Chapter 2: Description and Comparison of Alternatives

Introduction

This chapter describes and compares the Alternatives considered for the Modoc National Forest Noxious Weed Treatment Project. It describes both Alternatives considered in detail and those eliminated from detailed study. The Alternatives are presented in tabular format (Table 2-18) so that the Alternatives and their environmental impacts can be readily compared.

Changes from the Draft Environmental Impact Statement (DEIS)

Alternative Descriptions

Chapter 2 has been rewritten for ease of understanding and comparison of Alternatives. The range of herbicide application rates in Alternatives 2 and 4 were corrected for clopyralid, glyphosate, dicamba, and triclopyr.

Design Standards

- A few of the Design Standards (DS) were rewritten for clarity and to be consistent with herbicide label directions.
- Design Standards were added to clarify and bring together direction that was somewhat scattered in the DEIS.
- Design Standards were modified or developed in response to suggestions made by the public, other government agencies, or Indian tribes.

Early Detection - Rapid Response

The need for the Forest Service to respond rapidly to new infestations and improve effectiveness was described in the DEIS through Early Detection - Rapid Response. Discussion of Early Detection - Rapid Response was moved from the index, and other parts of the DEIS were brought forward and consolidated in Chapter 2. The Early Detection - Rapid Response Strategy has been clarified in Chapter 2 and does not vary between Alternatives 4-6. Alternative 5 does not prescribe any herbicide use.

Treatment Methods and Alternative Descriptions made in response to public comments:

- Hexazinone was dropped from the analysis, as it is a pre-emergent herbicide and the FEIS calls for utilizing only post-emergent, directed spray applications.
- Chlorsulfuron was added to Alternative 6 due to comments from state and local government agencies requesting utilization of a widely used herbicide that is more effective and less toxic. Chlorsulfuron is an herbicide commonly used by state and local agencies for noxious weed control. It provides effective control of several noxious weeds found on the Modoc National Forest. Some benefits cited for including Chlorsulfuron

were: 1) selectivity to target broadleaf weeds with little to no effect on most perennial grass species; 2) superior control of perennial pepperweed; 3) low use rates compared to most other herbicides; and 4) low toxicity to applicators and wildlife.

- Two herbicide mixtures were added for analysis as a result of local government agencies requests to provide a more effective herbicide treatment while applying less active ingredient per acre (Alternative 6).
- Use of herbicides to treat noxious weed sites within designated wilderness areas was dropped. Updated inventories show no noxious weed sites are currently in the South Warner Wilderness. If herbicides are needed in the future a separate environmental analysis will be completed. This FEIS does analyze the effects of hand treatment of future noxious weed sites within the South Warner Wilderness in all action Alternatives.
- Physical+ and goat grazing methods were added as potential treatments to the analysis. Summaries of treatment method effectiveness and brief descriptions of the noxious weeds were included in this chapter (Alternatives 5 and 6).
- Implementation and Treatment Protocols are better described in Chapter 2 by Alternative.
- A table comparing Alternatives by differences in Design Standards is provided.
- Hand-clipping plants or seedpods to prevent seed production as not discussed in the DEIS; however, the impacts are considered in this FEIS in Alternatives 5 and 6 in response to comments received on the DEIS.

Elements Common to Understanding Alternatives

The following sub-sections provide information that will be useful in understanding noxious weeds species and general information (i.e., not specific to Alternatives) about treatment options.

Weed Species to be Treated

Thirty-two different noxious weeds are believed to be present in Modoc County and may occur on the Modoc National Forest (Table 2-1). California Department of Food and Agriculture has developed a rating for noxious weeds. Each pest rating represent's the Department's assessment of the statewide risk of the pest to the agricultural, horticultural, forestry and public health interests of California. The ratings are intended as aids for managers to assess a particular pest's environmental, agricultural and biological significance and control action(s) recommended by the Department. Rating "A" refers to "an organism of known economic importance subject to state (or commissioner when acting as a state agent) enforced action involving: eradication, quarantine regulation, containment, rejection, or other holding action." There are 14 noxious weed species within Modoc County with a "A" rating. Rating "B" refers to "an organism of known economic importance subject to: eradication, containment, control or other holding action at the discretion of the individual county agricultural commissioner. There are 11 noxious weed species within Modoc County with a "B" rating. Rating "C" refers to "an organism of no state enforced action outside of nurseries except to retard spread" at the discretion of the county agricultural commissioner. There are seven noxious weed species within Modoc County with a "C" rating.

Table 2 - 1. Noxious Weeds of Modoc County

"A" Rated		
Common Crupina	*Crupina vulgaris*	Proposed to be treated
Dalmatian toadflax	*Linaria dalmatica*	Proposed to be treated

Diffuse knapweed	*Centaurea diffusa*	Proposed to be treated
Halogeton	*Halogeton glomeratus*	Not known to occur on the Modoc NF
Leafy spurge	*Euphorbia esula*	Not known to occur on the Modoc NF
Longleaf ground cherry	*Physalis longifolia*	Not known to occur on the Modoc NF
Musk thistle	*Carduus nutans*	Proposed to be treated
Perennial sowthistle	*Sonchus arvensis*	Not known to occur on the Modoc NF
Plumeless thistle	*Carduus acanthoides*	Proposed to be treated
Scotch thistle	*Onopordum acanthium*	Proposed to be treated
Skeletonweed	*Chondrilla juncea*	Not known to occur on the Modoc NF
Spotted knapweed	*Centaurea stoebe ssp. micranthos*	Proposed to be treated
Squarrose knapweed	*Centaurea squarrosa*	Proposed to be treated
Yellowspine thistle	*Cirsium ochrocentrum*	Not known to occur on the Modoc NF
"B" Rated		
Austrian fieldcress	*Rorippa austriaca*	Not known to occur on the Modoc NF
Canada thistle	*Cirsium arvense*	Proposed to be treated
Dyer's woad	*Isatis tinctoria*	Proposed to be treated
Globepodded hoarycress	*Cardaria pubescens*	Recently detected on the Modoc NF
Heart-podded hoarycress	*Cardaria draba*	Not known to occur on the Modoc NF
Japanese knotweed	*Polygonum cuspidatum*	Not known to occur on the Modoc NF
Mediterranean sage	*Salvia aethiopis*	Proposed to be treated
Purple loosestrife	*Lythrum salicaria*	Not known to occur on the Modoc NF
Quackgrass	*Agropyron repens*	Not known to occur on the Modoc NF
Russian knapweed	*Acroptilon repens*	Recently detected on the Modoc NF
Tall whitetop	*Lepidium latifolium*	Proposed to be treated
"C"Rated		
Common Russian thistle	*Salsola tragus*	Occur at rates beyond control
Field bindweed	*Convolvulus arvensis*	Occur at rates beyond control
Klamathweed	*Hypericum perforatum*	Proposed to be treated
Medusahead	*Taeniatherum caput-medusae*	Occur at rates beyond control
Povertyweed	*Iva axillaris*	Occur at rates beyond control
Puncturevine	*Tribulus terrestris*	Not known to occur on the Modoc NF
Yellow starthistle	*Centaurea solstitialis*	Proposed to be treated

The fourteen species that are proposed to be treated under this FEIS were chosen because their populations are currently at a low enough level where they can be eradicated and/or controlled within the boundaries of the Modoc National Forest. Other than three large sites, their populations are small enough that they can be treated efficiently and effectively; however, if these species are left untreated, their populations could spread so that treatment would be difficult. The three large sites of noxious weed infestations on the Modoc National Forest include 5,658 acre dyer's woad, 159 acres common crupina and 850 acres Dalmatian toadflax. Treatment of these sites varies by Alternative.

All species with a rating of "A" and "B" that are known to occur on the Modoc National Forest are proposed for treatment. Recently, globepodded hoary cress and Russian knapweed were detected on the Forest. Because these sites were recently detected they were not analyzed in this FEIS; however, they could be treated under the Alternatives with Early Detection Rapid Response. Two "C" rated species, yellow starthistle and Klamathweed, are not predominant in the County and are proposed for treatment under this proposal in an attempt to eradicate them from the County. Four "C" rated noxious weed species; common Russian thistle, field bindweed, medusahead and povertyweed, occur at population levels that are currently beyond control within the Modoc National Forest. These species have spread to such an extent that, given the current treatment methods and cost of treatment, it is currently not feasible to treat them. Ten noxious weed species that occur elsewhere within Modoc County are not known to occur within the Modoc National Forest.

Weed Species Information

Detailed descriptions of the 14 noxious weeds were provided in Appendix G of the DEIS. The information contained in Appendix G of the DEIS was from the weed sheets gathered and prepared by staff in the Non-Cropland Weed group of the University of California Cooperative Extension Service, in the Weed Science Program, Department of Vegetable Crops, University of California, Davis, CA 95616 (http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/), and the book Invasive Plants of California's Wildlands edited by Carla C. Bossard, John M. Randall, and Marc C. Hoshovsky, University of California Press, 2000 (http://groups.ucanr.org/ceppc/Invasive_Plants_of_California's_Wildlands/).

Appendix G of the FEIS does not provide the detailed descriptions that were provided in the DEIS. Instead, Appendix G of the FEIS provides numerous links to locations for noxious weed information, including the Internet links above.

Weed Treatment Methods for Selected Noxious Weeds

Weed eradication, control, and containment can be accomplished by several methods. The methods vary in cost and effectiveness. The Alternatives considered in this FEIS vary by treatment methods in response to public comments and the need to develop effective and economical treatment methods.

This FEIS does not consider using biological methods or prescribed fire. Limited grazing and mechanical methods are considered. This FEIS primarily relies on hand-pulling, digging, and herbicide treatment methods. Table 2-2 describes the treatment methods that are included in one or more of the Alternatives. Table 2 -3 describes the effectiveness of weed treatment methods by noxious weed species.

Of the treatments proposed, consideration of herbicides brought the most attention in comments on the DEIS. In response to these comments, the Forest added two Alternatives, clarified the Design Standards, and expanded the effects analysis in the FEIS. The purpose of this expanded analysis is not to emphasize treatment with herbicides; it is to provide a broad base of reasonable treatment methods and thorough analysis from which both the agency and the public could understand how best to address treatment of noxious weeds. The EIS will not evaluate the use of herbicides for commercial timber enhancement or livestock forage production.

