10.6	3.53	99.7	0.06	0.02	0.6
Triclopyr (Acid & BEE) 1.5 lbs/ac	3.78	0.969	48.0	0.8	0.2	10.0
NPE	0.138	0.0368	1.82	0.01	0.004	0.2

Under Alternative 2 and 4, 0.43% percent of potential deer habitat forest-wide could receive herbicides. This value drops significantly under Alternative 6, where a maximum of 522 acres could be treated using herbicide (Chapter 2 of FEIS).

Home range size for does and fawns is approximately was 0.4 to 1.1 miles square (Zeiner et al 1990) or 256 to 704 acres. There is a very little chance of mule deer receiving a large enough dose of contaminated vegetation in most weed occurrences for the following reasons. One, mule deer are not known to forage exclusively on the weed species selected for treatment. Two, most of the weed occurrences within potential habitat for deer are less than an acre. Therefore, it would be improbable to the point of insignificance that 10 to 100% of their diet would be in contaminated materials.

The exception would be in the larger weed occurrences. Although weeds are not considered forage, there easily could be overspray onto non-target plants within the weed occurrence (R. Wilson, pers. comm.), especially in the more densely packed weed occurrences. These larger occurrences, where there is a greater risk to deer, are discussed below.

DH013ISTI (Dyer's woad) (5,658 acres) – This Dyer's woad occurrence contains a variety of weed densities from homogenous patches of weeds to single plants. The habitat includes plantations, burned east-side pine stands and shrub communities. About 1/3 of the weed occurrence consists of lava reefs, which do not have large amounts of suitable forage and cover for deer (J. Ivrin, pers. comm.). The deer that utilize the area of this occurrence typically are off-site (in Oregon) at the time of year treatment would occur. However, the area does contain winter deer range and a few residential animals could consume year-round (J. Irvin, pers.comm.). For the most part, when the deer are concentrated in this polygon, they are heavily utilizing browse.

Under Alternatives 2 and 4, the entire occurrence could be treated. Those resident deer would probably not suffer effects associated with acute toxicities, which would require 100% of the diet to consist of contaminated vegetation. However, they could exhibit signs of toxicity associated with chronic exposures, especially at the lower (10% of the diet) and central values (30% of the diet) (Table 10). The only herbicide with hazard quotients over 1.0 at the lower and central levels is 2,4-D. According to information for mammals from the SERA report on 2,4-D, this herbicide has a low chance to cause "frank signs of neurotoxicity", but has an 80% chance of causing some degenerative changes to various organs. Although the effects do not appear to cause direct mortality to the animals, depending on the extent of the effect, individual animals could be at greater risk of predation. Treatment of this weed occurrence under Alternative 6 would cause no risk to the few resident deer, because only the outer edges would be sprayed to contain its spread.

BV006LIDA (Dalmatian toadflax) – The majority of the area is lava reef country with open conifer stands. The entire weed occurrence is roughly 850 acres. In many areas, the toadflax has a patchy distribution consisting of small clumps of plants that are less than .001 acre in size. Under Alternatives 2 and 4, the entire occurrence could be treated. However, there would still be a basic matrix of native plants to provide food for deer, so neither the acute nor the chronic scenarios are likely under Alternatives 2 and 4. Under Alternative 6, only the exterior satellites of the weed occurrence would be treated. Therefore, given the site conditions and deer food preferences, there would be no risk to mule under any action alternative for this occurrence.

BV001CRVU2 (Crupina) – The area along Post Canyon has crupina present along the road into conifer at various levels of infestation. The largest concentrations were at the lower end of the canyon in the open sage habitats. Other plants, both native and exotic, were within the matrix. In Alternatives 2 and 4 the entire occurrence could be treated. The acute scenario of 100% of the diet consisting of contaminated vegetation is not likely, because deer are not documented to rely on crupina for food. However, like the large Dyer's woad occurrence, some individual deer could be affected by 2,4-D under Alternatives 2 and 4. Under Alternative 6, only the exterior satellites of the weed occurrence would be treated, so there would be no risk to mule deer because of the limited exposure.

Under the alternatives with Early Detection/Rapid Response activities, wildlife biologists will review new noxious weed treatment sites prior to implementation. If concerns for deer surface, (including conditions not covered within the analysis for the FEIS), additional Design Standards could be added.

Mule deer are well distributed across the Modoc NF. Because only a few individual deer could be affected on three weed occurrences, implementation of Alternatives 2-6 would have no impact on the distribution of deer on the Modoc NF. Nor would there be any direct or indirect effects to

the whole population of deer on the Modoc NF, because of the animal use patterns for these weed occurrences is outside of the time of greatest potential for risk.

Cumulative Effects to Populations to Mule Deer

Since there are no direct or indirect effects to the mule deer population on the Modoc NF, there would be no cumulative effects.

The potential effects to pronghorn from herbicide use are as follows. There are 229 weed occurrences that are 1 acre or less out of a total of 237 weed occurrences within potential pronghorn habitat. These occurrences are small to the point where there would not be sufficient contaminated vegetation to cause acute or chronic effects. DH013ISTI (Dyer's woad), BV284ONAC (Scotch thistle), and BV001CRUV2 (Crupina) cause the greatest concern.

DH013ISTI (Dyer's woad) accounts for 1,743.68 acres of the total in both herbicide and physical. Although the 6,000 acre dyer's woad occurrence is within potential antelope habitat, it is north and west of the areas of greatest pronghorn concentration and use. During his 22 years on the Modoc NF, Mr. Irvin has seen a maximum of twelve individual sightings of pronghorn in this weed occurrence (J. Irvin, pers. comm.). Plus, pronghorn daily movements have been documented to range from 0.06 to 0.5 miles (Zeiner et al 1990), so they would not remain in an area to perpetually consume contaminated vegetation. Therefore, treatment of noxious weeds with herbicides will not affect pronghorn under Alternatives 2, 4 and 6.

There are 157.89 acres of potential pronghorn habitat in BV001CRUV2 (Crupina). This weed occurrence, in reality, does not provide potential habitat and is typed as such, only because an artifact of the way the lines depicting potential pronghorn habitat were drawn (B. Turner, pers. comm.). Therefore, there would be no risk to pronghorn by the treatment of this occurrence under any Alternative.

BV284ONAC consists of small pockets of scotch thistle that run the length of Messenger Gulch; although 16.31 acres of this polygon are typed as potential pronghorn habitat, very little of the total polygon would be treated because of the diffuse density of the weed distribution within the entire weed occurrence.

Under the alternatives with Early Detection/Rapid Response activities, wildlife biologists will review new noxious weed treatment sites prior to implementation. If concerns for pronghorn surface, (including conditions not covered within the analysis for the FEIS), additional Design Standards could be added.

Pronghorn are well distributed across the Modoc NF within potential habitat. Because only a few individuals could be affected in localized areas, implementation of Alternatives 2-6 would have no impact on the distribution of pronghorn on the Modoc NF. Nor would there be any direct or indirect effects to the whole population of pronghorn on the Modoc NF, because pronghorn use patterns occurring outside of the large weed occurrences.

Cumulative Affects to Populations Pronghorn Antelope

Because there are no direct or indirect effects to pronghorn antelope, there are no cumulative effects to pronghorn antelope populations or distribution under any alternative.

4.e.4. Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the Mule Deer and Pronghorn Antelope

The cumulative effects of the Action Alternatives of the Noxious Weeds Project will result in no decrease in forest-wide habitat for mule deer or pronghorn antelope. There would be no effect to mule deer or pronghorn populations by the implementation of any action alternative. Therefore, the impact of the Noxious Weeds Project will not alter the existing forest-wide trend in habitat, nor will it change the existing forest-wide population distribution trend for mule deer or pronghorn antelope.

4.f. Osprey

The osprey is both a terrestrial MIS as well as Species of Special Concern in California.

4.f.1. Habitat/Species Relationship

Osprey habitat varies greatly, but common denominators are: (1) adequate supply of accessible fish within (10–20 km) of nest; (2) open nest sites, which are generally elevated (e.g., trees, artificial platforms, towers, or bluffs); (3) ice-free season sufficiently long to allow fledging of young. In the western U.S. (Idaho, California, Oregon), most pairs (80–95%) nest in trees; historically in northeastern California (Tule Lake), 250–300 pairs nested in tall yellow pines (*Pinus ponderosa*) and junipers; nests were 12 to 30 meters from the ground. Ospreys on the Modoc National Forest utilize snags, platforms, or other structures in pine and mixed conifer habitats to situate their nests.

Microhabitat for foraging also varies greatly. Osprey forage along rivers, marshes, reservoirs, ponds and lakes, which have a ready supply of fish. Osprey are visual hunters, therefore foraging is less successful in water with thick emergent and submerged vegetation. Reservoirs often provide ample expanses of shallow, clear water—ideal conditions for hunting. Live fish comprised at least 99% of prey items recorded in almost every published account with a wide variety of fish species taken; osprey will also use birds, reptiles, small mammals, amphibians, and invertebrates (Zeiner et al. 1990a).

Nesting ospreys are able to adapt to certain level of disturbance (Bent 1937 and Palmer 1988a in USDA Forest Service 1994). Other authors have found that osprey will abandon the nest, especially when the disturbance is unexpected (various authors in USDA Forest Service 1994). Modoc NF has standards and guidelines in the form of Limited Operating Periods to protect nesting osprey.

4.f.2. Project-level Effects Analysis based on Habitat

Key Habitat Factor(s) for the Analysis: The proposed project, the removal of noxious weeds from Forest System Lands, will have no affect on habitat for osprey. Osprey utilize trees and snags for nests, and do not use noxious weeds for cover or food. The potential effects from the project are disturbance at the nest site and potential ingestion of contaminated prey.

Analysis Area for Project-level Effects Analysis: The analysis area for osprey is limited to the 13,238 acres of occupied habitat within 0.5 miles of nest sites and an additional 1,419 acres of potential habitat on the Modoc National Forest. This habitat is located around the reservoirs and lakes on the Forest; the greatest density is on the Devil's Garden and Big Valley Districts.

Alternatives 1 (Current Management)

Direct and Indirect Effects to Habitat The Forest Service currently treats 20 to 30 acres a year by physical methods. Currently, the Forest does not use herbicides to treat noxious weeds.

Implementing weed treatments under Alternative 1 would have no effect to osprey habitat. There will be no change in the current or future amount of large trees or snags by the treatment of noxious weeds. Therefore, 0 % of the current osprey habitat in the analysis area would be affected by implementation of Alternative 1.

Cumulative Effects to Habitat Because there is no direct or indirect effect to osprey habitat, there are no cumulative effects to osprey habitat.

Alternatives 2 to 6

There are a maximum of 0.46 acres (0.03%) that may be treated with physical or herbicide means within the 13,238 acres of occupied habitat forest-wide. There are an additional 9.99 acres (0.7%) of (WM009CIAR4) (Canada thistle) in potential habitat.

Table 12. Proposed treatment within Potential Osprey Habitat

Species	Total Acres of Habitat Forest- wide	Total Maximum Acres of Physical Treatments*	Total Maximum Acres of Herbicide Treatments
Osprey – Occupied	13,238	0.46	0.46
Osprey - Potential	1,419	9.99	9.99

*** This figure includes the maximum, where physical or herbicide methods may be employed.**

The WM009CIAR4 (Canada thistle) occurrence consists of old beaver ponds that are mostly sedimented into meadow habitat and do not contain fish (M. Yamagiwa, pers. comm.). They were typed as potential osprey habitat, due to an artifact in the data set. Therefore, there will be no effect to osprey in treating this weed occurrence.

No nest trees or nesting habitat would be removed under any action alternative. Prey habitat should benefit from the treatment of weeds, because weeds in riparian habitats may cause increased sedimentation. Purple loosestrife (*Lythrum salicaria*), tall whitetop (*Lepidium latifolium*), and Canada thistle (*Cirsium arvense*) have the potential to locally contribute to unstable stream banks. Not only do species like tall whitetop exclude native species, but these species do not have root systems that withstand erosive forces of water, and could allow increased sedimentation into creeks as well as loss of bank habitat (www.cal-ipc.org; FEIS invasive plant database; Bossard, Randal, and Hoshovsky 2000). However, the beneficial effects to osprey habitat forest-wide are small at this point; therefore there would be no direct or indirect effect to osprey habitat by implementation of Alternatives 2-6.

Cumulative Effects to Habitat

Because there is no direct or indirect effect to osprey habitat, there are no cumulative effects to osprey habitat.

4.f.3. Summary of Population Status and Trend at the Forest Scale

The Modoc NF LRMP (as amended by the SNFPA) requires forest-scale distribution population monitoring for osprey. The sections below summarize population status and trend data for these species. This information is drawn from the detailed information on population trends in the Modoc National Forest MIS Report (USDA 2007b), which is hereby incorporated by reference.

Population Status and Trend at the Bioregional Scale

In California, the current osprey range is expanding south of San Francisco Bay along the southern limit of its range in western California and southward into the Sierra Nevada. California-wide BBS data for the period of 1966-2004 classifies osprey as "Definitely increasing" (Siegel and DeSante 1999), with a significant increase of 6.6% (range 2.3 to 10.9) per year over the 33 routes. At the Sierra Nevada scale, for the period of 1966-2004, Sierra Nevada-wide BBS data classifies osprey as "possibly increasing" (Siegel and DeSante 1999), with an increase of 33.6% (range 15.4 to 51.8%) per year over 5 routes. This trend is consistent with trends observed at the State and Survey-wide scales.

Nest locations to date, have been derived through a combination of incidental sightings, intensive nest stand searches, and BBS data. At the time of preparation, the Forest LRMP FEIS described the Forest as having seven active nesting territories (USDA 1991b). Currently, there are at least 14 territories or twice the number that occurred in 1991.

Effects of the Alternatives Considered within the Noxious Weeds FEIS

The only direct effect from physical and herbicide treatments is the potential for disturbance to nesting osprey; literature has documented instances where osprey will abandon nests, if the activity is outside of their usual experience. Modoc LRMP allows for up to 0.5 mile LOPs around active nests sites. Pre-treatment surveys and LOPs for active nest sites will take care of potential disturbance effects on nesting osprey.

There is a small potential for herbicides getting into adjacent reservoirs and streams, thereby contaminating water and potentially harming fish in occupied osprey habitat; fish are the osprey's dietary staple. The direct effects to fish and their habitat would be short-term (especially in a stream situation) as well localized in small patches (0.09 acres is the largest weed occurrence size). The use of treatment buffers and spill plan should minimize this potential harm to prey. Regardless, treatment with herbicides on 0.26 acres forest-wide would not cause 10 to100% of an osprey's diet to consist of contaminated fish.

Under the alternatives with Early Detection/Rapid Response treatments, new occurrences would be reviewed by wildlife biologists prior to implementation. All weed occurrence implementation sites will need to meet fish habitat and water quality standards, and therefore will be limited in acre size; in addition, treatment buffers adjacent to water, as per the BMP's and Design Standards, will add extra protection. If treatment of new occurrences is outside of the conditions examined under the Noxious Weeds Treatment FEIS, additional Design Standards could be added.

Cumulative Effects to Populations

Because there are no direct or indirect effects to osprey populations, there are no cumulative effects to osprey populations.

4.f.4. Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the Osprey

The cumulative effects of the Action Alternatives of the Noxious Weeds Project will result in no decrease in forest-wide habitat for osprey. Nor will there be any potential effect to the population for osprey. Therefore, the implementation of the Noxious Weeds Project will not alter the existing forest-wide trend in habitat, nor will it change the existing forest-wide population distribution trend for osprey.

4.g. Red-breasted and Red-naped Sapsuckers

Red-breasted and red-naped sapsuckers are both terrestrial MIS as well as a non-game species in California. Both red-naped and red-breasted sapsuckers were selected as Management Indicator Species for the Forest, because of "their affinity for snags or live trees with heart rot in or near riparian zones". Both species prefer hardwoods for feeding and reflect the management of hardwood vegetation within riparian zones (US Forest Service 1991b. Page 3-110).

4.g.1. Habitat/Species Relationship

Habitats used by red-breasted sapsucker include riparian, deciduous hardwood and various conifer stands, especially those stands adjacent to meadows, lakes, and slow moving streams (Zeiner et al. 1990a). "[The red-breasted sapsucker] frequents sparse to moderate canopy with suitable snags for nest and roost excavation, especially in the vicinity of aspens, wet meadows, clearings, lakes, and other open habitats (Zeiner et. al. 1990a)". Data from Dr. Laudenslayer's study on the Modoc National Forest showed red-breasted sapsuckers nesting in dry, open east side pine stand with few pine snags and juniper in the understory in addition to riparian habitats.

Red-breasted sapsuckers forage mainly on deciduous hardwoods (Zeiner et. al. 1990a), but sometimes conifers in east-side pine in northeastern California (Oliver 1970). The birds eat sap, cambium, and other tree tissues as well as arthropods (Zeiner et al. 1990a). Insects are gleaned or caught using a "fly catch" technique (Walters et al. 2002). Territory size was up to 15 acres around nest sites.

Habitat types used by red-naped sapsuckers include mixed conifer, aspen, and montane riparian habitats, especially those areas with aspen, willow, and cottonwood (Zeiner et. al. 1990). Although they will use a variety of trees including conifers, they "apparently prefer to nest in aspen and montane riparian habitats"; they also require snags or live trees with rot for excavating cavities (Zeiner et. al. 1990a, Daily 1993). On the Humboldt-Toiyabe National Forest, red-naped sapsuckers used aspen more than any other habitats (Warkentin and Reed 1999).

Red-naped sapsuckers appear to be omnivorous, foraging on insects and sap (Crockett and Hadow 1975); Zeiner et. al. (1990a) also included berries in their diet. In Colorado, red-naped sapsuckers made wells in willows, where large sections of the bark were torn down to the cambium (Ehrlich and Dailey 1988). A study conducted in northwestern Montana found that

sapsuckers were almost entirely dependent on conifer sap in the spring when they first arrive on site; the sap from aspen and birch is not important until after these species leaf out. Insects are not abundant in their diets' until later in the season (Tobalske 1992). Territory size was up to 15 acres around nest sites.

4.g.2. Project-level Effects Analysis based on Habitat

Key Habitat Factor(s) for the Analysis: The proposed project, the removal of noxious weeds from Forest System Lands, will have no affect on riparian hardwood habitat, which is important for both sapsucker species. Neither species is known to use noxious weeds for cover or food. The main potential effect is limited to the potential consumption of herbicide contaminated insect and plant materials.

Analysis Area for Project-level Effects Analysis: The analysis area for red-breasted sapsucker is limited to the 107,300 of potential habitat on the forest. These conifer stands are scattered throughout the Warner Mountain Ranger District forest. In addition, they are concentrated in the portions of the Big Valley, Devil's Garden, and Doublehead Districts.

The analysis area for red-naped sapsucker is limited to the 45,600 acres of potential habitat on the forest. Habitat is located in proximity to aspen stands. In general, the areas are concentrated on the Warner Mountain Ranger District with a few scattered pockets in other portions of the Forest.

Alternative 1 (Current Management)

Direct and Indirect Effects to Habitat The Forest Service currently treats 20 to 30 acres a year by physical methods. Currently, the Forest does not use of herbicides to treat noxious weeds.

Implementing weed treatments under Alternative 1 would have no effect on habitat for either sapsucker. There will be no change in the current or future amount of snags by the treatment of noxious weeds. There will be little if any change in the amount of willows and aspen. Therefore, 0 % of the current red-breasted or red-naped sapsucker habitat in the analysis area would be affected by implementation of Alternative 1.

Cumulative Effects to Habitat Because there is no direct or indirect effect to red-breasted or red-naped sapsucker habitat, there are no cumulative effects to habitat for either species of sapsucker under this alternative.

Alternatives 2 to 6

Direct and Indirect Effects to Habitat There are a maximum of 51.35 acres out of 107,300 acres (0.048%) where physical treatments of potential red-breasted sapsucker habitat forest-wide could occur (13). There are a maximum of 49.93 acres (0.047%), where herbicide treatments may be applied within potential red-breasted sapsucker habitat forest-wide. There are a maximum of 14.7 acres out of 45,600 acres (0.032%) where physical or herbicide treatments could be applied within potential red-naped sapsucker habitat forest-wide (Table 13).

Table 13. Proposed Treatment within Potential Red-breasted and Red-naped Sapsucker Habitat

Species	Total Acres of Potential Habitat Forest-wide	Total Maximum Acres of Physical Treatments*	Total Maximum Acres of Herbicide Treatments*

Red-breasted Sapsucker	107,300	51.35	49.93
Red-naped Sapsucker	45,600	14.7	14.7

*** This figure includes the maximum, where physical or herbicide methods may be employed.**

Implementing weed treatments under Alternatives 2 through 6 would have no effect on red-breasted or red-naped sapsucker habitat. There will be no change in the current or future amount of snags for nesting or foraging trees, nor will there be any change in the amount of shrubs for foraging under implementation of any action alternative. Aspen and meadow habitat could be stable to improved by the implementation of any action alternative in very small areas, because the treatment decreases the competition to native species by noxious weeds.

Just like the hairy and pileated woodpeckers, the sapsuckers spend their time foraging in trees and willows. According to Walters et al. (2002), foraging red-breasted sapsuckers in a California study spent 73% of their time in trees, 21% on snags, 3% on logs, 1% on the ground and 1% in the air. Since native trees and shrubs will remain as part of this FEIS, there will be little if any change to potential prey habitat by implementation of any alternative. Therefore, there will be no direct or indirect effects to habitat for either sapsucker under any action alternative.

Cumulative Effects to Habitat Because there are no direct or indirect effects to red-breasted or red-naped sapsucker habitat, there are no cumulative effects to habitat for either sapsucker species under these alternatives.

4.g.3. Summary of Population Status and Trend at the Forest Scale

The Modoc NF LRMP (as amended by the SNFPA) requires forest-scale distribution population monitoring for both sapsuckers. The sections below summarize population status and trend data for the red-breasted and red-naped sapsucker. This information is drawn from the detailed information on population trends in the Modoc National Forest MIS Report (USDA 2007a), which is hereby incorporated by reference.

Population Status and Trend at the Bioregional and Local Scales

Population monitoring data collected by various partners at the bioregional scale indicate that red-breasted sapsuckers as “possibly decreasing” (Siegel and DeSante 1999), with a non-significant decrease of -3.18% (range -7.8 to 1.6%) per year for the Sierra Nevada. Population trends have also been evaluated using the Institute for Bird Populations’ Monitoring Avian Productivity and Survivorship program (MAPS), which oversees a nationwide dataset of mist-netting stations. MAPS data for red-breasted sapsucker between 1992-2001 for the entire Northwest region, (which includes 12 MAPS stations in the Sierra Nevada) showed an average 2-year population change of 0.28% (s.e.= 7.3). These data infer that red-breasted sapsucker populations across most of their range may be stable.

Red-breasted sapsuckers have been detected from 1910 to the present during various surveys on the Modoc NF. Historical records of specimens collected from the Berkeley Natural History Museum date back to 1910 and the 1940’s. More recently, red-breasted sapsucker presence/absence on the Modoc National Forest has been noted under the following efforts: project generated stand searches conducted for various species, the Pacific Southwest Research Station (PSW) cavity nesting bird study (Laudenslayer 2002), and during province and forest level surveys for willow flycatcher. The distribution for red-naped sapsuckers is the same as during the Modoc LRMP.

California has only a small sliver of the red-naped sapsucker range in North America. According to BBS staff biologists, there has only been one red-naped sapsucker sighting for California. This sighting was west of the Modoc NF. Siegel and DeSante (1999), who used BBS data as part of their conservation assessment, also stated that there was insufficient data to determine a trend for red-naped sapsucker for the Sierra Nevada. However, there is an increase in the trend of the red-naped sapsucker data for 1966 to 2003 in a large portion of the red-naped sapsucker range.

Red-naped sapsuckers have been sighted infrequently on the Modoc National Forest; the majority of the sightings are on the Warner Mountain Ranger District. Red-naped sapsuckers have been detected during stand searches conducted for various projects, the Pacific Southwest Research Station (PSW) cavity nesting bird study (Laudenslayer 2002), and project level surveys for willow flycatcher. In addition, there are historical records of specimens collected from the Modoc NF at the Berkeley Natural History Museum. In the PSW study, red-naped sapsuckers were detected at various locations on the Modoc NF, however, no nest sites were found. The distribution for red-naped sapsuckers is basically the same as during the Modoc LRMP.