Table 2 - 2. Descriptions of Treatment Methods Included in One or More Alternatives

Method	Description	Discussion
Hand pulling, grubbing, digging,	"Hand pulling is easy to plan and implement, and is often the best way to control small infestations, such as when a weed is first detected in an area. Hand pulling may be a good Alternative in sites where herbicides or other methods cannot be used. The key to effective hand pulling is to remove as much of the root as possible while minimizing soil disturbance. For many species, any root fragments left behind have the potential to re-sprout, and pulling is not effective on plants with deep and/or easily broken roots. Annuals and tap-rooted plants are particularly susceptible to control by hand-pulling. It is not as effective against many perennial weeds with deep underground stems and roots that are often left behind to re-sprout." (Tu et al. 2001)	The Modoc NF has conditions that may limit the amount and season of hand pulling, grubbing, or digging. Most of the Forest is rock covered with shallow soils which hinders the removal of the entire root system. In addition, once the area has dried out, the ground can become hard as cement.
clipping	Hand clipping the plant or seedpod to prevent seed production. Method does not remove infestation. Requires several visits to site annually to insure plant does not produce seeds.	Clipping was not discussed in the DEIS, however the impacts are considered in this FEIS in Alternatives 5 and 6 in response to comments received on the DEIS.
Hand-held string trimmer	Hand-held string trimmer used to cut the plant or seed pod.	Does not remove the plant or infestation. It does prevent the spread of new seeds. Not discussed in the DEIS, however the impacts are considered in this FEIS in Alternatives 5 and 6 in response to comments received on the DEIS.
Competitive seeding	Used after populations have been reduced by other control actions.	
Grazing animals intensely on 4-25 acres for specific plants	Grazing can either promote or reduce weed abundance at a particular site. By itself, grazing will rarely, if ever, completely eradicate invasive plants. However, when grazing treatments are combined with other control techniques, such as herbicides or biocontrol, severe infestations can be reduced and small infestations may be eliminated. Grazing or other actions of grazing animals (wallowing, pawing up soil) can cause significant damage to a system, and promote the spread and survival of noxious weeds. Overgrazing on weed sites can reduce native plant cover, disturb soils, weaken native communities, and allow exotic weeds to invade. In addition, animals that are moved from pasture to pasture can spread invasive plant seeds. In general, the specific weed and desirable native plants will determine the number and species of animal grazers and the duration and frequency of grazing. (Tu et al. 2001)	Not discussed in the DEIS, however the impacts are considered in this FEIS in Alternatives 5 and 6 in response to comments received on the DEIS. EPA pointed out goat utilization assists in control of musk thistle.
Mulching	Cover the ground and/or weed seedlings with mulch (hay, grass clippings, wood chips, etc.) or other type of ground cover (newspaper clippings). This prevents weed seeds and seedlings from receiving sunlight necessary to survive and grow.	Mulching can be used on relatively small areas, but will often stunt or stop growth of desirable native species. Mulching cannot control some perennial weeds because their extensive food

Method	Description	Discussion
		reserves allow them to continue to grow up through the mulch. (Tu et al. 2001)
Placing Tarps on Plants (Soil solarization)	Placing Tarps over an area to shade out undesirable plants. “Soil solarization is the technique of placing a cover (usually black or clear plastic) over the soil surface to trap solar radiation and cause an increase in soil temperatures to levels that kill plants, seeds, plant pathogens, and insects. In addition, when black plastic or other opaque materials are used, sunlight is blocked which can kill existing plants (Katan et al. 1987). Soil solarization however, can cause significant biological, physical, and chemical changes in the soil that can last up to two years, and deter the growth of desirable native species. Soil solarization is used in horticulture and for a few high value agriculture crops like strawberries. This method has not been used extensively for weed control in natural settings. The effectiveness of soil solarization depends, in part, on how susceptible weed seeds are to temperature increases. It is most effective against winter annual weeds that germinate under cool conditions (Elmore 1990). Summer annuals and other species adapted to higher temperatures, which germinate during warmer parts of the year, are less susceptible. Soil solarization is most effective during the summer months, and may be less effective in cooler climates (DeVay 1990). The higher the temperature, the more quickly a kill is achieved. Solarization is effective only if done in wet soil. Where soils are typically dry, they must first be irrigated until soil from the surface to 50 to 60 cm deep is at field capacity (Grinstein & Hetzroni 1991). “(Tu et al. 2001)	The Salmon River Restoration Council on the Six Rivers National Forest has used this method on a limited basis on a few sites. It is not considered for widespread use in this FEIS because of concerns about visual impacts, adverse impacts to non-target species and soil, and the high winds experienced over long periods of time on the Modoc National Forest. In addition the Salmon River area receives over 4 times as much rainfall as the Modoc NF annually. The dry conditions on the Modoc NF soils are not conducive to widespread use of this method. “Soil solarization is beneficial in that it releases nutrients that are tied up in the organic component of the soil, and that it can kill unwanted plants without the use of chemicals (Stapleton 1990). However, solarization leaves an open substrate that can be readily invaded by new organisms, both native and non-native once the plastic is removed (Stapleton 1990). The influx of nutrients that results from solarization can be advantageous to restoration efforts, but can promote aggressive, ruderal plants that typically thrive in nutrient-rich soils.” (Tu et al. 2001)
Physical+	Hand-pulling, hoeing, grubbing, clipping seed head or plant, trimming with hand-held string trimmer, covering with mulch or tarp	See hand-pulling, grubbing, digging, and clipping (above).
Ground Application with Directed Spray or wicks applied directly to individual plants	Herbicide applied directly to the plant with a wick is much like applying paint to a wall with a roller. Provides maximum control of herbicide application directly to plants without drift or droplets hitting the ground. Used most effectively in riparian areas. Directed Spray hand application is accomplished by wand with regulated nozzle in such a fashion that spray is directed within 1 to 2 feet of the target vegetation. This spraying is done at an angle to reduce overspray. Plants that are three feet tall are left standing. Taller plants are will need to be cut or bent to insure that spray is within three feet of the ground.	Application as indicated minimizes herbicide spray reaching non-target plants or water. It also minimizes risk to soil & soil organisms.

Table 2 - 3. Effectiveness of All Methods Considered for Treatment of Noxious Weed Species

Common Name	Scientific Name	Cat	Life History	Hand Pulling	Mechanical	Biological	Rx Fire	Herbicide	Grazing
Dalmatian Toadflax	*Linaria dalmatica*	A	Perennial Rhizomatous	Not Effective – complete removal of roots with numerous dormant root buds is generally infeasible.	Not Effective	Yes	Not Effective	Yes - Dicamba Glyphosate	Not Effective
Diffuse Knapweed	*Centaurea diffusa*	A	Biennial	Caution, use only on sites with few plants. Re-sprouting can occur. Hand pulling must be repeated 2-4 times a year.	May reduce but not eliminate seed production. Rosettes are generally too low for mowing. Tillage is not recommended.	Yes - Several insect agents greatly vary in their ability to reduce knapweed seed and vegetative reproduction. Establishment may take from one to several years. Will not eradicate knapweeds, but may be utilized to reduce knapweed populations over time.	Yes - if followed by herbicides	Yes - 2, 4-D, Dicamba, and Clopyralid; or Tank Mix 2.[1]	Not Effective

Common Name	Scientific Name	Cat	Life History	Hand Pulling	Mechanical	Biological	Rx Fire	Herbicide	Grazing
Musk Thistle	*Carduus nutans*	A	annual or biennial	Yes	No Mowing 3 ft tall musk thistle plants to a 6 in stubble will prevent seed production, but thistles quickly recover from remaining buds near the base. Tillage is not always practical in non-crop areas.	Yes – but can attack other thistle species – possible risk to native thistles.	Yes – Fire will remove dense stands of mature thistles.	Yes - chlorsulfuron (0.37 - 0.75 oz ai/A) applied during early bloom stage reduced seed production by over 99%. Dicamba, 2, 4-D, Clopyralid, Glyphosate and combination will be effective. (; or Tank Mix[1] 1 or 2).	Limited Goats – Many thistle problems occur when range or pastures are overgrazed in summer and early fall, or when conditions, such as drought stress or poor fertility in soils are present.
Plumeless Thistle	*Carduus acanthoides*	A	winter annual or biennial	Yes	Same as Musk Thistle	Same as Musk Thistle	Same as Musk Thistle	Same as Musk Thistle	Same as Musk Thistle
Scotch Thistle	*Onopordum acanthium*	A	Biennial	Caution, use only on sites with few plants. Make sure to remove entire root re-sprouting can occur. Hand pulling must be repeated 2-4 times a year	May reduce seed production	No	No	Dicamba, 2, 4-D, Clopyralid; or Tank Mix[1] 1 or 2.	No
Spotted Knapweed	*Centaurea stoebe ssp. micranthos*	A	Biennial	Caution, Same as Diffuse knapweed	Same as Diffuse knapweed	Same as Diffuse knapweed	Same as Diffuse knapweed	Same as Diffuse knapweed	Same as Diffuse knapweed
Squarrose Knapweed	*Centaurea squarrosa*	A	Perennial	Caution, Same as Diffuse knapweed	Same as Diffuse knapweed	Same as Diffuse knapweed	Same as Diffuse knapweed	Same as Diffuse knapweed	Same as Diffuse knapweed

Common Name	Scientific Name	Cat	Life History	Hand Pulling	Mechanical	Biological	Rx Fire	Herbicide	Grazing
Crupina	*Crupina vulgaris*	A	winter annual	Yes - Before flowering small infestations. Infestations should be checked every two to four weeks	Limited on steep slopes or rugged range areas.	Not Effective	Not Effective	Since other control strategies are limited herbicides may be the most effective means for eradicating larger infestations. Dicamba (0.5 lb ae/A) + 2, 4-D (1.0 lb ae/A). Glyphosate (1.0 lb ae/A). Clopyralid (0.13 lb ae/A). Triclopyr (.25 lb ae/A ; or Tank Mix[1] 2.	Not Effective
Canada Thistle	*Cirsium arvense*	B	Perennial Rhizomatous	No – but may work on small infestations.	Not Effective - Does not result in complete kill. May be more effective when combined with herbicide treatments. Must be repeated every 7-21 days.	Not Effective	Not Effective - Canada thistle may respond both positively and negatively to burning.	Yes - The rate, timing, and effectiveness of these treatments may vary. Chlorsulfuron, Clopyralid, Dicamba, Glyphosate; or Tank Mix[1] 1 or 2.	Not Effective
Dyer's Woad	*Isatis tinctoria*	B	Biennial	Caution - make sure to remove the entire root; re-sprouting from the crown can occur.	No - Not effective due to re-sprouting of root crown	No – not approved in CA.	No – too sparse to carry fire.	2, 4-D chlorsulfuron	Not Effective

Common Name	Scientific Name	Cat	Life History	Hand Pulling	Mechanical	Biological	Rx Fire	Herbicide	Grazing
Mediterranean Sage	*Salvia aethiopis*	B	Biennial/ perennial	Caution - re-sprouting from the crown can occur. Make sure to sever the root at least 3 inches below the soil surface. A shallower depth will result in crown re-sprouting	No -Not effective due to prostrate growth habit of the rosettes. Tillage is generally not an option in areas these plants infest.	Yes – effective-ness spotty	Not Effective	Dicamba, 2, 4-D	Not Effective
Tall Whitetop (Perennial Pepperweed)	*Lepidium latifolium*	B	Perennial Rhizomatous	Not Effective	Limited long-term impact	Yes	No	Dicamba and 2, 4-D Chlorsulfuron; or Tank Mix[1] 2.	No
Klamathweed	*Hypericum perforatum*	C	Perennial; used medicinally	Caution, removal of the entire root structure is necessary as re-sprouting from the crown can occur.	No - Promotes vegetative spread of rhizomes	Yes	No – Spreads Infestation	No	No

Common Name	Scientific Name	Cat	Life History	Hand Pulling	Mechanical	Biological	Rx Fire	Herbicide	Grazing
Yellow Starthistle	*Centaurea solstitialis*	C	annual/ biennial	Yes only very small infestations. Take care not to disturb soil.	No -Will not provide complete control, although it can be effective with moderate infestations and erect growth form.	Yes – but not sufficient to provide long-term starthistle management and is rated as low and moderate in reducing infestations.	Prescribed burns can provide control if implemented after annual plants have dried, but before yellow starthistle seed is produced.	2, 4-D, Dicamba, Triclopyr, Glyphosate, Chlorsulfuron; or Tank Mix[1] 1 or 2.	No - Will not control populations but may reduce seed production if done intensely at the right time.

Note 1: Definitons of the various treatment methods are found in tables 2-2 and 2-10.

Note 2: This Table is based on information from the State of Californa, Department of Food and Agriculture, Division of Plant Health and Pest Prevention Services web site at: http://www.cdfa.ca.gov/phpps/ipc/weedinfo/winfo_list-commname.htm

[1] Tank mixes were added to Alternative 6 to use combinations of pesticides when the tank mix would be more effective and would utilize less active ingredients. Tank Mix 1 is a mixture of chorsulfuron and 2, 4-D and Tank Mix 2 is a mixture of dicamba and 2, 4-D. (2, 4-D is could be the amine or ester formulation depending on the distance from water.

Herbicide Treatment Methods Proposed for Use

Herbicides would be applied directly to weed leaves and stems using directed spray or wick applicators. Surfactants may be used to impart spreading, wetting, dispersal, and/or emulsification of herbicides. Directed spray applicators, one type of foliar applicator, spray herbicide directly onto target plants from containers with spray hose and appropriate nozzle. Other desirable plants are avoided. Directed spray applicators will be brought to infestation sites by motorized vehicles with spray hoses and or by backpack as appropriate. Crook-necked spray bottles and similar equipment may be used to carry herbicide over distances and through dense vegetation for safety reasons. These sprayers, particularly hand-pumped spray or spray bottles can target very small plants or parts of plants. Wicking is a technique that uses a sponge or wick on a handle to wipe herbicide directly onto weed foliage and stems. The wick generally prevents drift or droplets from falling onto non-target plants and soil. Other methods of application maybe used based on technology and effectiveness.

Figure 2 - 1. Photographs of Herbicide Application Tools Proposed

Truck-Mounted Pressurized Sprayer	ATV-Mounted Pressurized Sprayer	Towed Pressurized Sprayer
Backpack Sprayer	Wick Applicator	Wick Applicator (closeup)

All registered herbicides must have a label certifying that the Federal Environmental Protection Agency (EPA) and the California Department of Pesticide Regulation (DPR) have approved the herbicide for use. Product labels are legal documents whose language is determined and approved by the EPA during the pesticide registration process. All herbicides proposed for use are registered in the U.S. and California and have a label certifying that the EPA and the DPR have approved the herbicide for proposed uses.

The label contains information about the product, including its relative toxicity, potential hazard to humans and the environment, directions for use, storage and disposal, and first aid treatment in case of exposure. These label directions provide for public and worker safety by requiring posting of treated areas, pre-designation of mixing, storage and filling sites, and transportation and handling practices in accordance with toxicity of each formulation.

The length of time each herbicide controls noxious weeds varies with the type of herbicide, environmental conditions, and target weed. Some herbicides control weeds for a short time period, while others can provide several years of control from one application. EPA approved

herbicide labels include safe handling practices, application rates, and labels, susceptibility of weeds to different herbicides, Material Safety Data Sheets, guidelines, and an Emergency Spill Response proposed for use on this project are contained in the project file at the Supervisor's Office in Alturas, California.

Use of herbicides for noxious weed treatment involves application of products developed, labeled, and produced to treat weed species at certain stages of plant growth. Most herbicides considered in this analysis are "selective" which means they control certain plant species while allowing other species to remain unaffected. Several herbicides are considered because they vary in effectiveness on different noxious weeds. As stated in the DEIS, Alternatives 2 and 4 will include analysis of pesticide treatment using 2, 4-D, clopyralid, dicamba, glyphosate, and triclopyr, applied at appropriate rates according to label directions determined by EPA and DPR requirements (Table 2-14). As a result of public comment, Chlorsulfuron and specific mixtures of 2, 4-D, with Dicamba or chlorsulfuron are considered in Alternative 6.

The DEIS listed hexazinone as an herbicide to be utilized in the treatment of three noxious weed species on less than 15 acres. As a result of public comment, the proposed use of hexazinone was reevaluated. Subsequently, it was dropped from analysis in this FEIS for two reasons. First, it is registered primarily for use as a pre-emergent soil treatment, which is not a treatment method being proposed. Second, the three weed species it was proposed to treat can each be successfully treated with other herbicides proposed for use.

Herbicide selection depends on weed species, level of infestation, location, other resource concerns (see Best Management Practices), and the applicability of herbicides. Herbicide selection considers, but is not limited to, the following criteria:

- Herbicide effectiveness on target weed species;
- Proximity to water or other sensitive areas;
- Soil characteristics;
- Potential unintended impacts to non-target species such as conifers or shrubs;
- Adjacent treatments (private or state land); and
- Timing of treatment.

Herbicides in the action Alternatives and targeted weed species are shown in Table 2-14. The herbicides were selected for inclusion into the noxious weed treatment program because of their proven effectiveness on the selected noxious weeds and their characteristics and selectivity.

Information on the use and restrictions of herbicides is continually changing. New restrictions or elimination of use of analyized herbicides may occur. Updated formulations and herbicides with less toxic herbicides and lower rates also may be likely to be developed. During annual work planning additional chemicals and lower rates may be considered for site specific applications as long as the effects are within the range of effects analyzed, chemicals are applied under label instructions and a risk assessment for the chemical has been prepared that demonstrates less environmental or human risk are shown. The new chemicals and/or lower rates risk assessments conducted during annual work planning will be analyzed and considered like any other new information as specified in FSH 1909.15.18.

Herbicide Characteristics and Selectivity

Clopyralid: Clopryalid is a selective herbicide used to kill unwanted annual and perennial broadleaf plants.

Clopyralid is relatively persistent in soil and is degraded by soil microbes and not susceptible to photo or chemical degradation. Once Clopyralid has been applied to soils, it rapidly disassociates (Shang and Arshad 1998), becoming extremely soluble in water and does not bind strongly with soil particles. Lack of adsorption 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. Do not apply Clopyralid 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 that has high intensity and short duration precipitation events (Source- Weed Control Methods Handbook, The Nature Conservancy, Tu et al.).

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. Do not apply Clopyralid 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. (Source-- Weed Control Methods Handbook, The Nature Conservancy, Tu et al.).

From the Specimen Label for Transline (EPA Reg. No. 62719-259 revised 07-26-99) Clopyralid should not be applied where soils have a rapid to very rapid permeability or the depth to groundwater is shallow.

Dicamba: Dicamba is a selective herbicide used to kill broadleaf weeds before and after they sprout; however, the only dicamba formulations that are being considered in this FEIS are those that would be applied after weeds sprout.

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 and the method of degradation by soil microbial activity. The rate of degradation of Dicamba is slower at low temperature and low soil moisture (Source: Pesticide Fact Sheet prepared by Information Ventures, Inc.).

Dicamba can be introduced to groundwater and surface water. Application of Dicamba or in combination with 2, 4-D on sensitive or shallows soils can introduce the active ingredient into the groundwater table.

Glyphosate: Glyphosate is a broad-spectrum, non-selective herbicide that kills all plants, including grasses, broadleaf and woody plants.

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. 1989a). Unbound or free Glyphosate molecules are degraded at a steady and relatively rapid rate by soil microbes (Nomura and Hilton 1977, Rueppel et al 1977 and Busse 2001).

Because Glyphosate binds strongly to soils, it is unlikely to enter waters through surface or sub-surface 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 over spray.

Bakke (2001) summarized water quality monitoring following ground based application of herbicides for herbicide residues in USFS Region 5 from1991 to 1999. For Glyphosate, distances where the application was not allowed ranged from 200 feet to 0 feet from water bodies. There

were no detections of herbicide residues in water or sediments in any of the samples with the exception of one noxious weed treatment that occurred within the riparian zone. Even within the riparian zone, only one of twelve samples had a detection, and that was at a level below any level of concern for human health or aquatic resources. Two sites on the Stanislaus NF where a 10-foot no application distance was used, showed no detection of residues immediately post-treatment and post-treatment after the first storm flow.

Glyphosate has been shown to bind with the soil particle when it is applied to the soil, it has been shown by current research at the USDA Forest Service Pacific Southwest Research Station in Redding, California that the microbial activity of the soil is not adversely affected by Glyphosate and that soil microorganisms break down the active chemical ingredient within 24 to 72 hours after application (Busse et al. 2001).

Triclopyr: Triclopyr is a selective herbicide used to kill unwanted broadleaf plants.

Microbial metabolism accounts for a significant percentage of Triclopyr degradation in soils. In general, warm moist soils with a high organic will support the largest microbial populations and the highest rate of herbicide 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 (.50 in) 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. This chemical has properties and characteristics associated with chemicals detected in groundwater.

The use of this chemical in areas where soils are permeable, shallow depth or where the water table is shallow may result in groundwater contamination. Do not apply directly to un-impounded rivers or streams. Applications should be made only where there is little or no hazard from spray drift (Source Specimen: Label Garlon 3A Revised 03-19-03).

In water, the two formulations of triclopyr (water soluble salt and ester formulas) can behave very differently. The water-soluble salt is degraded in the water column through photolysis and hydrolysis (McCall & Gavit 1985). The ester is not water soluble and can be persistent in the aquatic environment. The ester binds to organic particles in the water column and precipitates to the sediment layers (McCall & Gavit 1986). Bound ester molecules will degrade through hydrolysis and photolysis to Triclopyr acid (Smith 1976) which move back into the water column and continue to degrade. The rate of degradation is dependent on the water temperature, pH, and sediment content.

Triclopyr acid has an intermediate soil adsorption capacity resulting in the potential for the movement of small amounts of Triclopyr following the first significant rainfall (McCall & Gavit 1986), but further leaching is believed to be minor (Newton et al. 1990; Stephenson et al. 1990 and Thompson et al. 1991). Movement of Triclopyr through surface and subsurface runoff in areas with minimal rainfall is believed to be negligible (Newton et al. 1990; Stephenson et al. 1990) (Source- Weed Control Methods Handbook, The Nature Conservancy, Tu et al.).