Effects of the Alternatives Considered within the Noxious Weeds FEIS

There is very little chance of either species receiving a large enough dose of contaminated vegetation or insects to cause a risk to individual birds for the following reasons. They forage mainly on trees, willows, and snags. Most of the weed occurrences within potential habitat red-breasted or red-naped sapsuckers are less than an acre; therefore, it would be unlikely that 10 to 30% of their diet would be in contaminated materials. The larger occurrences, where there is a greater likelihood of contamination are discussed below. The weed occurrences in potential red-breasted sapsucker habitat are followed by the red-naped weed occurrences.

Red-breasted sapsucker occurrences:

BV006LIDA (Dalmatian toadflax) – The majority of the area is lava reef country with open conifer stands. Under Alternatives 2 and 4, there are 4.55 acres within potential red-breasted sapsucker habitat in the entire 850 acre toadflax occurrence that could be treated. This 4.55 acre area would be included in 1 territory or 0.004% of the potential red-breasted sapsucker habitat on the Forest. It is highly unlikely that insects would climb from a weed onto an adjacent tree or willow and be ingested, because the insects tend to utilize specific types of plants (e.g. insects like carpenter ants utilize wood fiber and would not tend to concentrate on herbaceous weeds). Moreover, the toadflax has a patchy distribution consisting of small clumps weeds within a matrix of native plants, so herbicides would not be applied to a 4.55 acre block. Given their feeding preferences and the diffuse nature of the toadflax within the occurrence, it is unlikely to the point of being discountable that there would be any effect to red-breasted sapsuckers by implementation of Alternative 2 or 4. Under Alternative 6, only the exterior satellites of the weed occurrence would be treated, so there would be no risk to red-breasted sapsucker under this Alternative.

WM003LIDA (Dalmatian toadflax) – As stated under the hairy woodpecker discussion, this occurrence actually encompasses a series of very small patches. Although there are 20.26 acres of potential red-breasted sapsucker habitat, only about 1 acre of potential habitat would be treated. Consequently, the chance of a red-breasted sapsucker consuming 10 to 30% of their diet from treated plants would be remote under Alternatives 2, 4 and 6.

BV001CRVU2 (Crupina) – The area along Post Canyon had crupina present along the road into conifer at various levels of infestation. The largest concentrations were at the lower end of the canyon in the open sage habitats. Other plants, both native and exotic, are within the matrix. In Alternatives 2 and 4, the entire occurrence could be treated. There are 12.96 acres of potential red-breasted sapsucker habitat that could be treated. This could equate to one territory. Most of the insects would not cross over from herbaceous weeds to snags and logs. In addition, crupina does not provide a fruit that would be ingested either. Given the red-breasted sapsuckers' feeding preferences, implementation of Alternatives 2 or 4 are not expected to affect this sapsucker. Under Alternative 6, only the exterior satellites of the weed occurrence would be treated, so there would be no risk to red-breasted sapsucker.

BV302ONAC (Scotch thistle) – The site is within mixed conifer habitat with a high degree of incense cedar. Many of the trees are small diameter (sapling and pole sized) (J. Landoski, pers. comm.), and would not be considered prime potential red-breasted sapsucker habitat. According to the database, there are only 40 plants, so the potential for contamination of a large part of a sapsuckers diet would also be low. Given that only 2.41 acres of potential red-breasted sapsucker could be treated, the low suitability of the area for sapsuckers, and the low number of weeds to be treated, use of herbicides are not expected to have any affect to red-breasted sapsucker under any Alternative for this weed occurrence.

WM009CIAR4 (Canada thistle) **–** Although the beaver degraded this site, there could be potential red-breasted sapsucker in close juxtaposition to contaminated insects. The sapsuckers would not forage on thistles, but ants could be sprayed and move onto willows, where they could be consumed by sapsuckers. Assuming that a potential territory encompasses 15 acres, 3.21 acres or 21.4% of a potential territory could be treated. Clopyralid would be the preferred herbicide for treatment under Alternatives 2, 4 and 6; the hazard quotient for a small bird consuming insects is less than 1.0, so the risk of toxic effects to birds is small. Design Standard DS-12b would limit the use of 2,4-D on the site, thereby further minimizing the potential for toxic effects to this species.

Under the alternatives with Early Detection/Rapid Response activities, wildlife biologists will review new noxious weed treatment sites prior to implementation. If concerns for red-breasted sapsuckers surface (including conditions not covered within the analysis for the FEIS), additional Design Standards could be added.

To summarize, the use of herbicides will have discountable effects to single red-breasted sapsuckers and will have no direct or indirect effect on the distribution and population of red-breasted sapsucker on the Modoc National Forest for the following reasons. One, only a small amount of potential red-breasted sapsucker habitat is scheduled to be treated (even in the largest weed occurrences). Two, the treatment consists of spraying weeds not preferred foraging structures (trees, snags, logs, and willows). Three, prey should be largely unaffected, because there would be a small amount of insect migration from weeds to woody structures. Finally, the lower hazard quotient rating for herbicides scheduled for use.

Cumulative Effects to Populations

Because there are no direct or indirect effects to red-breasted sapsucker population and distribution on the Modoc NF, there are no cumulative effects to red-breasted sapsucker population or distribution under any alternative.

These following paragraphs discuss occurrences within potential red-naped sapsucker habitat and potential effects to this species by their treatment.

WM004ONAC (Scotch thistle) – The vegetation on this site is dominated by a pine plantation with most trees about 20 to 30 feet tall and is not considered red-naped sapsucker habitat. The vegetation understory was generally sparse consisting of shrubs, forbs and grasses. Therefore, implementation under Alternatives 2, 4 and 6 are not expected to effect red-naped sapsucker for this site.

WM009CIAR4 (Canada thistle) **–** The beaver severely degraded this potential red-naped sapsucker habitat site, so there is little chance for red-naped sapsucker to consume contaminated insects. Clopyralid would be the preferred herbicide for treatment under Alternatives 2, 4 and 6; the hazard quotient for a small bird consuming insects is less than 1.0, so the risk of toxic effects to birds is small. Design Standard 12b would limit the use of 2,4-D on the site, thereby further minimizing the potential for toxic effects to this species. Therefore, treatment of this site is not expected to effect red-naped sapsucker under any alternative.

Under the alternatives with Early Detection/Rapid Response activities, wildlife biologists will review new noxious weed treatment sites prior to implementation. If concerns for red-naped sapsuckers surface (including conditions not covered within the analysis for the FEIS), additional Design Standards could be added.

Cumulative Effects to Populations Because there are no direct or indirect effects to red-naped sapsuckers, there are no cumulative effects to red-naped sapsucker populations or distribution under any alternative.

4.g.4. Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the Red-naped and Red-breasted Sapsucker

The cumulative effects of the Action Alternatives of the Noxious Weeds Project will result in no decrease in forest-wide habitat for either sapsucker species. There is the potential effect to one potential red-breasted sapsucker territory and no red-naped sapsucker territories. Therefore, the impact of the Noxious Weeds Project will not alter the existing forest-wide trend in habitat, nor will it change the existing forest-wide population distribution trend for red-breasted or red-naped sapsucker.

4.h. Western Gray Squirrel

The western gray squirrel is a terrestrial MIS as well as a game species in California.

4.h.1. Habitat/Species Relationship

Habitat for this species includes dense stands of large trees and snags with abundant cavities and food, preferably near water; the authors went on to state that this species “require large trees, mast, and snags” (Zeiner et al. 1990). In the Mammalian Species Number 474: *Sciurus griseus*, they noted that gray squirrels utilize various habitats that have oaks (Carraway and Verts 1994). These authors also noted that gray squirrel’s use cavities that have been excavated by woodpeckers for raising young. Squirrels were found to prefer areas with a patchy understory that had a greater diversity of food producing trees and shrubs (Ryan and Carey 1995). These stands also needed to have connected tree canopies to allow arboreal travel especially within 66

yards of the nest (Ryan and Carey 1995). There are 1,447 acres of oak and an additional 125,473 acres of mixed conifer habitat on the Modoc N.F. that were modeled as potential habitat.

Food studies conducted in part in Shasta and Tehama Counties noted that squirrels mainly used hypogeous fungi, and acorns as well as a variety of plant and animal matter (Stienecker 1977, Stienecker and Browning 1970). A study in Oregon found that gray squirrels used conifer seeds; some of the cones were cached for winter (Carraway and Verts 1994).

4.h.2. Project-level Effects Analysis based on Habitat

Key Habitat Factor(s) for the Analysis: The proposed project, the removal of noxious weeds from Forest System Lands, will have no affect on oak habitat for western gray squirrel; gray squirrel are not reliant on noxious weeds for cover or food. The main potential effect is limited to the potential consumption of herbicide contaminated plant and insect materials by gray squirrel.

Analysis Area for Project-level Effects Analysis: The analysis area for western gray squirrel is limited to the 126,920 acres of potential habitat on the forest. The highest quality oak habitat is limited to the Big Valley and Devil's Garden Districts. The low incidence habitat is found on the Warner Mountain and Big Valley Districts.

Alternative 1 (Current Management)

Direct and Indirect Effects to Habitat The Forest Service currently treats 20 to 30 acres a year by physical methods. Currently, the Forest does not use of herbicides to treat noxious weeds.

Implementing weed treatments under Alternative 1 would have no effect gray squirrel habitat. There will be no change in the current or future amount of oaks, which are a primary focus of the LRMP Standards and Guidelines for squirrel habitat. Nor will there be any change in the amount of large trees, which provide food and cover. Therefore, 0 % of the current western gray squirrel habitat in the analysis area would be affected by implementation of Alternative 1.

Cumulative Effects to Habitat

Because there is no direct or indirect effect to western gray squirrel habitat, there are no cumulative effects to squirrel habitat under this alternative.

Alternatives 2 to 6

Direct and Indirect Effects to Habitat

There were no noxious weed occurrences within the oak polygons found throughout the Forest, which is the habitat with the greatest amount of squirrels. Tree cavities and dreys would not be removed under any action alternative. There is a maximum of 47.3 acres (0.038%) that could be treated with herbicides in low incidence potential squirrel habitat (Table 14).

Table 14. Proposed Treatment within Low Incidence Potential Gray Squirrel Habitat

Total Acres of Potential low incidence Habitat Forest-wide	Total Maximum Acres of Physical Treatments*	Total Maximum Acres of Herbicide Treatments*
125,473	47.69	47.3

*** This figure includes the maximum, where physical or herbicide methods may be employed**

According to food studies completed in northern California, the following foods were the highest volume in the samples: fungi, acorns, pine nuts, insects, and green vegetation (forbs) (Stienecker 1977, Stienecker and Browning 1970). Fungi, acorns, and pine nuts will not be affected by herbicides or physical treatments of weeds. The removal of noxious weeds would not affect potential insect prey habitat, because there are currently no native insects that require weeds for food or cover. In addition, sufficient native plants exist outside of the boundaries of the current weed occurrences to provide forbs for insects and squirrels. Therefore, there will be no direct or indirect effects to western gray squirrel habitat by implementation of any alternative.

Cumulative Effects to Habitat

Because there are no direct or indirect effects to western gray squirrel habitat, there are no cumulative effects to gray squirrel habitat under these alternatives.

4.h.3. Summary of Population Status and Trend at the Forest Scale

The Modoc NF LRMP (as amended by the SNFPA) requires forest-scale distribution population monitoring for western gray squirrel. The sections below summarize population status and trend data for the gray squirrel. This information is drawn from the detailed information on population trends in the Modoc National Forest MIS Report (USDA 2007b), which is hereby incorporated by reference.

Population Status and Trend at the Bioregional and Local Scales

Western gray squirrel is “S4, Apparently Secure” (“Uncommon but not rare; some cause for long-term concern due to declines or other factors”) in California (NatureServe 2006). With respect to northeastern California, Fish and Game personnel believe the gray squirrel population seems to be stable (Tim Burton and Scott Hill, pers. comm.). Richard Shinn noted that locally in Modoc County, the squirrel populations receive little hunting pressure (R. Shinn, pers. comm.). Dr. Laudenslayer is currently working with mammalogists from San Jose State University to determine if there has been a range extension of grey squirrels into Surprise Valley (east of the Modoc National Forest).