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 have 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 (Source: Pesticide Fact Sheet prepared by Information Ventures, Inc.).

Triclopyr 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 has a mobility of low to moderate.

Bakke (2001) summarized water quality monitoring following ground based application of herbicides for herbicide residues in USFS Region 5 from1991 to 1999. For Triclopyr, no application distances ranged from 200 feet to 10 feet. Monitoring results showed residual detections of Triclopyr for no application distances less than 15 feet. With a 20 foot no application distance, no detections were found.

2, 4-D: 2, 4-D is used as a systemic herbicide used to selectively control broadleaf weeds.

2, 4-D is degraded in soils primarily by microbes. Hemmett and Faust (1969) concluded that the size of the microbial population, the concentration of 2, 4-D and the ratio of the two factors determine 2, 4-D degradation rates. 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. This herbicide is considered to be highly mobile, it is prone to move off site in surface runoff and sub surface flow (Source Weed Control Methods Handbook, The Nature Conservancy, Tu et al.). 2, 4-D is identified by the EPA as having characteristics that make it an herbicide with high leaching potential and very water soluble thereby making it subject to movement by runoff when applied adjacent to or near water. The EPA identifies that 2, 4-D is broken down into inert particles by soil microbial activity within 7 days following application.

The EPA reports that 2, 4-D has low soil persistence. 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.

Chlorsulfuron: Chlorsulfuron is a selective herbicide used to kill annual, biennial, and perennial broadleaf weeds before and after they sprout; however, the only chlorsulfuron formulations that are being considered in this FEIS are those that would be applied after weeds sprout.

Chlorsulfuron should not be applied to soils when they are saturated or when they are subject to periods of intense rainfall. Aerial drift potential increases at wind speed of less than 3 mph (due to variable direction and inversion potential) or more than 10 mph. Drift potential is high during a surface inversion (Source- Specimen Label Telar DF (EPA Reg. No. 352-522)).

A 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.

Tank Mixes: Two tank mixes are proposed to be applied under Alternative 6. These tank mixes are as follows: Tank Mix #1—chlorsulforon mixed with 2, 4-D; Tank Mix #2—dicamba mixed with 2, 4-D.

Tank Mix #1 (Chlorsulfuron + 2, 4-D): 2, 4-D is identified by the EPA as having characteristics that make it an herbicide with a high leaching potential and is very water-soluble, thereby making

it subject to movement by runoff when applied adjacent to or near water. Chlorsulfuron has been shown to be highly mobile and is moderately persistent in most soils. Chlorsulfuron should not be applied to soils when they are saturated or when they are subject to periods of intense rainfall. Both chlorsulfuron and 2, 4-D are highly mobile and can be transported by surface runoff into streams and lakes.

Tank Mix #2 (Dicamba + 2, 4-D): Application of dicamba or in combination with 2, 4-D on sensitive or shallows soils can introduce the active ingredient into the groundwater table. Tank Mix #2 should not be applied to saturate 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

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 groundwater table.

Selection of weed management treatment is not a choice of one treatment over another, but rather a selection of a combination of treatments that would be most effective on the target species for a particular location.

Early Detection – Rapid Response Strategy

An integrated weed management approach for addressing invasive plant problems calls for Early Detection – Rapid Response for newly discovered sites to insure weed infestations are removed upon discovery.

During development of the FEIS and finalizing the response to comments the Modoc National Forest decided to clarify adaptive management to a narrower definition and to clarify that the program was in line with National, Regional and Forest Integrated Weed Management principles. Therefore; adaptive management discussions and program have been replaced with what is more appropriately called Early Detection - Rapid Response Strategy.

An Early Detection – Rapid Response Strategy offers an avenue to describe and evaluate the consequences of changing invasive plant infestations and treatment.

The following paragraphs cover Early Detection – Rapid Response as it relates to project design, environmental effects analysis, and monitoring, evaluation, and change. This section also covers using Forest Service Handbook procedures for addressing new information and changed circumstances after decisions are made.

Under an Early Detection - Rapid Response Strategy, new or previously undiscovered infestations would be treated according to approved methods and Design Standards. Treatments may occur in all Forest Plan land allocations and may include invasive species that are not listed in Table 1-1. A treatment and restoration plan would be developed for new infestations, based on the process outlined in the section on Implementation Planning below. The IDT considered the kinds of site conditions encountered throughout the treatment areas and analyzed the effects of applying a range of treatment prescriptions to these situations. The Implementation Planning process would ensure that treatments of currently undetected invasive plants would have effects within the scope of those disclosed in this FEIS, because the Design Standards were developed considering a wide range of conditions that occur throughout the Forest. The Design Standards serve to eliminate or minimize the risk of significant effects to such a degree that even though precise treatment locations may not be known, the effects of treatment are known..

Rapid Response for this analysis anticipates that existing sites may increase in the number of plants by approximately 10 % per year. The number of new sites found is anticipated to be less than 50 per year based on the inventories carried out as part of other projects. Proposed treatment

of acres identified under Early Detection - Rapid Response would be capped at no more than 100 acres being treated in any given year, and no more than 200 acres in total. The rationale for this cap is to provide flexibility to treat new and/or expanding weed sites while remaining within the range of effects as displayed in this analysis.

The current invasive plant list for the Modoc National Forest is included in the Modoc National Forest Integrated Weed Management Strategy of 2005, the database maintained for noxious weed inventory is maintained electronically and is updated as new occurrences are found or information on existing sites is developed.

The intent of an Early Detection - Rapid Response Strategy is to treat new infestations when they are small so that the likelihood of adverse treatment effects is minimized. In addition, the precise location of individual target plants, including those mapped in the current inventory is subject to change.

Thus, the Early Detection - Rapid Response Strategy included in Alternatives 4,5, and 6 allows the Forest Service to treat across the Forest where the need exists, based on, but not limited to the current inventory and anticipated rates of spread. The annual implementation planning process is intended to ensure that effects are within the scope of those disclosed in this FEIS.

Noxious Weed Site Re-treatments

Some noxious weed sites may require re-treatment to fully control or eradicate the site. Re-treatment of noxious weed sites within the same season will normally be done physical+ treatments. Herbicide treatments will occur only once per year. Phyiscal + treatment will not exceed one cubic meter per acre without prior authorization from the heritage resources specialist.

Re-treatment of noxious weed sites may be needed to manage the seed bank. This need to retreat noxious weed sites was identified in the DEIS and is clarified here as Seed Bank Management. Seed Bank Management includes visiting previously treated sites on an annual basis to treat newly germinated weeds. Seed Bank Management is included in all action Alternatives.

The extent of proposed treatments and herbicide treatments is summarized in Table 2-12. The most extensive proposed herbicide treatment under this FEIS would occur if either Alternative 2 or 4 are selected. Under Alternatives 2 and 4, up to 6,639 acres could receive some form of herbicide treatment. However, this represents less than ½ of 1 % of the total land area of the Modoc National Forest, or stated differently, for each 288 acres of Forest, just 1 acre, on average, could be treated with herbicides under this Alternative. Alternative 6 limits possible herbicide treatments to 541 acres (7/100s of one % of the Forest).

In addition to the very limited percentages of the Forest that could be treated with herbicides under this FEIS, the majority of the sites are small and scattered (most are 1/10 acre or less in size). This further reduces the potential for concentrated impacts of herbicides on people or wildlife in localized areas.

Also, within identified weed sites, weed plants frequently 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 people or wildlife in localized areas.

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 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, especially so in the case of Glyphosate which is generally effective against all types of green plants. Bare areas are typically the preferred habitats of weeds. Any inadvertent 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 act to reduce the total quantities of herbicides applied to weed sites.

A comparison of environmental impacts and significant issues is presented in Table 2-18. The potential impact for each Alternative is displayed for each of the four Significant Issues, as well as for threatened and endangered wildlife, threatened and endangered aquatic species, threatened and endangered plants, and cultural plants.

The total amount of herbicides applied by implementing any of the Alternatives utilizing herbicides is displayed in Table 2-15. Table 2-16 displays the contribution of total herbicide application by each herbicide to the total applied in Modoc County over the 2003 and 2004 calendar years as reported by the California Department of Pesticide Regulation.

Alternatives Considered

Based on the significant issues identified through public comment on the DEIS, the Forest Service developed two additional Alternatives that address the Purpose and Need to a different degree than the three action Alternatives in the DEIS. In addition, the Forest Service is required to analyze a No Action Alternative (current management). The Proposed Action, No Action Alternative, and the four action Alternatives are described in detail below. Alternatives 1-4 are the Alternatives from the DEIS with corrections and clarifications in data and statements as a result of the DEIS comments. Alternatives 5 and 6 expand on Alternatives 3 and 4 in response to comments on the DEIS and reduce the scope of treatment in size and intensity.

A wide range of Alternatives is provided by the No Action Alternative (Alternative 1, current management), the Proposed Action (Alternative 2), and the four action Alternatives. The action Alternatives vary in acres treated, types of treatments, and treatment design. The Alternatives depict treatment methods that can reasonably be expected to be implemented given anticipated budgets, treatment timeframes, and availability of equipment and procedures available to the Modoc National Forest. Experimental and/or newly developing techniques are not analyzed.

Design Standards for Alternatives

Design Standards guide implementation of Alternatives 2 through 6. All Design Standards are described in Table 2-4, and a summary of Design Standards related to surface water is displayed in Figure 2-2. Design Standards ensure that noxious weed treatments result in environmental effects that are within the direct, indirect, and cumulative effects described in Chapter 3. Examples of how Design Standards are applied are presented in Appendix B.