Data for gray squirrel on the Forest consists of series of incidental sightings data. Gray squirrels have been observed almost entirely in oak habitat on the Modoc National Forest. There are a few sightings in pine stands on the Devil’s Garden Ranger District and a few sightings in higher-elevation mixed conifer habitats of the Big Valley and Warner Mountain Districts (George Studinski, Ken Romberger, and M. Flores, pers. comm). Gray squirrels have not been detected during mammalian surveys conducted at several locations on the Warner Mountain District by San Jose State University staff (J. Matson, pers. comm.). The vast majority of the gray squirrel observations east of the oak habitat on the Modoc NF have been in Surprise Valley (B. Laudenslayer, pers. comm.).

Effects of the Alternatives considered within the Noxious Weeds FEIS

Under Alternatives 3 and 5 (non-herbicide Alternatives) as well as the physical treatment aspects of Alternatives 2, 4, and 6, there would be no potential ingestion of contaminated materials.

The potential for ingestion of enough contaminated material to cause an effect to gray squirrel population would a very minor for the following reasons. First, there are no weed occurrences in the oak habitats, where the highest density of squirrels exist. Second, conifer, fungal materials,

and native plants would remain on site. Finally, the largest weed occurrences within the low incidence gray squirrel habitat are found on the Warner Mountains, where there are few gray squirrels.

There is a maximum of 47.0 acres (0.038%) in low incidence gray squirrel/conifer habitat, which could be treated with herbicides forest-wide. There have been no gray squirrels detected in the largest weed occurrences (WM001ISTI, WM002ISTI, WM003ISTI, WM004ISTI, and WM005ISTI – [Dyer's woad] and WM009CIAR [Canada thistle]). The rest of the occurrences in potential low incidence squirrel habitat are small and scattered. It is not likely that 10 to 100% of a gray squirrel's diet would consist of contaminated vegetation, because of the low density of squirrels on the Warner Mountain District in addition to the gray squirrels' feeding preferences (which do not appear to include weeds).

Under the alternatives with Early Detection/Rapid Response activities, which wildlife biologists would review, prior to implementation; if concerns for western gray squirrel surface, additional Design Standards could be added, if weed treatment areas were outside of the conditions analyzed within the FEIS.

To summarize, the use of herbicides will have no direct or indirect effect on the distribution and population of gray squirrel on the Modoc National Forest for the following reasons. One, only a small amount of potential gray squirrel habitat is scheduled for treatment, and it is outside of the area of known occupancy. Two, the treatment consists of spraying weeds, not preferred foraging and reproductive structures. Three, food should be largely unaffected, because their foraging preferences.

Cumulative Effects to Populations

Since there are direct or indirect effects to western gray squirrels, there are no cumulative effects to western gray squirrel population or distribution on the Modoc NF.

4.h.4. Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the Western Gray Squirrel

The cumulative effects of the Action Alternatives of the Noxious Weeds Project will result in no decrease in forest-wide habitat for western gray squirrel. There are no potential effects to the squirrel population. Therefore, the Noxious Weeds Project will not alter the existing forest-wide trend in habitat, nor will it change the existing forest-wide population distribution trend for western gray squirrel.

4.j. Yellow Warbler

The yellow warbler is a terrestrial MIS as well as a Species of Special Concern in California.

4.j.1. Habitat/Species Relationship

Yellow warblers are found in various shrubby riparian areas in localized areas throughout the Forest. General habitat for yellow warblers includes both open-canopy riparian woodlands in addition to open conifer stands with substantial amounts of shrubs in the understory (Zeiner et al. 1990). King et al. (2001) found that yellow warblers on the Lassen National Forest and Lassen Volcanic National Park utilized "encroaching" lodgepole pine near meadows for nesting,

perching, and singing. During the breeding season, open to medium density woodlands and forests with a dense shrub understory are frequently used (Zeiner et al. 1990).

Yellow warblers forage in trees and shrubs; the males tended to forage in areas that were less dense, presumably to be more visible to aide in territory boundary defense (Busby and Sealy 1979). A study in Utah found that they never foraged on the ground; a similar study in Wyoming found that they foraged on the ground about 4% of the time (Lowther et. al. 1999). Numerous authors have found that their diet is composed of arthropods; the diet varied based on the type of prey available (Busby and Sealy 1979; Lowther et. al. 1999).

4.j.2. Project-level Effects Analysis based on Habitat

Key Habitat Factor(s) for the Analysis: The proposed project, the removal of noxious weeds from Forest System Lands, will have no affect on riparian habitat for yellow warbler; yellow warblers are not reliant on noxious weeds for cover or food. The main potential effect is limited to the potential consumption of herbicide contaminated insect materials by yellow warbler.

Analysis Area for Project-level Effects Analysis: The analysis area for yellow warbler is 53,000 acres of potential habitat forest-wide. The habitat is distributed throughout the Big Valley and Warner Mountain Districts with a few localized areas on the Devil's Garden and Doublehead Districts.

Alternative 1 (Current Management)

Direct and Indirect Effects to Habitat The Forest Service currently treats 20 to 30 acres a year by physical methods. Currently, the Forest does not use of herbicides to treat noxious weeds.

Implementing weed treatments under Alternative 1 would have no effect yellow warbler habitat. There will be no change in the riparian vegetation consisting of shrubs and trees that comprise nesting and foraging habitat. Therefore, 0 % of the current yellow warbler habitat in the analysis area would be affected by implementation of Alternative 1.

Cumulative Effects to Habitat

Because there is no direct or indirect effect to yellow warbler habitat, there are no cumulative effects to yellow warbler habitat under this alternative.

<u>Alternatives 2 to 6</u>

Direct and Indirect Effects to Habitat

A maximum of 0.2 acres (0.0004%) forest-wide could receive physical or herbicide treatments within potential yellow warbler habitat. These warblers nest in trees and shrubs, so no nesting habitat will be removed under any action alternative. A study in Utah found that they never foraged on the ground; a similar study in Wyoming found that they foraged on the ground about 4% of the time (Lowther et. al. 1999). Prey habitat would not be affected, because there are currently no native insects that are reliant on weeds for food or cover. Moreover, sufficient native plants exist outside of the boundaries of the current weed occurrences to provide food and cover for prey. Therefore, no foraging habitat would be removed with implementation of any action alternative. Since there will be no direct or indirect effect to nesting and foraging habitat, there

will be no direct or indirect effect to yellow warbler habitat by the implementation of any Alternative.

Table 15. Proposed Treatment within Potential Yellow Warbler Habitat

Total Acres of Potential Habitat Forest-wide	Total Maximum Acres of Physical Treatments*	Total Maximum Acres of Herbicide Treatments*
53,000	0.2	0.2

*** This figure includes the maximum, where physical or herbicide methods may be employed**

Cumulative Effects to Habitat

Because there are no direct or indirect effects to yellow warbler habitat, there are no cumulative effects to yellow warbler habitat under these alternatives.

4.j.3. Summary of Population Status and Trend at the Forest Scale

The Modoc NF LRMP (as amended by the SNFPA) requires forest-scale distribution population monitoring for yellow warbler. The sections below summarize population status and trend data for the yellow warbler. This information is drawn from the detailed information on population trends in the Modoc National Forest MIS Report (USDA 2007b), which is hereby incorporated by reference.

Population Status and Trend at the Bioregional and Local Scales

Yellow warbler has been monitored throughout California. California-wide BBS data for the period of 1966-2004 classifies yellow warbler as “possibly decreasing” (Siegel and DeSante 1999) with a non-significant decrease of -1.4% (range -3.3 to 0.4) per year. The Regional Credibility ranking is “Blue” (“data with larger sample size, at least moderate precision, and at least moderate abundance on routes”). The Christmas Bird Count for California data shows huge annual fluctuations in the yellow warbler numbers, but that the overall trend has increased

At the Sierra Nevada scale for the period of 1966-2004, Sierra Nevada-wide BBS data classifies Yellow warbler as “possibly decreasing” (Siegel and DeSante 1999) with a non-significant decrease of -2.4% (range -6.2 to 1.5%) per year. The Regional Credibility ranking is “Blue” (“data with larger sample size, at least moderate precision, and at least moderate abundance on routes”).

Yellow warblers have been sighted on the Modoc National Forest from 1910 to the present. This species is found sporadically in riparian areas containing a variety of shrub species throughout the Forest. Presence data has been collected as part of surveys for avi-fauna conducted in the early part of the century (1910 survey by Taylor and Bryant; 1920 survey by White), a series of incidental sightings by biologists and technicians, surveys conducted for the Tuscarora Pipeline Project, and during riparian point counts run for willow flycatcher. Yellow warbler appears to be distributed in various areas across the Forest similar to the pattern discussed in the Modoc LRMP.

Effects of the Alternatives Considered within the Noxious Weeds FEIS

Forest-wide a maximum of 0.2 acres could receive herbicide or physical treatments. Under Alternatives 3 and 5 (non-herbicide Alternatives) as well as the physical treatment aspects of

Alternatives 2, 4, and 6, there would be no potential ingestion of contaminated materials. The effects discussed below pertain to herbicide treatments considered under Alternatives 2, 4 and 6.

According to the literature, yellow warblers feed on insects taken from shrubs and trees, although there is a low risk of gathering contaminated insects from the ground. Given that there are only 0.2 acres out of 53,000 acres (0.0004%) of potential habitat forest-wide that could receive herbicides treatments and the fact that this species mainly gleans insects from trees and shrubs, direct and indirect effects are too small to the point of being discountable.

For the small bird consuming contaminated insects scenario, 2,4-D (alone or in a tank mix), dicamba, and the surfactant NPE all exceed hazard quotient ratings of 1.0. Neither of the two weed sites would be treated with 2,4-D under Alternatives 2 and 4, because they both lay within 1,000 feet of water. Under Alternative 6, any of the herbicides could be used. However, the assumption behind this scenario is that 100% of the diet consists of contaminated insects. Given the small size of the weed occurrence and their foraging preferences, this potential effect is small to the point of being discountable.

Under the alternatives with Early Detection/Rapid Response activities, new occurrences will be reviewed by wildlife biologists prior to implementation; all weed occurrence implementation sites will need to meet water quality standards, and therefore will be limited in acre size as per the Best Management Practices (BMP's) and Design Standards. Consequently, there are inconsequential direct and indirect effects to individual yellow warblers and no direct or indirect to the yellow warbler distribution or population on the Modoc NF by the implementation of any alternative.

Cumulative Effects to Populations

Since there are no direct or indirect effects to the yellow warbler distribution or population on the Modoc NF, there are no cumulative effects to yellow warbler population.

4.j.4. Relationship of Project-Level Impacts to Forest-Scale Habitat and Population Trends for the Yellow Warbler

The cumulative effects of the Action Alternatives of the Noxious Weeds Project will result in no decrease in forest-wide habitat for yellow warbler. There are also no potential effects to the Modoc NF yellow warbler population. Therefore, the Noxious Weeds Project will not alter the existing forest-wide trend in habitat, nor will it change the existing forest-wide population distribution trend for yellow warbler.

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ATTACHMENT A

Letter of Concurrence

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Klamath Falls Fish and Wildlife Office
1936 California Avenue
Klamath Falls, Oregon 97601
(541) 885-8481 FAX (541)885-7837

In Reply Refer To:
1-10-07-I-0006
Cross-reference: 1-10-98-TA-042, 1-10-99-TA-067,
1-10-03-I-082, 1-10-04-234, 1-10-05-I-021, 1-10-05-105-SP

MAR 0 8 2007

Stanley G. Sylva, Forest Supervisor
Modoc National Forest
800 West 12th Street
Alturas, California 96101-3132

Dear Mr. Sylva:

Thank you for your email received on February 28, 2007, requesting U.S. Fish and Wildlife Service (Service) concurrence with the Modoc National Forest's (Forest) effects determinations for the proposed Noxious Weed Implementation Project (Project) documented in the Final Environmental Impact Statement (FEIS) that is currently *in press*. On February 26, 2007, the Service received the Wildlife Biological Assessment (BA) via email and received the final Botany and Aquatic Species BAs on March 6, 2007 via email.

The Forest has determined the Project may affect, but is not likely to adversely affect the federally threatened bald eagle (*Haliaeetus leucocephalus*). This consultation is based on information provided in the BAs, FEIS for the Noxious Weed Treatment Project and additional materials and information provided by Forest staff or acquired through our office. This response is prepared in accordance with section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq*.).