Table 2 - 4. Design Standards for Alternatives 2 through 6

Code	Design Standard	2	3	4	5	6
DS-01	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.	X	X	X	X	X
DS-02	Planning: Treatment priorities for sites and methods are listed in Table 2-13, Comparison of Treatment Priorities	X	X	X	X	X
DS-03	Planning - Time Period: Time Frame for Implementation is 5 years.	X	X			

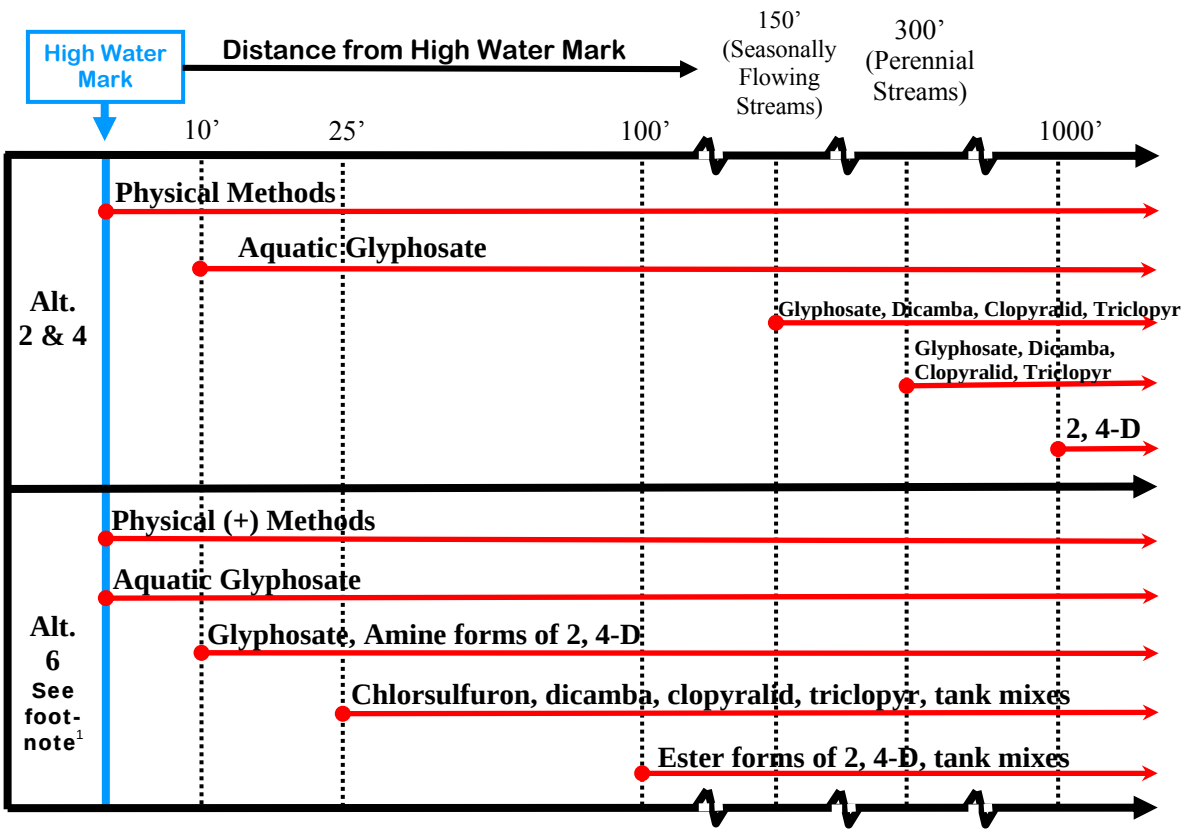
Code	Design Standard	2	3	4	5	6
DS-04	Planning - Time Period: Time Frame for Implementation is 10 years or longer (FSH 1909.15 section 18.03). Review the environmental documentation of actions awaiting implementation and those of ongoing programs or projects at least every 5 years to determine if the environmental analysis and documentation is still current. If the responsible official determines that it is current and a correction, supplement, or revision is not necessary, implementation would continue. The results of the review will be documented in the project file.			X	X	X
DS-05a	Physical treatment will be used when occurrences are small consisting of having fewer than 100 weed plants or are a tenth (0.10) of an acre or less. Sites of 0.10 acre or less with over 100 plants may be treated with herbicides until the population is reduced to less than 100 plants.	X		X		
DS-05b	Physical+ treatment will be used when occurrences are small consisting of having fewer than 25 weed plants or are a tenth (0.10) of an acre or less. Sites of 0.10 acre or less with over 25 plants may treated with herbicides until the population is reduced to less than 25 plants.					X
DS-06	Physical+ treatment of rhizomatous species would not be used.	X	X	X		
DS-07	Physical+ treatments may be used on rhizomatous species weed sites smaller than 1/10 of an acre in size, and that have young, small plants that can be totally removed, including the rhizomatous roots.				X	X
DS-08	Physical treatment: To reduce seed spread, disposal of noxious weeds that are grubbed or manually removed will be as follows: If no flowers or seeds are present, pull the weed and place it on the ground to dry out if species is not rhizomatous or there is a potential for re-sprouting. If flowers or seeds are present, pull the weed carefully to prevent seeds from falling, and place in an appropriate container for disposal.	X	X	X	X	X
DS-09	Heritage Resources: Weed treatments will be coordinated with the Forest heritage resource specialist and Forest tribal relations manager to protect heritage resources such as traditional plant gathering areas, rock art, and historic structures. Soil disturbance will be limited to cubic meter per acre, without prior authorization from the heritage resources specialist. (R5 Programmatic Agreement for minimum disturbance activities with State Historic Preservation Officer)	X	X	X	X	X
DS-10	Wildlife and Fish - Terrestrial: Limited Operating Periods for TE&S 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 LOP for sandhill crane will be implemented from 1 April to 30 August for all active crane nests.	X	X	X	X	X
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.					X
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.	X		X		X
DS-12b	Wildlife and Fish – No 2, 4-D on weed occurrences greater than 2 acres in size.					X
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.	X		X		X
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-watershed.	X	X	X	X	X

Code	Design Standard	2	3	4	5	6
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.	X	X	X	X	X
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.	X	X	X	X	X
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.	X		X		
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.					X
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.					X
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.					X
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.	X		X		X

Code	Design Standard	2	3	4	5	6
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.	X	X	X		
DS-21	Soils: Areas with bare soil created by the treatment of noxious weed, the site would be evaluated for rehabilitation.				X	X
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.	X		X		X
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.	X		X		
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.					X
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.					X
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).	X	X	X	X	X
DS-26	Herbicides: No mixing of herbicides will take place.	X		X		
DS-27	Herbicides: Two herbicide mixtures are available for application. Mixture 1 (Chlorsulfuron + 2, 4-D) and mixture 2 (Dicamba + 2, 4-D).					X
DS-28	Herbicides: Herbicide treatments 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.	X		X		X
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.	X		X		X
DS-30	Herbicides: All herbicide spray tanks will be equipped with a pressure gauge to ensure that low pressure application of herbicides is achieved.					X
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		X		
DS-32	Sensitive Plants: No spraying of herbicides within 50 feet of sensitive plant species. Wicking and Physical+ treatments may take place within 50 feet of sensitive plants.					X
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.					X
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.	X		X		X
DS-35	Safety and Health: All Personal Protective Equipment, required by state and federal regulations, for the specific type of treatment being implemented, will be used during field operations.	X	X	X	X	X

Code	Design Standard	2	3	4	5	6
DS-36	Safety and Health: Signs regarding herbicide use will be placed at access points to treatment areas prior to initiating treatment. Signs will list herbicides to be used, effective dates, and name and phone number of Forest contact.	X		X		X
DS-37	Safety and Health: Herbicides will only be applied by trained and/or certified applicators in accordance with label instructions and applicable federal and state pesticide laws.	X		X		X
DS-38	Safety and Health: Klamathweed (St. Johnswort) will not be treated with herbicides due to its use as a medicine by some.	X		X		X

Figure 2 - 2: Summary of Design Standards for Treatments in Relation to Surface Water



[1] Under Alternative 6, Design Standard-19a applies in the areas under the jurisdiction of the Lahontan Water Quality Control Board (east side of the Warner Mountains; see Figure 3-2): No treatments would occur from the high-water mark for a distance of 10 feet; only aquatic glyphosate would be used from 10 to 100 feet of the high-water mark; further than 100 feet from the high-water mark, the other herbicides displayed in the Alternative may be applied. Under Alternative 6, Design Standard-11, in habitat for TES aquatic species, aquatic glyphosate is the only herbicide that may be used within 100 feet of the High Water Mark.

Alternative 1: No Action (Current Management)

This Alternative is required by regulation (CFR 1502.8) and provides a baseline for comparison and analysis of effects.

Under Current Management the Forest is implementing direction in the Forest Land and Resource Management Plan, the Sierra Nevada Forest Plan Amendment, and the Modoc National Forest Integrated Weed Management Strategy (Sylva 2005). Under this direction, a Noxious Weed Risk

Assessment is completed for all projects planned on the Forest. The risk assessment assigns an expected risk level to proposed activities and identifies inventory, monitoring, and physical + weed-related actions to be included in project implementation. The use of herbicides has not been authorized for these weed related actions. On average, the Forest treats 20 to 30 acres per year with physical + methods covered under project environmental analysis. The Forest currently has no NEPA decision that encompasses the treatment and/or containment of all noxious weeds on the Forest. Under this Alternative, a Forest wide noxious weed control program would not be implemented.

Alternative 2: The Proposed Action

This Proposed Action was created to respond to the Purpose and Need as described in Chapter 1. Under this Alternative, the Modoc National Forest proposes to treat noxious weeds on 536 existing sites comprising approximately 6,899 acres using herbicides and physical methods over a five-year time frame. Listed below are features of Alternative 2:

- Treating between 300 to 1,500 acres annually for the next five years.
- A total of 536 sites will be treated as detailed in Table 2-5.
- Physical + methods would be used at 161 sites (31 acres) that are less than 10 feet from any water source, to include 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 non rhizomatous noxious weed species.
- Twenty-six sites (2.4 acres) located greater than 10 feet from any water source and comprised of rhizomatous species will be treated with herbicides.
- Sixteen sites of rhizomatous species that have some acreage within 10 feet of water will receive partial treatment. 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).
- Herbicides would only be applied using hand-held spray equipment with directed spray and wicking treatments.
- Herbicides used would be clopyralid, dicamba, glyphosate, triclopyr, and 2, 4-D.
- Design Standards applicable to this Alternative are listed in Table 2-4.
- Retreatment of the treated sites until weeds are eliminated is not counted as new acres treated.
- 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.

Table 2 - 5. Alternative 2 Site-Specific Treatment Information [1]

Species	Trmt. Code	Rhizom / non Rhizom	Distance to Water	W/in 1000 ft of H2O	W/in 150 ft SMZ	W/in 300 ft SMZ	Number of Sites	Surveyed Acres	Proposed Treatment Acres	Potential Total Amount of Herbicide Application[2]
Canada Thistle	NT	rhizom	H2O<10ft	Yes			5	0.45	0	
Canada Thistle	NT	rhizom	H2O<10ft	Yes	No	Yes	6	0.23	0	
	PT -H		H2O>10ft					0.32	0.32	0.16 – 1.2 lbs ae Aquatic Glyphosate
Canada Thistle	NT	rhizom	H2O<10ft	Yes	Yes	Yes	4	1.48	0	
	PT -H		H2O>10ft					8.79	8.79	4.4 – 32.96 lbs ae Aquatic Glyphosate
Canada Thistle	NT	rhizom	H2O<10ft	Yes	Yes	No	2	0.04	0	
	PT -H		H2O>10ft					0.22	0.22	0.11 – 0.83 lbs ae Aquatic Glyphosate
Dalmatian Toadflax	NT	rhizom	H2O<10ft	Yes	Yes	Yes	2	6.5	0	
	PT -H		H2O>10ft					888.89	888.89	444.45 – 3,333.33 lbs ae Aquatic Glyphosate
Dalmatian Toadflax	NT	rhizom	H2O<10ft	Yes	Yes	No	2	0.29	0	
	PT -H		H2O>10ft					6.08	6.08	3.04 – 22.8 lbs ae Aquatic Glyphosate
Diffuse Knapweed	P	non rhizom	H2O<10ft				5	2.48	2.48	
Dyer's woad	P	non rhizom	H2O<10ft				26	4.65	4.65	
Klamathweed (a.k.a. St. Johnswort)	P	rhizom	H2O<10ft				9	2.61	2.61	
Mediterranean Sage	P	non rhizom	H2O<10ft				16	7.1	7.1	
Musk Thistle	P	non rhizom	H2O<10ft				4	0.45	0.45	
Plumeless Thistle	P	non rhizom	H2O<10ft				1	0.09	0.09	

Species	Trmt. Code	Rhizom / non Rhizom	Distance to Water	W/in 1000 ft of H2O	W/in 150 ft SMZ	W/in 300 ft SMZ	Number of Sites	Surveyed Acres	Proposed Treatment Acres	Potential Total Amount of Herbicide Application[2]
Scotch Thistle	P	non rhizom	H2O<10ft				90	11.49	11.49	
Spotted Knapweed	P	non rhizom	H2O<10ft				4	1.26	1.26	
Squarrose Knapweed	P	non rhizom	H2O<10ft				3	0.27	0.27	
Yellow Starthistle	P	non rhizom	H2O<10ft				3	0.27	0.27	
Canada Thistle	H	rhizom	H2O>10ft	Yes	No	No	6	0.61	0.61	0.06 - 0.15 lbs ae Clopyralid, or 0.15 – 1.22 lbs ae Dicamba, or 0.31 - 2.29 lbs ae Glyphosate
Canada Thistle	H	rhizom	H2O>10ft	Yes	Yes	Yes	1	0.1	0.1	0.05 - 0.38 lbs ae Glyphosate
Canada Thistle	H	rhizom	H2O>10ft	Yes	No	Yes	7	0.65	0.65	0.33 - 2.44 lbs ae Glyphosate
Canada Thistle	H	rhizom	H2O>10ft	No	No	No	2	0.2	0.2	0.02 - 0.05 lbs ae Clopyralid, or 0.05 – 0.4 lbs ae Dicamba, or 0.1 – 0.75 lbs ae Glyphosate
Dalmatian Toadflax	H	rhizom	H2O>10ft	Yes	No	Yes	1	0.08	0.08	0.04 - 0.3 lbs ae Glyphosate
Dalmatian Toadflax	H	rhizom	H2O>10ft	No	No	No	7	0.61	0.61	0.15 - 1.22 lbs ae Dicamba, or 0.31 – 2.29 lbs ae Glyphosate
Tall Whitetop	H	rhizom	H2O>10ft	Yes	No	No	2	0.19	0.19	0.10 - 0.71 lbs ae Glyphosate
Crupina	P or H	non rhizom	H2O<10ft				1	158.65	158.65	78.29 – 587.14 lbs ae Aquatic Glyphosate, or 15.66 – 39.14 lbs ae Clopyralid, or 78.29 – 234.86 lbs ae Triclopyr

Species	Trmt. Code	Rhizom / non Rhizom	Distance to Water	W/in 1000 ft of H2O	W/in 150 ft SMZ	W/in 300 ft SMZ	Number of Sites	Surveyed Acres	Proposed Treatment Acres	Potential Total Amount of Herbicide Application[2]
Diffuse Knapweed	P or H	non rhizom	H2O>10ft	No	No	No	3	0.87	0.87	0.44 - 1.74 lbs ae 2, 4-D, or 0.22 – 1.74 lbs ae Dicamba, or 0.09 – 0.22 lbs ae Clopyralid
Diffuse Knapweed	P or H	non rhizom	H2O>10ft	Yes	No	No	3	0.33	0.33	0.08 - 0.66 lbs ae Dicamba, or 0.03 -0.08 lbs ae Clopyralid
Diffuse Knapweed	P or H	non rhizom	H2O>10ft	Yes	No	Yes	1	0.09	0.09	P (0.02 - 0.18 lbs ae Dicamba, or 0.01 – 0.02 lbs ae Clopyralid >SMZ)
Dyer's Woad	P or H	non rhizom	H2O<10ft	Yes	Yes	Yes	2	2.33	2.33	1.06 – 8.74 lbs ae Aquatic Glyphosate
Dyer's Woad	P or H	non rhizom	H2O<10ft	Yes	Yes	No	5	34.16	34.16	17.08 – 128.10 lbs ae Aquatic Glyphosate
Dyer's woad	P or H	non rhizom	H2O<10ft	Yes	No	Yes	1	1.2	1.2	0.51 – 4.5 lbs ae Aquatic Glyphosate
Dyer's woad	P or H	non rhizom	H2O>10ft	No	No	No	10	2.8	2.8	1.4 - 5.6 lbs ae 2, 4-D
Dyer's woad	P or H	non rhizom	H2O>10ft	Yes	Yes	Yes	1	0.99	0.99	P (0.5 - 1.98 lbs ae 2, 4-D >1000 ft H2O)
Dyer's woad	P or H	non rhizom	H2O>10ft	Yes	Yes	No	3	5664.81	5664.81	P (2832.41 - 11329.62 lbs ae 2, 4-D >1000ft H2O)
Dyer's woad	P or H	non rhizom	H2O>10ft	Yes	No	Yes	4	0.97	0.97	P (0.49 - 1.94 lbs ae 2, 4-D >1000ft H2O)

Species	Trmt. Code	Rhizom / non Rhizom	Distance to Water	W/in 1000 ft of H2O	W/in 150 ft SMZ	W/in 300 ft SMZ	Number of Sites	Surveyed Acres	Proposed Treatment Acres	Potential Total Amount of Herbicide Application[2]
Dyer's woad	P or H	non rhizom	H2O>10ft	Yes	No	No	12	12.15	12.15	P (6.75 - 24.30 lbs ae 2, 4-D >1000ft H2O)
Mediterranean Sage	P or H	non rhizom	H2O>10ft	No	No	No	5	0.45	0.45	0.11 - 0.90 lbs ae Dicamba, or 0.23 – 0.9 lbs ae 2, 4-D
Mediterranean Sage	P or H	non rhizom	H2O>10ft	Yes	No	No	3	1.18	1.18	0.30 - 2.36 lbs ae Dicamba
Mediterranean Sage	P or H	non rhizom	H2O>10ft	Yes	No	Yes	2	0.18	0.18	P (0.05 - 0.36 lbs ae Dicamba > SMZ)
Musk Thistle	P or H	non rhizom	H2O>10ft	No	No	No	2	6.05	6.05	1.51 - 12.10 lbs ae Dicamba, or 0.61 – 1.51 lbs ae Clopyralid, or 3.01 – 22.69 lbs ae Glyphosate
Musk Thistle	P or H	non rhizom	H2O>10ft	Yes	No	No	5	0.45	0.45	0.11 - 0.90 lbs ae Dicamba, or 0.05 – 0.11 lbs ae Clopyralid, or 3.01 – 22.69 lbs ae Glyphosate
Musk Thistle	P or H	non rhizom	H2O>10ft	Yes	No	Yes	1	2.36	2.36	1.18 - 8.85 lbs ae Glyphosate
Scotch Thistle	P or H	non rhizom	H2O<10ft	Yes	Yes	No	3	22.96	22.96	10.65 – 79.88 lbs ae Aquatic Glyphosate
Scotch Thistle	P or H	non rhizom	H2O>10ft	No	No	No	63	5.95	5.95	1.49 - 11.9 lbs ae Dicamba, or 2.98 – 11.9 lbs ae 2, 4-D, or 0.60 – 1.49 lbs ae Clopyralid

Species	Trmt. Code	Rhizom / non Rhizom	Distance to Water	W/in 1000 ft of H2O	W/in 150 ft SMZ	W/in 300 ft SMZ	Number of Sites	Surveyed Acres	Proposed Treatment Acres	Potential Total Amount of Herbicide Application[2]
Scotch Thistle	P or H	non rhizom	H2O>10ft	Yes	No	No	161	31.72	31.72	7.93 – 63.44 lbs ae Dicamba, or 2.37 – 5.94 lbs ae Clopyralid
Scotch Thistle	P or H	non rhizom	H2O>10ft	Yes	No	Yes	21	3.17	3.17	P (0.79 - 6.34 lbs ae Dicamba, or 0.32 – 0.79 lbs ae Clopyralid > SMZ)
Scotch Thistle	P or H	non rhizom	H2O>10ft	Yes	Yes	No	14	1.26	1.26	P (0.32 - 2.52 lbs ae Dicamba, or 0.13 – 0.32 lbs ae Clopyralid > SMZ)
Scotch Thistle	P or H	non rhizom	H2O>10ft	Yes	Yes	Yes	4	0.4	0.4	P (0.1 - 0.8 lbs ae Dicamba, or 0.04 – 0.1 lbs ae Clopyralid >SMZ)
Spotted Knapweed	P or H	non rhizom	H2O>10ft	No	No	No	9	2.56	2.56	1.28 - 5.12 lbs ae 2, 4-D, or 0.64 – 5.12 lbs ae Dicamba, or 0.26 – 0.64 lbs ae Clopyralid
Spotted Knapweed	P or H	non rhizom	H2O>10ft	Yes	Yes	No	1	0.01	0.01	P (0.003 - 0.02 lbs ae Dicamba, or 0.001 – 0.003 lbs ae Clopyralid >SMZ)
Squarrose Knapweed	P or H	non rhizom	H2O>10ft	Yes	No	No	1	0.09	0.09	0.05 - 0.18 lbs ae 2, 4-D, or 0.02 – 0.18 lbs ae Dicamba, or 0.01 – 0.02 lbs ae Clopyralid
Squarrose Knapweed	P or H	non rhizom	H2O>10ft	Yes	No	Yes	1	0.09	0.09	P (0.3 - 0.18 lbs ae Dicamba, or 0.01 – 0.02 lbs ae Clopyralid >SMZ)

Species	Trmt. Code	Rhizom / non Rhizom	Distance to Water	W/in 1000 ft of H2O	W/in 150 ft SMZ	W/in 300 ft SMZ	Number of Sites	Surveyed Acres	Proposed Treatment Acres	Potential Total Amount of Herbicide Application[2]
Yellow Starthistle	P or H	non rhizom	H2O<10ft	Yes	Yes	Yes	1	1.03	1.03	0.48 – 3.56 lbs ae Aquatic Glyphosate
Yellow Starthistle	P or H	non rhizom	H2O>10ft	No	No	No	4	0.36	0.36	0.18 - 0.72 lbs ae 2, 4-D, or 0.09 – 0.72 lbs ae Dicamba, or 0.18 – 0.54 lbs ae Triclopyr, or 0.18 – 1.35 lbs ae Glyphosate
Yellow Starthistle	P or H	non rhizom	H2O>10ft	Yes	No	No	2	0.91	0.91	0.23 - 1.82 lbs ae Dicamba, or 0.46 – 1.37 lbs ae Triclopyr, or o.46 – 3.41 lbs ae Glyphosate
Total sites and acres being treated under this Alternative							536	6899.44	6899.44	0.08 - 0.2 lbs ae Clopyralid; 2843.5 - 11371.2 lbs ae 2, 4-D; 13.46 – 105.7 lbs ae Dicamba; 1.70 - 12.68 lbs ae Glyphosate; 560.23 – 4,203.04 lbs ae Aquatic Glyphosate

1. Explanation of treatment codes: P – hand pulling, hoeing, grubbing. P+ (physical plus) – hand pulling, hoeing, grubbing, clipping seed head or plant, trimming with string trimmer, covering with mulch or tarp. H – herbicide. NT – no treatment. LT – limited treatment. G – goat grazing. PT-H – partial treatment of site with herbicides. NT – not treated.