The BAs also assessed the potential for effects to the federally endangered Lost River sucker (*Deltistes luxatus*), shortnose sucker (*Chasmistes brevirostris*), and Shasta crayfish (*Pacifastacus fortis*); and the federally threatened northern spotted owl (*Strix occidentalis caurina*), Warner sucker (*Catstomus warnerensis*) and slender Orcutt grass (*Orcuttia tenuis*) and determined that the proposed project is likely to have no effect on those listed species or their associated habitat. The Service acknowledges those determinations, and the Service will not consider those species further in this concurrence.

Consultation History

Our project records indicate that discussions and correspondence on this project have been ongoing since 1998. This section 7 consultation is a reinitiation of consultation from 2003. On April 8, 2003, the Service issued a Letter of Concurrence (FWS#1-10-03-I-082) to the Forest on

TAKE PRIDE IN AMERICA

the Proposed Action alternative found in the November 2004 Draft EIS. Since then, the Forest has finalized the EIS (FEIS) and developed two new alternatives. Alternative 6 is now the Preferred Alternative in the FEIS triggering reinitiation of consultation with the Service. Since 2003 there have been numerous correspondences between the Service and the Forest upon development of the FEIS. See page three and four of the Terrestrial Wildlife Biological Assessment for a culmination of the correspondence.

On November 29, 2006, the Modoc National Forest sent a letter to the Service requesting concurrence on the Project. Upon receipt of that letter the Service did not have the Terrestrial Wildlife Species BA nor did the Forest indicate which of the six alternatives presented in the FEIS you wished to receive concurrence on. The consultation process could not begin until this information was received. We finally received the necessary information, including modified Botany and Aquatic Species BAs on March 6, 2007.

This concurrence memorandum supersedes the previous consultations for the Modoc National Forest Noxious Weed Implementation Project.

Description of Proposed Action

The Project would authorize treatment of 14 species of noxious weeds. The control of these plants will promote the ecosystem health of forested and rangeland habitats by maintaining or improving native forbs and grass communities and promoting biological diversity on the Forest. The Project encompasses the entire Forest, which is located in portions of Modoc, Lassen, and Siskiyou Counties of northeastern California.

Alternative 6 in the FEIS is the preferred alternative and is the Proposed Action. The Proposed Action is comprised of two components. The first component defines specific treatments in defined areas that target known noxious weeds sites. The second component is a reactive strategy that will implement treatments of new sites of noxious weeds as they are located on the Forest.

The Modoc National Forest proposes to treat noxious weeds on a total of 541 existing sites comprising approximately 341 acres through physical and herbicide methods over a ten-year period. Table 2-8 in Chapter 2 of the FEIS provides site-specific treatment information including information on noxious weed species, type of treatment proposed (physical and/or chemical), distance to water and potential total amount of herbicide application. Also in Chapter 2, Table 2-11b lists the herbicides proposed for use on the noxious weeds species and their rates of application. Listed below are features of Alternative 6:

- Treating approximately 341 acres (541 known sites).
- 116 sites (19 acres) will be treated using physical methods to include manual hand pulling, grubbing, hoeing, clipping (including "weedeaters"), and mulching/tarping.
- 371 sites (116 acres) will be treated using the physical methods listed above and/or herbicides.
- 46 sites (65 acres) will be treated using herbicide methods.

- Five sites (41 acres) may be treated using goat grazing. These sites may alternatively be treated with physical and/or herbicide methods.
- Three sites (5,658 acre dyers woad site, 159 acre common crupina site, and 850 acre Dalmatian toadflax site) would be treated utilizing limited treatment methods along major travel ways to reduce potential for spread. These sites will be treated around the borders to contain the infestations. The estimated number of acres treated would be 100 acres along the borders. These treatment acres are estimated proportionally to the size of the current inventoried acres for these three sites.
- Herbicide treatments include: Chlorsulfuron, Clopyralid, Dicamba, Glyphosate, Triclopyr, 2-4-D, and two herbicide mixtures (Mix 1: Chlorsulfuron + 2,4-D, and Mix 2: Dicamba + 2,4-D).
- No 2,4-D treatments will be applied to noxious weed occurrences greater than 2 acres in size.
- Herbicide treatments in this alternative will include use of surfactants and dyes. Surfactants increase the absorption of herbicide by the target weeds, and dyes assist the applicator in efficiently treating target weeds.
- Herbicide treatments will be the primary treatment for rhizomatous species.

The Proposed Action also identifies an Early Detection - Rapid Response Strategy. This strategy will provide the opportunity to treat new sites of the identified species that have developed, existing sites that have expanded, and new sites of new noxious weeds using the same treatments as outlined for the noxious weed species identified provided that environmental effects are within the design standards, and effects analyses are reflected in the FEIS. Proposed treatment under this strategy will be capped at 200 acres over the life of the alternative with no more than 100 acres being treated in any given year. The rationale for this cap is to provide limited flexibility to treat new and/or expanding weed sites while remaining within the range of effects as displayed in this analysis.

If the Forest finds it necessary to implement this strategy and they implement it in occupied bald eagle habitat, then the Forest intends to coordinate with the Service to ensure that the action is consistent with this consultation/concurrence.

Species Occurrences

Before the Modoc National Forest Land and Resource Management Plan (LRMP) was finalized, there were 10 active bald eagle territories on the Forest. During the planning phase for the Modoc LRMP, a recovery goal of 21 territories of bald eagle was established. As of 2005, there were 33 territories found on the Modoc National Forest. In the last five years, 31 out of 33 territories have produced offspring, often annually. More information regarding eagle trends and status at both the local and bioregional scales can be found on pages 11 and 12 of the Terrestrial Wildlife BA.

Impacts and Effects from the Proposed Action

Project Design Standards are measures incorporated into a project to minimize or avoid effects to endangered or threatened species. Table 2-2 in Chapter 2 of the FEIS has the complete list of Design Standards associated with the Proposed Action.

There are six noxious weed locations on the Modoc National Forest within 0.5 miles of bald eagle nests and one noxious weed occurrence within potential habitat on Forest Service lands. There are 4.68 acres that could receive manual treatments and 4.78 acres that could receive chemical treatments within occupied habitat; chemical treatments could be significantly less if the 3.84 acres of Mediterranean sage occurrence is treated using manual methods.

Annually, a program of work will be presented to biologists so they can survey nests to determine if the nests are active and require Limited Operating Periods (LOPs) to protect the bald eagle pair. If nesting eagles are present, a LOP will be instituted up to 0.5 miles line of sight around active nest sites to minimize disturbance to nesting birds (Design Standard-10).

There will be no direct effects to bald eagle habitat by physical or chemical removal of weeds; no potential nest or pilot trees will be affected by this project.

There may be a beneficial effect to prey habitat by weed removal. Although bald eagles on the Modoc National Forest tend to forage on fish, waterfowl, and carrion, there have been remains of ground squirrels and other animals found under active nests. Eliminating weeds and allowing native plants to thrive could improve potential cover and food for some types of prey.

The only chemical of concern for a bald eagle is the herbicide 2,4-D, which has hazard quotient rating above one for a predatory bird consuming contaminated fish scenario. Under the Proposed Action only 0.27 acres forest-wide could be treated with 2,4-D either by itself or in a tank mix. One site of Canada thistle (DG006CIAR4) is within 25 feet of the water's edge. However, Design Standard-13 in the FEIS states that no 2,4-D will be used within 25 feet of the water's edge in occupied bald eagle habitat. This significantly reduces the risk of 2,4-D contaminating a water source and fish within eagle habitat.

See page nine through 15 of the Wildlife BA for a more detailed effects analysis.

Concurrence

Based upon our review of the proposed action, the Service concurs with the Forest's determination that the action may affect, but is not likely to adversely affect the bald eagle. This concurrence is based on the reasons mentioned in the "Impacts and Effects of the Proposed Action" section above. In summary, we base our concurrence as follows:

The Project would likely have insignificant or discountable effects, if any, due to:

- Use of limited operating periods to avoid disturbances during nesting.
- Implementation of buffers that prohibit the use of herbicides near water sources that could contaminate an eagle's prey species.

Unless new information reveals effects of the proposed actions that may affect species in a manner or to an extent not considered in the information provided by the Forest, or a new species is listed or critical habitat designated that may be affected by the proposed actions, no further action pursuant to the Act is necessary.

If you have any questions regarding this response, please contact Trisha Roninger or Rick Hardy of my staff at (541) 885-8481.

Sincerely,

Curt Mullis

Curt Mullis
Field Supervisor

cc:
Marty Yamagiwa, USFS, Modoc NF
Mary Flores, USFS, Modoc NF
Cheryl Beyer, USFS, Modoc NF

Appendix W:

Terrestrial Invertebrate Wildlife Species Specialist Report

Appendix W: Terrestrial Invertebrates Biological Report

BIOLOGICAL REPORT

TERRESTRIAL INVERTEBRATES

Modoc National Forest

Noxious Weed Enviromnetal Impact Statement

January 26, 2007

Prepared by:
John Clark
Wildlife Biologist

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Introduction

The weed treatments proposed in this project range from no change from current management in the No Action Alternative (Alternative 1), to the use of hand tools, weedeaters, hand pulling, seed head clipping, mulching, tarping, goat grazing, reseeding and herbicide treatments in the Action alternatives. A description of all alternatives is given in Table 1 below. A brief description of each alternative follows the table.

Comparison of Alternatives

Table 1: Summary Comparison of Alternatives for the Noxious Weed Treatment Project

Alternatives / Alternative Features	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Treatment Timeframe	Ongoing*	5 years	5 years	10 years	10 years	10 years
Treatment Sites and Acres	Sites/Acres	Sites/Acres	Sites/Acres	Sites/Acres	Sites/Acres	Sites/Acres
Total Inventoried Weeds (2004)	541/6908	541/6908	541/6908	541/6908	541/6908	541/6908
Inventoried Weeds Fully Treated	20-30 ac/yr[1]	520/5,995	494/5,993	520/5,995	520/180	538/241
Inventoried Weeds Receiving Partial Treatment[2]	0/0	16/904[2]	0/0	16/904[2]	0/0	0/0
Inventoried Weeds Receiving Limited Treatment[3]	0/0	0/0	0/0	0/0	9/100[3]	3/100[3]
Inventoried Weeds Not Treated[4]	6,878[1]	5/9[4]	47/916[4]	5/9[4]	5 / 5515	0/6,567[4]
Proportion of Inventoried Weeds Treated	0.4%	n.a./87%	91%/87%	99%/99%	100%/4%	100%/5%
Noxious Weeds Treated Through Early Detection – Rapid Response (ED – RR, acres) [5]	0	0	0	Up to 200 acres (100 ac max/yr)	Up to 200 acres (100 ac max/yr)	Up to 200 acres (100 ac max/yr
Total Acres of Weeds Treated	20-30 ac/yr[1]	6,899 acres	5,993 acres	7,099 acres	480 acres	541 acres
Treatment Methods for Inventoried Noxious Weeds (2004)	Sites/Acres	Sites/Acres	Sites/Acres	Sites/Acres	Sites/Acres	Sites/Acres
Physical – hand pulling, hoeing, grubbing	0/0	161/31	494/5,993	161/31	0/0	0/0
Physical+ – Physical plus, clipping seed head or plant, weed eater, mulch/tarp	20-30 ac/yr[1]	0/0	0/0	0/0	527/139	116/19
Physical and/or Herbicide Treatmer	0/0	333/5,961	0/0	333/5,961	0/0	371/116
Herbicide	0/0	42/907	0/0	32/907	0/0	46/65
Limited Treatment[3]	0/0	0/0	0/0	0/0	9/100	3/100
Goat Grazing or Herbicide Treatmer	0/0	0/0	0/0	0/0	5/41	5/41
Total Acres Potentially Treated with Herbicides (Incl. ED-RR acres)	0/0	355/6,868	0/0	355/7,068	0/0	425/522

[1]Under Current Management (Alt. 1), approximately 20 to 30 acres of noxious weeds are treated each year through other site specific NEPA decisions as part of other projects in accordance with the Modoc NF Integrated Weed Management Strategy (2005).

[2]These sites are rhizomotous species that occur within 10 feet of H2O. Those sites that are within 10 feet of H2O would not be treated. Sites with acreage ooutside of this 10 foot no treatment zone would receive partial treatment. The acreage within the 10 foot zone would not be treated, the acreage outside the 10 foot zone would be treated with herbicides.

[3]Includes treating along borders of infestations to prevent spread using the methods specific to each alternative. Treatment is estimated at 100 acres to be proportionally distributed based on the size of the individual infestations. These acres are included in the Inventoried Noxious Weeds Treated acreage.