Notes:

The treatment method is listed for each site. Herbicide treatments are listed in order of preference according to Table 2-3, along with other effective herbicides that may be used. The most effective herbicide is in bold.

2. The total amount of herbicide application is based on the preferred herbicide for the given noxious weed species, and is based on the application rates listed in Table 2-14 (in bold). The potential amounts of the other herbicides available for use are also listed. The summary and total amount of potential application is based on the most effective herbicide that is available for use. The effects analysis section evaluates the effects of all herbicides available for use.

Alternative 3

Alternative 3 responds to Significant Issues 1, 2, and 4; which concern anticipated negative effects of herbicide use. Alternative 3 does not include the use of herbicides. Under this Alternative, the Modoc National Forest proposes to treat noxious weeds on a total of 494 existing sites comprising approximately 5,993 acres through physical methods over a five-year time frame. Listed below are features of Alternative 3:

- Treating between 300 to 1,500 acres annually for the next 10 years,
- 494 sites (5,993 acres) would be treated using physical methods, to include hand pulling, digging, grubbing, and hoeing.
- 47 sites (916 acres) would not be treated as these sites are composed of rhizomatous species, and physical methods are ineffective in treating rhizomatous species.
- A description is given in Table 2-6.
- Re-treatment of the treated sites until weeds are eliminated is not counted as new acres treated.

Table 2 - 6. Alternative 3 Site-Specific Treatment Information[1]

Species	Trmt. Code	Distance to Water	Rhizom / non Rhizom	Number of Sites	Surveyed Acres	Proposed Treatment Acres
Canada Thistle	NT	H2O<10ft	rhizom	33	13.09	0
Dalmatian Toadflax	NT	H2O>10ft	rhizom	12	902.45	0
Tall Whitetop	NT	H2O>10ft	rhizom	2	0.19	0
Summary for NT Treatment				47	915.73	0
Crupina	P	H2O<10ft	non rhizom	1	158.65	158.65
Diffuse Knapweed	P	H2O<10ft	non rhizom	5	2.48	2.48
Diffuse Knapweed	P	H2O>10ft	non rhizom	7	1.29	1.29
Dyer's woad	P	H2O>10ft	non rhizom	31	5682.71	5682.71
Dyer's woad	P	H2O<10ft	non rhizom	33	42.58	42.58
Klamath Weed	P	H2O<10ft	non rhizom	9	2.61	2.61
Mediterranean Sage	P	H2O<10ft	non rhizom	15	6.44	6.44
Mediterranean Sage	P	H2O>10ft	non rhizom	11	2.47	2.47
Musk Thistle	P	H2O<10ft	non rhizom	4	0.45	0.45
Musk Thistle	P	H2O>10ft	non rhizom	8	8.86	8.86
Plumeless Thistle	P	H2O<10ft	non rhizom	1	0.09	0.09
Scotch Thistle	P	H2O<10ft	non rhizom	89	42.05	42.05
Scotch Thistle	P	H2O>10ft	non rhizom	251	35.17	35.17
Spotted Knapweed	P	H2O<10ft	non rhizom	4	1.26	1.26
Spotted Knapweed	P	H2O>10ft	non rhizom	10	2.57	2.57
Squarrose Knapweed	P	H2O<10ft	non rhizom	3	0.27	0.27
Squarrose Knapweed	P	H2O>10ft	non rhizom	2	0.18	0.18

Species	Trmt. Code	Distance to Water	Rhizom / non Rhizom	Number of Sites	Surveyed Acres	Proposed Treatment Acres
Yellow Starthistle	P	H2O<10ft	non rhizom	4	1.3	1.3
Yellow Starthistle	P	H2O>10ft	non rhizom	6	1.27	1.27
Summary for physical treatment: Physical methods can include hand pulling, hoeing, and/or grubbing.				494	5992.7	5992.7
Total sites and acres considered in this Alternative				541	6908.43	5992.7
Total sites and acres being treated under this Alternative				494	5992.7	5992.7

1. Explanation of treatment codes: P – hand pulling, hoeing, grubbing. P+ (physical plus) – hand pulling, hoeing, grubbing, clipping seed head or plant, trimming with string trimmer, covering with mulch or tarp. H – herbicide. NT – no treatment. LT – limited treatment. G – goat grazing. PT-H – partial treatment of site with herbicides. NT – not treated.

Alternative 4

Alternative 4 responds to Significant Issue 3, which 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. Under this Alternative, the Modoc National Forest proposes to treat noxious weeds on a total of 536 existing sites comprising approximately 6,899 acres through physical and herbicide methods over a ten-year time frame. Listed below are features of Alternative 4:

- Treating a total of 7,099 acres at 536 sites over the next ten years (average annual 500-1,500). This includes 200 acres treated through Early Detection-Rapid Response.
- 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 non-rhizomatous noxious weed species.
- 26 sites (2.4 acres) located greater than 10 feet from any water source and composed of rhizomatous species would be treated with herbicides.
- 16 sites of rhizomatous species that have some acreage within 10 feet of water would receive partial treatment. The acreage within 10 feet of water would not be treated, and the acreage that is further then 10 feet of water would be treated with aquatic Glyphosate (904.3 acres).
- No treatment would occur at 5 sites (9 acres). These sites are composed of rhizomatous species and are within 10 feet of water.
- Herbicides would only be applied using hand-held spray equipment with directed spray and wicking treatments.
- Herbicide used would be clopyralid, dicamba, glyphosate, triclopyr, and 2-4-D.
- An Early Detection - Rapid Response Strategy would be implemented in this Alternative. 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 this FEIS. Proposed treatment under Early Detection – Rapid Response would be capped at no more than 100 acres per year, and no more than a total of 200 acres. 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.

- A description is given in Table 2-7.
- Design Standards applicable to this Alternative are listed in Table 2-4.
- Retreatment of the treated sites until weeds are eliminated is not counted as new acres treated.

Table 2 - 7. Alternative 4 Site-Specific Treatment Information[1]

Species	Trmt. Code	Rhizom / non Rhizom	Distance to Water	W/in 1000ft H2O	W/in 150 ft SMZ	W/in 300 ft SMZ	Number of Sites	Surveyed Acres	Proposed Treatment Acres	Potential Total Amount of Herbicide Application[2]
Canada Thistle	NT	rhizom	H2O<10ft	Yes			5	0.45	0	
Canada Thistle	NT	rhizom	H2O<10ft	Yes	No	Yes	6	0.23	0	
	PT-H		H2O>10ft					0.32	0.32	0.16 – 1.2 lbs ae Aquatic Glyphosate
Canada Thistle	NT	rhizom	H2O<10ft	Yes	Yes	Yes	4	1.48	0	
	PT-H		H2O>10ft					8.79	8.79	4.4 – 32.96 lbs ae Aquatic Glyphosate
Canada Thistle	NT	rhizom	H2O<10ft	Yes	Yes	No	2	0.04	0	
	PT-H		H2O>10ft					0.22	0.22	0.11 – 0.83 lbs ae Aquatic Glyphosate
Dalmatian Toadflax	NT	rhizom	H2O<10ft	Yes	Yes	Yes	2	6.5	0	
	PT-H		H2O>10ft					888.89	888.89	444.45 – 3,333.33 lbs ae Aquatic Glyphosate
Dalmatian Toadflax	NT	rhizom	H2O<10ft	Yes	Yes	No	2	0.29	0	
	PT-H		H2O>10ft					6.08	6.08	3.04 – 22.8 lbs ae Aquatic Glyphosate
Diffuse Knapweed	P	non rhizom	H2O<10ft				5	2.48	2.48	
Dyer's woad	P	non rhizom	H2O<10ft				26	4.65	4.65	
Klamath Weed	P	non rhizom	H2O<10ft				9	2.61	2.61	
Mediterranean Sage	P	non rhizom	H2O<10ft				16	7.1	7.1	
Musk Thistle	P	non rhizom	H2O<10ft				4	0.45	0.45	
Plumeless Thistle	P	non rhizom	H2O<10ft				1	0.09	0.09	
Scotch Thistle	P	non rhizom	H2O<10ft				90	11.49	11.49	
Spotted Knapweed	P	non rhizom	H2O<10ft				4	1.26	1.26	
Squarrose Knapweed	P	non rhizom	H2O<10ft				3	0.27	0.27	
Yellow Starthistle	P	non rhizom	H2O<10ft				3	0.27	0.27	

Species	Trmt. Code	Rhizom / non Rhizom	Distance to Water	W/in 1000ft H2O	W/in 150 ft SMZ	W/in 300 ft SMZ	Number of Sites	Surveyed Acres	Proposed Treatment Acres	Potential Total Amount of Herbicide Application[2]
Canada Thistle	H	rhizom	H2O>10ft	Yes	No	No	6	0.61	0.61	0.06 - 0.15 lbs ae Clopyralid, or 0.15 – 1.22 lbs ae Dicamba, or 0.31 – 2.29 lbs ae Glyphosate
Canada Thistle	H	rhizom	H2O>10ft	Yes	Yes	Yes	1	0.1	0.1	0.05 - 0.38 lbs ae Glyphosate
Canada Thistle	H	rhizom	H2O>10ft	Yes	No	Yes	7	0.65	0.65	0.33 - 2.44 lbs ae Glyphosate
Canada Thistle	H	rhizom	H2O>10ft	No	No	No	2	0.2	0.2	0.02 - 0.05 lbs ae Clopyralid, or 0.05 – 0.40 lbs ae Dicamba, or 0.10 – 0.75 lbs ae Glyphosate
Dalmatian Toadflax	H	rhizom	H2O>10ft	Yes	No	Yes	1	0.08	0.08	0.04 - 0.3 lbs ae Glyphosate
Dalmatian Toadflax	H	rhizom	H2O>10ft	No	No	No	7	0.61	0.61	0.15 - 1.22 lbs ae Dicamba, or 0.31 – 2.29 lbs ae Glyphosate
Tall Whitetop	H	rhizom	H2O>10ft	Yes	No	No	2	0.19	0.19	0.10 - 0.71 lbs ae Glyphosate
Crupina	P or H	non rhizom	H2O<10ft				1	158.65	158.65	78.29 – 587.14 lbs ae Aquatic Glyphosate, or 15.66 – 39.14 lbs ae Clopyralid, or 78.29 – 234.86 lbs ae Triclopyr
Diffuse Knapweed	P or H	non rhizom	H2O>10ft	No	No	No	3	0.87	0.87	0.44 - 1.74 lbs ae 2, 4-D, or 0.22 – 1.74 lbs ae Dicamba, or 0.09 – 0.22 lbs ae Clopyralid
Diffuse Knapweed	P or H	non rhizom	H2O>10ft	Yes	No	No	3	0.33	0.33	0.08 - 0.66 lbs ae Dicamba, or 0.03 – 0.08 lbs ae Clopyralid
Diffuse Knapweed	P or H	non rhizom	H2O>10ft	Yes	No	Yes	1	0.09	0.09	P (0.02 - 0.18 lbs ae Dicamba, or 0.01 – 0.02 lbs ae Clopyralid >SMZ)
Dyer's woad	P or H	non rhizom	H2O<10ft	Yes	Yes	Yes	2	2.33	2.33	1.06 – 8.74 lbs ae Aquatic Glyphosate
Dyer's woad	P or H	non rhizom	H2O<10ft	Yes	Yes	No	5	34.16	34.16	17.08 – 128.10 lbs ae Aquatic Glyphosate