[4]Excluded in Alt. 2 and Alt. 4: 5 sites of rhizamotous species that are within 10' of live water and partial acreage of 16 sites of rhizamotous species that are within 10' of live water. Rhizamotous species will not be treated by physical methods in these alternatives. Excluded in Alt. 3: 47 sites of rhizamotous species. Excluded in Alt. 5: 5,658 acre Dyer's woad, 850 acre Dalmatian toadflax, 159 acre crupina, and 6 sites of rhizamotous species. These sites will receive limited treatment around the perimeter estimated at 100 acres proportionally distributed based on the size of these sites. Excluded in Alt. 6: 5,658 acre Dyer's woad, 850 acre Dalmatian toadflax, 159 acre crupina. These sites will receive limited treatment around the perimeter estimated at 100 acres proportionally distributed based on the size of these sites.

[5]May use any of the methods approved for use in this NEPA decision.

[6]For Alt. 2 this includes the acres under the physical and/or herbicide method plus the herbicide treated acres. Alt. 4 adds the same categories as Alt. 2 plus adds in the potentially treated 200 acres through early detection rapid response. Alt. 6 includes the Physical and/or Herbicide acres, the herbicide acres, the acres under goat grazing, the acres under the limited treatment category, and the 200 acres under Early Detection-Rapid Response.

[7]This is the cost for a single treatment at each site proposed for treatment. Multiple treatments will increase this cost.

Size and Extent of Proposed Treatments

The extent of proposed treatments and herbicide treatments are summarized in Table 2. The most extensive proposed herbicide treatment under this FEIS would occur if Alternative 2 (up to 6,868 acres treated) or Alternative 4 (up to 6,868 acres treated) is selected. However, both Alternatives 2 and 4 propose to treat less than 1/2 of one percent of the total land area of the Modoc National Forest. Alternative 6 limits possible herbicide treatments to 522 acres which represents about 3/100s of one percent of the Forest. Alternatives 1, 3 and 5 do not include any herbicide treatments.

Table 2. Weed sites and percentages of the Forest proposed for treatment for each alternative.

Alternative	1	2	3	4	5	6
Sites that may be treated	20-30 ac/yr*	536	494	536	541	541
Maximum acres that may be treated	20-30 ac/yr*	6,899	5,993	7,099	480	541
Maximum acres potentially treated with herbicides	0	6,868	0	6,868	0	522
Percent of Forest that may be treated with herbicides	0%	0.42%	0%	0.42%	0%	0.03%

*Under current management (alternative 1), approximately 20-30 acres of noxious weeds are treated each year through other site specific NEPA decisions, as part of other projects in accordance with the Modoc NF Integrated Weed Management Strategy (2005).

In addition to the fact that the percentages of the Forest that could be treated with herbicides under this FEIS are very small, the majority of the weed sites are small and scattered (most are 1/10 acre or less in size). Thus further reducing the potential for concentrated impacts of herbicides on terrestrial invertebrate populations in localized areas.

Also, within identified weed sites, weed plants normally constitute less than complete ground cover, often much less, with only a few plants scattered across some weed sites. Thus herbicide treatment will result in a patchwork of treated and untreated areas even within the confines of many weed sites. This again reduces the potential for concentrated impacts on invertebrate populations.

The primary objective of the herbicide treatment methods, proposed for use in this FEIS, is to efficiently kill weeds by delivering the herbicide directly to the leaves and stems of the individual weed plants using directed spraying and/or wicking methods. Application of herbicides to non-target plants would be counterproductive, as this may create bare areas...Bare areas thus created, would be subject to invation by weeds. Any inadvertant spraying of the soil surface or non-target plants is also unproductive, as it adds to the cost of treatment without killing weeds. These considerations for economy and effectiveness of the weed treatments will help protect

surface and soil dwelling invertebrates, as well as those present on non-target plants, from direct spray and will act to reduce the total quantities of herbicides applied to weed sites.

(Alternative 1) No Action Alternative

The no action alternative would continue the current management of the Forest in regard to noxious weeds. Which would include non-herbicide treatment of approximately 20 to 30 acres of noxious weeds through other site specific NEPA decisions as part of other projects in accordance with the Modoc National Forest Integrated Weed Management Strategy (2005).

(Alternatives 2-6) All Action Alternatives

The action alternatives will treat 14 species of noxious weeds using either physical and cultural methods (alternatives 3 & 5); or herbicide, physical, and cultural methods (alternatives 2, 4 & 6). Herbicides and the application rates proposed for use in this project are listed in Table 3. Herbicide applications may include surfactants and dyes.

Table 3. Herbicides and rates of application proposed for each alternative.

Herbicide	Application Rates	Proposed for use in Alternatives
Clopyralid	0.1 – 0.25 lb/ae/ac	2, 4, 6
Dicamba	0.25 - 2.0 lb/ae/ac	2, 4, 6
Glylphosate	0.5 – 3.75 lb/ae/ac	2, 4, 6
Triclopyr	0.5 – 1.5 lb/ae/ac	2, 4, 6
2,4-D	0.5 – 2.0 lb/ae/ac	2, 4, 6
Chlorsulfuron	0.75 – 1.0 oz/ai/ac	6
Mix 1 – Dicamba + 2, 4-D	0.75 – 1.0 oz/ai/ac 0.5 – 1.5 lb/ae/ac	6
Mix 2 – Chlor Sulfuron + 2, 4-D	0.25 -1.0 lb/ae/ac 0.5 – 1.5 lb/ae/ac	6

Alternative 2, would treat between 300 and 1500 acres annually (for 5 years) on 536 sites covering 6,899 acres. Treatments would include physical and herbicide methods. Herbicides including clopyralid, dicamba, glyphosate, triclopyr and 2,4-D could be applied on up to 6,868 acres during the 5 year life of this alternative.

Alternative 3 would use physical methods to treat between 300 and 1,500 acres annually (for 5 years) on 494 sites which cover 5,993 acres. Herbicides would not be used.

Alternative 4, would treat between 500 and 1,500 acres annually (for 10 years) on 536 sites which cover 6,899 acres. This alternative includes an Early detection – Rapid response Strategy to treat up to 200 acres of new or expanded sites of noxious weeds. Thus a maximum of 7,099 acres could be treated during the life of this alternative. Treatments under this alternative include physical and herbicide methods. Herbicides including clopyralid, dicamba, glyphosate, triclopyr and 2,4-D could be applied on up to 6,868 acres during the life of this alternative.

Alternative 5 would treat 541 sites on 280 acres. Approved techniques include: physical methods, clipping, weed eaters, mulching, tarping and goat grazing. This alternative includes an Early detection – Rapid response Strategy to treat up to 200 acres of new or expanded sites of noxious weeds. Thus a maximum of 480 acres could be treated during the 10 year life of this alternative.

Alternative 6 would treat 341 acres on 541 known sites over the 10 year life of this alternative. Approved treatments include: herbicides, physical methods, clipping, weed eaters, mulching, tarping and goat grazing. This alternative includes an Early detection – Rapid response

Strategy to treat up to 200 acres of new or expanded sites of noxious weeds. Under this alternative, herbicides including clopyralid, dicamba, glyphosate, triclopyr, 2,4-D, chlorsulfuron, a mixture of 2,4-D with dicamba, and, a mixture of 2,4-D with chlorsulfuron could be applied on up to 522 acres during the 10 year life of this alternative.

Each site would receive a maximum of one herbicide treatment per year. Multiple non-herbicide treatments could applied each site per year as needed to control weeds.

Evaluating impacts of weed treatments to invertebrate populations

It is difficult to evaluate the impacts of weed treatments to invertebrate populations on the Modoc National Forest for several reasons. Information on distribution of species across the Forest is lacking, especially for less collectable invertebrates. For example, no information on the distribution or even the species of earthworms present on the Modoc National Forest could be found. Various species of earthworms have been reported in coniferous forests, aspen groves, grassland/shrubland, pastures and cultivated lands (Gonzalez et al. 2003 and James 2000). However, in the Columbia Basin, Fender, in a 1996 personal communication with James (2000), indicates areas of bitterbrush, juniper, and sagebrush probably lack earthworms. Due to the lack of specific information it must be assumed that earthworms, either native or introduced, exist on the Forest on all sites with sufficient soil. Arid sites with very shallow soils quite likely lack earthworms.

Other issues contributing to the difficulty of evaluating impacts of weed treatments on invertebrate populations including the following. Invertebrates are a highly diverse group, some with hard, dry, protective exoskeltons, while others have soft, moist skins. No doubt their physiologies, and their sensitivities to habitat disruption and herbicides vary widely. And finally, the published research that has been done on the impacts of herbicides on a relatively limited number of invertebrate species may not be representative of the thousands of species that are assumed to inhabit the Forest.

(Alternative 1) Impacts of No Action on Invertebrates

In the absence of forestwide treatment, it is assumed that the number and size of weed infestations will increase over time. New species of weeds will likely become established and weeds with “toeholds” in the Forest will likely become well established. Depending on the habitat requirements of invertebrates, some species may be benefitted. Some spiders species, for example, thrive in weedy areas, apparently benefitted by the habitat structure weeds provide (Haughton et. al, 1999). But typically, native species of animals are adapted to native plants, so many native invertebrates may be disavantaged by the encroachment of noxious weed species (Tallamy 2004, University of Delaware 2001). Failure to treat noxious weed infestations will allow noxious weeds to outcompete native plants on some sites, thus changing the natural vegetation of these sites. These changes may have some local impacts on invertebrate numbers, but are unlikely to result in widespread adverse impacts to any populations.

The absence of a forestwide treatment of noxious weeds, combined with the impacts of other activities on the Forest, will likely result in increased weed encroachment and alteration of natural vegetation communities. Ground disturbing activities such as timber harvesting, livestock grazing, road maintenance and prescribed burning all create some disturbance of the soil surface and enhance opportunities for weeds to take root and thrive. However, the cummulative effects are unlikely to adversely affect any terresterial invertebrate populations.

(All Action Alternatives) Direct and Indirect Impacts of Physical and Cultural Treatments

The physical and cultural treatments proposed in the five action alternatives might impact individual terrestrial invertebrates by altering habitat, disturbing the soil surface, injuring individual invertebrates, and/or temporarily disrupting food sources. However, these impacts are to some degree normal aspects of invertebrate life, and are conditions to which invertebrate populations have adapted. After all, the simple act of large animals walking across the landscape normally results in disturbing the soil surface, crushing weeds, flowers, and other plants (thus altering invertebrate habitat and food supplies) and treading on some invertebrates. Furthermore, public comment on the DEIS did not express concern for these potential impacts, rather was directed to the effects of herbicides on invertebrates. Therefore, although the physical and cultural treatments proposed in the FEIS may affect individual invertebrates, it is unlikely that these methods will adversely affect invertebrate populations. Therefore, the remainder of this report will address the possible impact of the proposed herbicide treatments on terrestrial invertebrates.

(Alternatives 2, 4 & 6) Effects of Herbicides on Invertebrates

Limited information is available on the effects of herbicides on terrestrial invertebrates. Since this group contains a diverse array of organisms including insects, spiders, snails, and worms, effects on individual species can be expected to vary. However, most published research on terrestrial invertebrates seem to agree with the basic premise of Delahaut and Koval (2006), regarding herbicides:

> *"Herbicides, at the other extreme, pose relatively little threat to earthworms. Their modes of action are directed toward plant regulation, and physiological processes of plants differ significantly from those of animals."*

Direct and Indirect Effects

The most consistent information available on the effects of herbicides on an invertebrate species, is for the honey bee, which is typically a test animal for required testing during the herbicide registration process. The hazard quotients for maximum application rates of the six herbicides proposed for use in this project range from 3 for 2,4-D, to 0.04 for chlopyralid (Table 4). Hazard quotients above 1.0, are considered to indicate risk. The proposed use of 2,4-D at rates above about 1 pound per acre, mixtures containing 2,4-D, and glyphosate (at the highest proposed rate) could result in hazard quotients above one for honey bees exposed to direct spray with 100 percent absorption of the herbicide. Scenerios other than direct spray with 100 percent absorption, (such as aerial drift of herbicide) would not result in hazard quotients indicating a notable level of risk.

Table 4. Hazard quotients for honey bees, exposed to direct spray with 100 percent absorptions of herbicides at rates proposed for use in this project.

Glyphosate	Triclopyr	Clopyralid	2,4-D	Dicamba	Chlorsulfuron
0.2 – 1.1	0.07 – 0.2	0.02 – 0.04	0.7 – 3.0	0.04 – 0.3	0.3 – 0.4

The three largest weed sites on the Forest are a 5,658 acre Dyer's woad site, a 850 acre site of Dalmation toadflax, and a 159 acre site of common crupina (which is part of a larger site on adjacent private lands that includes an additional 586 acres). These sites are proposed for complete treatment under Alternatives 2, 3 and 4, and only limited treatment (100 acres total) along major roads and weed site borders under Alternatives 5 and 6. Table 2-8a in the FEIS indicates all 3 weed species can be effectively treated with one or more herbicides proposed for

use in this project, which do not exceed the previously addressed thresholds of concern for honey bees. If Alternative 2 or 4 is selected, it is recommended that during the annual work planning process, concerns for honey bees or similar beneficial insects could be addressed by choosing treatments which restrict the use of 2,4-D, 2.4-D mixtures and glyphosate (at the maximum application rate) on these large sites. If Alternative 6 is selected, which proposes treating only limited areas of these large infestations, the use of glyphosate (at the maximum application rate) or 2,4-D (by itself or in mixtures) is unlikely to adversely affect honey bee populations due to the restricted acreage and linear nature of the proposed treatments.

The SERA for Chlorsulfuron notes that a study of a species of leaf-eating beetle showed no increase in mortality following direct spray at an application rate that exceeded the typical application by a factor of nearly 2,000 (SERA, 2004).

The Risk assessment for Herbicide Use in Forest Service Regions 1, 2, 3, 4, and 10 and on Bonneville Power Admistration Sites (USDA Forest Service, 1992) lists dicamba as moderately toxic to insects, but indicates the LD-50 doses for honey bees "far exceed those encountered in the field".

A study of butterflies on powerline right-of-ways treated by hand clearing versus herbicide treatments, found no significant difference in butterfly diversity and abundance on herbicide-treated and hand-treated right-of-ways. The study used a variety of herbicide mixtures, some mixtures contained triclopyr (Bramble et al. 1999).

Lindsay and French (2004) did not identify any significant direct or indirect effects on leaf litter invertebrate abundance or community composition in the four months following glyphosate application. Sul1livan and Sullivan (2003) reviewed literature on glyphosate and concluded the diversity of terresterial invertebrates in glyphosate-treated areas is variable and that abundance and diversity of invertebrates in a treated area is primarily a function of the degree of vegetation control and changes in vegetation structure.

Much of the limited information on herbicide effects on spiders comes from studies of broadcast-sprayed agricultural fields, where the use of herbicides has been found to depress spider numbers, however, this effect seems to be primarily related to the reduction of weeds, a favored habitat of spiders (Haughton et. al, 1999 and Bell et. al, 2002).

Direct spray of spiders with glyphosate under laboratory conditions resulted in low rates of mortality that were not dose related. Data on other arthropods also indicate low potential for direct toxic effect from glyphosate (SERA, 2003).

Morowati (2000) reports that use of glyphosate at the recommended field dose (for India) could cause at least 50 percent mortality in earthworms. However, the experimental methods employed in this laboratory experiment of uniformly spraying the unvegetated soil surface, which was also the location where foods (leafy vegetables) were scattered for the captive worms, do not accurately reflect the methods proposed for use in this FEIS. The directed spray and wicking techniques proposed for use on the Modoc National Forest would limit herbicide contact with the soil surface, while Morowati's experimental design maximizes introduction of glyphosate onto the soil surface, where it could be injested by the earthworms. Still, the study is useful as an indicator of the upper limit of possible effects to earthworms from accidental overspray.

Sullivan and Sullivan (2003), writing about plant and animal response to glyphosate, suggest that management for a mosaic of habitats within forest landscapes "should help ameliorate the short-term changes in species compostion accompanying vegetation management with glyphosate".

Response in earthworms to 2,4-D is variable with no measurable effect in the field or in a microcosm for some studies. Other studies report that 2,4-D in the soil can decrease earthworm growth, as can immersing earthworms in a solution of 2,4-D (SERA, 1998c).

Based on a single study, the acute toxicity of clopyralid to earthworms appears to be low (SERA, 2004a).

Cumulative Effects

On average 2,500 acres of saw logs and 3,000 acres of wood fiber are harvested annually on the Modoc National Forest. This combined acreage is less than 1/3 of 1 percent of the area of the Forest. Typically, these harvest activities are also divided among a number of different projects and areas across the Forest, thus limiting the impact in any one area of the Forest. The harvest prescriptions employed vary from clear cutting to under story thinning. Timber harvest activities create bare areas, which favor the establishment of noxious weeds, however, harvest contracts include provisions to prevent the introduction and establishment of weeds on project areas. The effects of these activities on invertebrate communities are little understood, however, native invertebrates are obviously adapted to survive periodic widespread habitat disruptions caused by wildfire and other natural phenomena.

Prescribed fire is used to treat approximately 1,000 acres annually on the Modoc National Forest. Its impact on terrestrial invertebrate communities is little known, however, fire is a natural component of forest and range ecosystems. Typically, the prescriptions for fire treatments call for fires of low to moderate intensities which leave a mosaic of burned and unburned areas. This mimics the characteristics of natural wildfires to which all native invertebrates have adapted, and it also leaves areas of refuge from the effects of the fire for terrestrial invertebrates.

Livestock grazing, by cattle or sheep, is permitted throughout most of the Modoc National Forest, although a few allotments are currently vacant. Little is known about the impacts of grazing livestock on invertebrate populations. However, native invertebrates evolved with grazing wildlife such as pronghorn, deer, elk and bighorn sheep, and thus are adapted to the impacts of light to moderate grazing. The intensity of livestock grazing on the Forest has been significantly reduced over at the past half century consequently the current condition of rangelands on the Forest is either stable or improving. Furthermore, the nature of the terrain and woody vegetation on the Forest generally results in a patchwork of sites (from the diminutive perspectives of invertebrates) that are either grazed or ungrazed (because they are protected by large rocks, shrubs, low-hanging trees, steep slopes, or other natural features).

The herbicides proposed for use in the five action alternatives appear to pose insignificant to low potential risk to terrestrial invertebrates. The noxious weed sites proposed for treatment are scattered and constitute extremely small percentages of the total Forest. All other Forest activities, other than livestock grazing, are typically scattered across the Forest and likewise involve very small percentages of Forest lands. Livestock grazing has a widespread, but low intensity impact on Forest lands. Together these activities are unlikely to have adverse cumulative effects on populations of terrestrial invertebrates.

Consistency with forest plan and other laws and policies

The Modoc National Forest Land and Resource Management Plan states in the Record of Decision that, “Maintaining the biodiversity of ecosystems, including the diversity of plants, fish, and wildlife and the age diversity of habitats, is a primary objective.” In chapter 4 of the plan it calls for “maintaining viable populations of all native and non-native desired vertebrate species.

The National Forest Management Act includes direction to preserve and enhance the diversity of plant and animal communities, including endemic and desirable naturalized plant and animal species, so that the diversity is at least as great as that which would be expected in a natural forest and the diversity of tree species is similar to that existing in the planning area (36 CFR 219.26 and 219.27). Similarly 36 CFR 219.19 states "Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. … In order to ensure that viable populations will be maintained , habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area."

In the absence of detailed knowledge of all the invertebrate species on the Forest, their life histories, distributions and population dynamics, the best approach to evaluating the potential effects of herbicides is to ask the following questions. Will there be a significant amount of habitat in the study area that will not be affected by herbicides? And will that habitat be distributed so that individual invertebrates can interact with others in the planning area? The answer to both of these questions appears to be yes. Therefore, I conclude that the herbicide treatments proposed for use in the FEIS are unlikely to adversely affect any invertebrate populations, or reduce the diversity of invertebrate communities.

A similar line of reasoning was used to evaluate the potential for adverse impacts to the Valley Elderberry Longhorn Beetle, a threatened species, in the Herger-Feinstein Quincy Library Group Recovery Act FEIS on page 3-111. "The risk to this species from proposed management activities by the alternatives appears to be low. A large portion of suitable habitat within the National Forest Boundaries is not included within the pilot project area…"(USDA Forest Service, 2003).

The wildlife risk assessment of the DEIS for the Invasive Plant Control Project for the Carson and Santa Fe National Forests concludes "Most of the proposed herbicides are either nontoxic or of low toxicity to birds mammals and insects. … it is very unlikely that any birds, mammals, or insects would be affected by herbicide use following recommended application rate procedures (USDA Forest Service. 2004). It should be noted that the Carson Santa Fe project included all of the herbicides proposed for use in the Modoc FEIS and several which are not proposed for use here.

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Appendix X:

Heritage Resources Specialist Report

NOXIOUS WEEDS EIS

Heritage Resource Management Specialists Report

Summary

The Modoc National Forest proposes to reduce, control, or eliminate noxious weed infestations on 6,908 acres at 541 specific locations throughout the forest. The area affected by the proposal includes National Forest System lands managed by the Modoc National Forest (MDF) in Modoc, Lassen, and Siskiyou counties, California.

Proposed Action – Alternative 2

The proposed action would initiate annual treatments of noxious weeds on a series of infestations ranging from an estimated low of 300 acres per year to a projected high of 1,500 acres per year (depending on annual budgets) scattered throughout the forest. The various methods analyzed under an integrated weed management approach are physical, cultural, and herbicidal. Wilderness and research natural areas would not be treated with herbicides. There would be no aerial application of herbicides by either fixed-wing or rotary aircraft. In addition, there would be no aquatic applications of herbicides. If approved, project operations would begin in 2008 and would continue for the next 5 years, barring any significant environmental changes. The proposed action calls for the reduction in noxious weed sites, reduction in the area covered by noxious weeds, or the eradication or control of 14 specific noxious weed species in 541 locations, covering approximately 6,908 acres.

Purpose and Need

The purpose of this project is to economically implement those portions of the Modoc National Forest Noxious Weed Management Strategy and action plan that call for implementation of a program to reduce, control, or eliminate noxious weed infestations on 6,908 acres at 541 sites for 14 identified weed species.

The eradication and control of these plants would meet the need and requirement of the forest to promote the ecosystem health of forested and rangeland habitats by eliminating or reducing noxious weed competition with native forbs and grass species, and ultimately preventing the loss of wildlife habitat. It is important to eradicate and control these plants with minimal disturbance to the soil and native and desirable non-native species to maintain habitat, prevent erosion, and prevent damage to the soil profile.

Failure to reduce, control, or eradicate these small infestations at this time would mean the spread of these weeds would continue. The spread of noxious weeds on the Modoc National Forest may lead to noxious weeds out-competing desirable native plant species and thus altering native plant communities. The continued spread of these noxious weed species increases the adverse impacts to humans, wildlife, livestock, and native plant communities.

Alternatives

Alternative 1 - No Action (current management)

This alternative is required by regulation (Code of Federal Regulations 1502.8). Under current management, the forest is complying with direction in the forest land and resource management plan and the Sierra Nevada Forest Plan Amendment, to complete a noxious weed risk assessment for all planned projects on the forest. The risk assessment assigns an expected risk level to proposed activities and identifies any weed-related actions that need implementation before, during, or after project implementation. The use of herbicides has not been authorized for these weed-related actions. The forest currently has no NEPA decision that encompasses the treatment or containment of all noxious weeds on the forest.

Alternative 2

Alternative 2 is the proposed action and is summarized on the previous page.

Alternative 3

This alternative calls for treating noxious weeds by pulling and grubbing, or planting native species to eliminate the identified noxious weeds at the documented sites. No herbicides are proposed in alternative 3, and the alternative was developed in response to issues 1, 2, and 4. This alternative would treat 5,993 acres at 494 sites using physical methods.

Alternative 4

This alternative was developed in response to significant issue 3. Alternative 4 builds on the proposed action by increasing the treatment periods from a maximum of 5 years to 10 years, with review of the NEPA document every 3 to 5 years to ensure environmental effects are within the range disclosed in this final EIS. In addition, alternative 4 allows for treatment of expanding populations in current or newly discovered sites through adaptive management. Alternative 4 would treat 6,899 surveyed acres at 536 sites using both herbicidal and physical methods. In addition, under the early detection – rapid response strategy, an additional 200 acres may be treated over the life of the alternative, with a cap of 100 acres treated in any one year.

Alternative 5

Alternative 5 was developed in response to comments on the draft EIS to provide a non-herbicide alternative that contained additional non-herbicide treatments. This alternative would be implemented over a 10-year treatment period and provides for treatment of expanding populations of noxious weeds in current or newly discovered sites through early detection - rapid response. Alternative 5 provides several new physical methods, which include clipping (including use of string trimmers), and mulching/tarping, as well as goat grazing as treatments for eradicating or controlling the 14 identified species of noxious weeds. Alternative 5 would treat 280 acres at 541 sites. In addition, under the early detection – rapid response strategy, an additional 200 acres may be treated over the life of the alternative, with a cap of 100 acres treated in any one year.

Alternative 6

Alternative 6 was developed to respond to comments that requested a more flexible approach using herbicidal treatment methods, early detection - rapid response techniques, and additional herbicides. This alternative would be implemented over a 10-year treatment period. The physical methods available in alternative 5 are also available as treatment methods in this alternative. Alternative 6 also includes the use of chlorosulfuron and two herbicide tank mixes. Alternative 6 would treat 341 acres at 541 sites. Under this alternative the three of the largest sites (159-acre common crupina site, 850-acre Dalmation toadflax site, and a 5,658 acre dyer's woad site) would only be treated in a limited manner to contain the spread of these sites. In addition, under the early detection – rapid response strategy, an additional 200 acres may be treated over the life of the alternative with a cap of 100 acres treated in any one year.

Environmentally Preferred Alternative

The environmentally preferred alternative is alternative 6, as it provides a multi-method approach to reduce or eliminate most noxious weed sites, while preventing spread of the three largest sites. Alternatives 2 and 4 include the treatment of large-acreage sites with herbicides and would result in the application of a greater amount of herbicide in the environment than in alternative 6. Alternatives 3 and 5 (non-herbicide alternatives) do not provide effective treatment for rhizomatous species, thus allowing for expansion of these noxious weed sites.

EXISTING CONDITION - AFFECTED ENVIRONMENT

Heritage Resources

The Modoc National Forest has a vast array of prehistoric and historic archaeological resources and traditional cultural properties and locations still used by local Native American populations. The prehistoric resources of the Forest span the last 10,000 years and the historic period sites date between roughly 1826 to the mid-20th Century. Contemporary Native American groups include the Pit River Tribe (Achomawi/Atsugewi), the Klamath Tribes (specifically, the Modoc), and the Northern Paiute of the Surprise Valley area. Many locations throughout the Forest continue to be utilized by these contemporary Native American peoples for plant gathering (such as epos, and medicinal plants), hunting, and other traditional cultural uses (including religious activities).

Several documents identify areas on the Forest that have been identified as traditional cultural properties, or places (TCPs) used by these contemporary groups. Among these are the Roybal-Evans (1982) report "Sites with Cultural Significance for the Upriver Bands of the Pit River Indian Tribe", and John Allison's (1994) volume entitled "The Cultural Landscape of the Klamath, Modoc and Yahooskin Peoples: Spirit, Nature, History". Other relevant sources in this subject area include several ethnographic reports prepared for various utility projects which have crossed the Forest in the last decade. Examples of sites or areas considered as TCPs by Native Americans could include springs (where medicinal waters may be extracted), mountain peaks, and the vast epos fields in the Devil's Garden. Some of these TCPs may be found eligible for nomination to the National Register of Historic Places (NRHP).

Prehistoric archaeological resources include numerous "lithic scatters", places where peoples in the past made some stone tool or butchered an animal, or camped briefly, to more prominent encampments and village sites with visible rock rings, pit house depressions, and an array of stone tools. They also include rock stacks or cairns, rock alignments, and rock art (petroglyph and pictograph sites). Over 7,000 such prehistoric sites have been recorded on the Forest to date. The overall average site density for the Forest is one site per 54 acres.

Historic period sites are less common, but include over 300 recorded to date spanning from about 1846 through the 1940s. The earliest dated site at present is the 1846 Applegate Trail, which crosses the Forest passing through the Warner Mountain, Devil's Garden, and Doublehead Ranger Districts. Other historic sites include Modoc War-related sites (1872-1873), homesteads (1870s-1920s), ranches, logging camps, old Forest Servce ranger stations, and Civilian Conservation Corps sites (1930s). Very little standing architecture (e.g., cabins) remains on the Forest -- most having decayed over the years or systematically burned or removed during the 1950s and 1960s.

Cultural, or heritage, resources sites are managed in several ways. The level or intensity of management, according to the FLRMP, has the following range:

- **Preservation** - sites are protected by excluding incompatible land activities.

- **Conservation** - when preservation is not feasible, scientific information is recovered from sites so that other land use activities can occur.

- **Interpretation** - sites are developed for public enjoyment and education through signs, trails, and public information kiosks.

- **No Management** - sites are not preserved in any way. (These sites are not of the quality suitable for nomination to the National Register of Historic Places. They contain little scientific information or Native American cultural heritage value.)

DESIRED FUTURE CONDITION

The desired future condition for the Forests heritage resources include continuing inventory to locate and record all heritage resources, and evaluate them in terms of eligibility to the National Register of Historic Places. Additionally, selected heritage resource sites may be developed for Public interpretation illustrating the past history anf heritage of the Forest and the various cultures and groups that have occupied and used this area for the last 10,000 years. A Forest standard includes the protection of access and use of sites and locations important to traditional Native American religious and cultural practices consistent with the American Indian Religious Freedom Act of 1978, and with the more recent Executive Order 13007.

Generally, heritage resources are conserved and protected largely by directing activities or use away from sensitive areas, by maintaining confidentiality, and by informing Forest users of heritage resource protection requirements.

MANAGEMENT OBJECTIVES

As stated above, the conservation and/or protection of heritage resources should be a management objective.

MANAGEMENT REQUIREMENTS

Depending upon the method selected for treatment of noxious weeds there may be varying degrees of potential effects on Heritage Resources, and varying degrees of complying with the provisions of the FLRMP and Historic Preservation compliance requirements.

MANUAL/MECHANICAL MANIPULATION

The use of either manual or mechanical treatment methods for the control of noxious weeds have the greatest potential for affecting heritage resources such as prehistoric and historic archaeological sites in a direct manner. These methods may also affect potential traditional cultural properties and contemporary Native American uses. If these methods are proposed, then a decison must be made as to whether or not the proposed action could affect these resources. Depending upon the anticipated nature of the affect full compliance with the National Historic Preservation Act (NHPA) may be required. If it is determined that the affect may be relatively minor, that is, unlikely to affect those qualities that may make an heritage property eligible for the NRHP, then the action may be treated as an "Exempt Undertaking" under the Pacific Southwest Regions "Programmatic Agreement" (PA) with the California State Historic Preservation Office (SHPO).

CHEMICALS

The use of chemicals (herbicides), generally, will have little potential effect on most archaeological properties (prehistoric or historic) and should be considered to have "no effect" on those qualities that may make a property eligible for the NRHP. Therefore, treatment of noxious weeds by the use of chemicals should be classed as an "Exempted Undertaking" in regards to compliance with the NHPA. The current PA allows for programmatic compliance for this class of undertaking.

However, this type of treatment, may have an effect on Native American TCPs, especially if the area is used for gathering food or medicinal plants. Any proposed use of chemical treatment should include advanced notification of the appropriate tribal organization and individuals who may use the area. Existing ethnographic information may help identifiy areas subject to potential conflicts.

BIOLOGICAL

The use of the introduction of natural biological agents, such as insects, to control noxious weeds, should have no effect on most heritage resources, and could be treated under the PA. The same may be said for the seeding of native species of plants, provided they are broadcast, or less than a cubic meter of soil is disturbed per acre planted. This action could also be dealt with under the PA. Again, however, these types of treatments may potentially affect Native American TCPs or use of an area and consultation with the appropriate tribal group or individuals should take place early in the planning stages of these efforts.

GOAT GRAZING

Goat Grazing (Alternatives 5 and 6) – The use of goat grazing to control noxious weeds should not represent a significant effect to most archaeological resources. Some very minor ground disturbance may be present as a result of the short-term trampling affect of a goatherd milling about in a single location. This action, however, should result in relatively little lateral displacement of surface artifactual materials (e.g., obsidian waste flakes, surface artifacts such as projectile points) and should have no impact on subsurface archaeological materials.

MONITORING REQUIREMENTS

Monitoring may be required if management recommendations are made for the alteration or redesign of a proposed undertaking for the protection or conservation of heritage resources. The monitoring should be focused on the effectiveness of the protective measures.

DIRECT AND INDIRECT IMPACTS

Alternative 2

The use of physical/manual treatment methods for the control of noxious weeds has potential for affecting heritage resources such as prehistoric and historic archaeological sites in a direct manner by causing surface displacement of artifacts (including the illegal removal of artifacts by hand crews). This method may also affect potential traditional cultural properties and contemporary Native American uses. If this method is proposed, then a decision must be made as to whether or not the proposed action could affect these resources. Depending upon the anticipated nature of the affect full compliance with the National Historic Preservation Act (NHPA) may be required. If it is determined that the affect may be relatively minor, that is, unlikely to affect those qualities that may make an heritage property eligible for the NRHP, then the action may be treated as an "Exempt Undertaking" under the Pacific Southwest Regions "Programmatic Agreement" (PA) with the California State Historic Preservation Office (SHPO).

The use of chemicals (herbicides), generally, will have little potential effect on most archaeological properties (prehistoric or historic) and should be considered to have "no effect" on those qualities that may make a property eligible for the NRHP. Therefore, treatment of noxious weeds by the use of chemicals should be classed as an "Exempted Undertaking" in regards to compliance with the NHPA.

However, this type of treatment may have an effect on Native American traditional cultural places (TCPs), especially if the area is used for gathering food or medicinal plants. Any proposed use of chemical treatment should include advanced notification of the appropriate tribal organization and individuals who may use the area. Existing ethnographic information may help identify areas subject to potential conflicts.

Indirect affects of these methods may be beneficial in some instances by removing unwanted noxious weeds and promoting the re-growth of native plants.

Alternative 3

The use of physical/manual treatments under this alternative would have the same direct and indirect effects as noted in Alternative 2 above.

The use of the introduction of seeding of native species of plants (cultural treatments), provided they are broadcast, or there is less than a cubic meter of soil disturbed per acre planted, should have no impacts on archaeological (prehistoric and historic) resources. This action could also be dealt with under the Regional PA. Again, however, this type of treatment may potentially affect Native American TCPs or Native American use of an area, and consultation with the appropriate tribal group or individuals should take place early in the planning stages of these efforts.

Alternative 4

This alternative, which includes the use of physical/manual treatments, chemical treatments, and cultural treatments, would have the same levels of direct and indirect effects as noted above for these treatments in Alternatives 2 and 3.

Alternatives 5 and 6

Goat Grazing (Alternatives 5 and 6) – The use of goat grazing to control noxious weeds should not represent a significant effect to most archaeological resources. Some very minor ground disturbance may be present as a result of the short-term trampling affect of a goatherd milling about in a single location. This action, however, should result in relatively little lateral displacement of surface artifactual materials (e.g., obsidian waste flakes, surface artifacts such as projectile points) and should have no impact on subsurface archaeological materials. Other proposed methods such as clipping and mulching/tarping, similarly should be relatively benign on most archaeological materials. As previously stated, each proposed treatment location needs to be identified prior to any action to assure that there are no heritage resources at risk.

Alternative 1 (No Action)

There would be no direct effect on heritage resources as a result of the alternative. However, the proliferation of invasive weeds could displace native plants traditionally used by native people, and could also result in increased erosion of heritage/archeological sites as native vegetation is displaced. The displacement of native plants could also have an impact on visually aesthetic elements of heritage sites.

CUMULATIVE EFFECTS

There are no direct or indirect effects from herbicide application control methods in any alternative, therefore, there would be no cumulative effects on heritage resources from those activities. Physical/manual, cultural control and goat grazing may have direct and indirect effects, although environmental protection measures are in place to avoid or minimize these effects. Other activities already planned or ongoing on the Forest (with the exception of illegal activities) also have measures to protect heritage resources, as required by the Forest Plan and other regulations. Cumulative effects from any action alternative are expected to be minimal, and heritage resources, known or discovered during

activities would be protected.

Specialist Report Prepared By: Gerald R. Gates, Forest Archaeologist
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