Species	Trmt. Code	Rhizom / non Rhizom	Distance to Water	W/in 1000ft H2O	W/in 150 ft SMZ	W/in 300 ft SMZ	Number of Sites	Surveyed Acres	Proposed Treatment Acres	Potential Total Amount of Herbicide Application[2]
Dyer's woad	P or H	non rhizom	H2O<10ft	Yes	No	Yes	1	1.2	1.2	0.51 – 4.5 lbs ae Aquatic Glyphosate
Dyer's woad	P or H	non rhizom	H2O>10ft	No	No	No	10	2.8	2.8	1.4 - 5.6 lbs ae 2, 4-D
Dyer's woad	P or H	non rhizom	H2O>10ft	Yes	Yes	Yes	1	0.99	0.99	P (0.5 - 1.98 lbs ae 2, 4-D >1000 ft H2O)
Dyer's woad	P or H	non rhizom	H2O>10ft	Yes	Yes	No	3	5664.81	5664.81	P (2832.41 - 11329.62 lbs ae 2, 4-D >1000ft H2O)
Dyer's woad	P or H	non rhizom	H2O>10ft	Yes	No	Yes	4	0.97	0.97	P (0.49 - 1.94 lbs ae 2, 4-D >1000ft H2O)
Dyer's woad	P or H	non rhizom	H2O>10ft	Yes	No	No	12	12.15	12.15	P (6.75 - 24.30 lbs ae 2, 4-D >1000ft H2O)
Mediterranean Sage	P or H	non rhizom	H2O>10ft	No	No	No	5	0.45	0.45	0.11 - 0.90 lbs ae Dicamba, or 0.23 – 0.9 lbs ae 2, 4-D
Mediterranean Sage	P or H	non rhizom	H2O>10ft	Yes	No	No	3	1.18	1.18	0.30 - 2.36 lbs ae Dicamba
Mediterranean Sage	P or H	non rhizom	H2O>10ft	Yes	No	Yes	2	0.18	0.18	P (0.05 - 0.36 lbs ae Dicamba > SMZ)
Musk Thistle	P or H	non rhizom	H2O>10ft	No	No	No	2	6.05	6.05	1.51 - 12.10 lbs ae Dicamba, or 0.61 – 1.51 lbs ae Clopyralid, or 3.03 – 22.69 lbs ae Glyphosate
Musk Thistle	P or H	non rhizom	H2O>10ft	Yes	No	No	5	0.45	0.45	0.11 - 0.90 lbs ae Dicamba, or 0.05 – 0.11 lbs ae Clopyralid, or 0.23 – 1.69 lbs ae Glyphosate
Musk Thistle	P or H	non rhizom	H2O>10ft	Yes	No	Yes	1	2.36	2.36	1.18 - 8.85 lbs ae Glyphosate
Scotch Thistle	P or H	non rhizom	H2O<10ft	Yes	Yes	No	3	22.96	22.96	10.65 – 79.88 lbs ae Aquatic Glyphosate

Species	Trmt. Code	Rhizom / non Rhizom	Distance to Water	W/in 1000ft H2O	W/in 150 ft SMZ	W/in 300 ft SMZ	Number of Sites	Surveyed Acres	Proposed Treatment Acres	Potential Total Amount of Herbicide Application[2]
Scotch Thistle	P or H	non rhizom	H2O>10ft	No	No	No	63	5.95	5.95	1.49 - 11.9 lbs ae Dicamba, or 2.98 – 11.9 lbs ae 2, 4-D, or 0.60 – 1.49 lbs ae Clopyralid
Scotch Thistle	P or H	non rhizom	H2O>10ft	Yes	No	No	161	31.72	31.72	7.93 – 63.44 lbs ae Dicamba, or 2.37 – 5.94 lbs ae Clopyralid
Scotch Thistle	P or H	non rhizom	H2O>10ft	Yes	No	Yes	21	3.17	3.17	P (0.79 - 6.34 lbs ae Dicamba, or 0.32 – 0.79 lbs ae Clopyralid > SMZ)
Scotch Thistle	P or H	non rhizom	H2O>10ft	Yes	Yes	No	14	1.26	1.26	P (0.32 - 2.52 lbs ae Dicamba, or 0.13 – 0.32 lbs ae Clopyralid > SMZ)
Scotch Thistle	P or H	non rhizom	H2O>10ft	Yes	Yes	Yes	4	0.4	0.4	P (0.1 - 0.8 lbs ae Dicamba, or 0.04 – 0.10 lbs ae Clopyralid >SMZ)
Spotted Knapweed	P or H	non rhizom	H2O>10ft	No	No	No	9	2.56	2.56	1.28 - 5.12 lbs ae 2, 4-D, or 0.64 – 5.12 lbs ae Dicamba, or 0.26 – 0.64 lbs ae Clopyralid
Spotted Knapweed	P or H	non rhizom	H2O>10ft	Yes	Yes	No	1	0.01	0.01	P (0.003 - 0.02 lbs ae Dicamba, or 0.001 – 0.003 lbs ae Clopyralid >SMZ)
Squarrose Knapweed	P or H	non rhizom	H2O>10ft	Yes	No	No	1	0.09	0.09	0.05 - 0.18 lbs ae 2, 4-D, or 0.02 – 0.18 lbs ae Dicamba, or 0.01 – 0.02 lbs ae Clopyralid
Squarrose Knapweed	P or H	non rhizom	H2O>10ft	Yes	No	Yes	1	0.09	0.09	P (0.3 - 0.18 lbs ae Dicamba, or 0.01 – 0.02 lbs ae Clopyralid >SMZ)
Yellow Starthistle	P or H	non rhizom	H2O<10ft	Yes	Yes	Yes	1	1.03	1.03	0.48 – 3.56 lbs ae Aquatic Glyphosate
Yellow Starthistle	P or H	non rhizom	H2O>10ft	No	No	No	4	0.36	0.36	0.18 - 0.72 lbs ae 2, 4-D, or 0.09 – 0.72 lbs ae Dicamba, 0.18 – 0.54 lbs ae Triclopyr, or 0.18 – 1.35 lbs ae Glyphosate

Species	Trmt. Code	Rhizom / non Rhizom	Distance to Water	W/in 1000ft H2O	W/in 150 ft SMZ	W/in 300 ft SMZ	Number of Sites	Surveyed Acres	Proposed Treatment Acres	Potential Total Amount of Herbicide Application[2]
Yellow Starthistle	P or H	non rhizom	H2O>10ft	Yes	No	No	2	0.91	0.91	0.23 - 1.82 lbs ae Dicamba, or 0.46 – 1.37 lbs ae Triclopyr, or 0.46 - 3.41 lbs ae Glyphosate
Total sites and acres being treated under this Alternative							536	6899.44	7099.44	0.08 - 0.2 lbs ae Clopyralid; 2843.5 - 11371.2 lbs ae 2, 4-D; 13.46 – 105.7 lbs ae Dicamba; 1.70 - 12.68 lbs ae Glyphosate; 560.23 – 4,203.04 lbs ae Aquatic Glyphosate

1. Explanation of treatment codes: P – hand pulling, hoeing, grubbing. P+ (physical plus) – hand pulling, hoeing, grubbing, clipping seed head or plant, trimming with string trimmer, covering with mulch or tarp. H – herbicide. NT – no treatment. LT – limited treatment. G – goat grazing. PT-H – partial treatment of site with herbicides. NT – not treated.

Notes:

The treatment method is listed for each site. Herbicide treatments are listed in order of preference according to Table 2-3 along with other effective herbicides that may be used. The most effective herbicide is in bold.

2. The total amount of herbicide application is based on the preferred herbicide for the given noxious weed species, and is based on the application rates listed in Table 2-14 (in bold). The potential amounts of the other herbicides available for use are also listed. The summary and total amount of potential application is based on the most effective herbicide that is available for use. The effects analysis section evaluates the effects of all herbicides available for use.

Alternative 5

Alternative 5 responds to comments on the DEIS to provide a non-herbicide Alternative that contains additional non-herbicide treatments, and an Early Detection - Rapid Response Strategy. Alternative 5 responds to Significant Issues 1, 2, 3, and 4. Alternative 5 does not include the use of herbicides. It includes goat grazing and physical treatment methods that are not included in Alternatives 2 and 3. Alternative 5 includes an Early Detection - Rapid Response Strategy, which responds to new species and new sites using treatment methods analyzed in this FEIS.

During analysis of responses to the DEIS, the Agency determined that it was economically prohibitive to treat the entire 5,658 acre site number DH013ISTI of dyer's woad with either herbicide or physical+ methods (referred to as “limited treatment”). Under Alternative, 5 only the perimeter of this site would be treated. Therefore, under Alternative 5, the Modoc National Forest proposes to treat noxious weeds on a total of 541 existing sites comprising approximately 280 acres through Physical+ methods over a ten year time frame. Listed below are features of Alternative 5:

- Use non-herbicide methods to eradicate, control, or contain approximately 480 acres at 541 sites of noxious weed species. This includes 200 acres treated under Early Detection-Rapid Response.
- 5 sites (41 acres) may potentially be treated using goat grazing. These sites may alternatively be treated using Physical+ methods.
- 527 sites (139 acres) would be treated using physical + methods, to include hand pulling, grubbing, hoeing, clipping (including use of hand-held string trimmers), and use of mulch and tarps.
- 9 sites (100 acres) would receive limited treatment to contain infestations. These sites include the large dyer’s woad site (5,658 acres), one crupina site (159 acres) and 7 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. Design Standards have been implemented in determining the treatment method that these acres would receive. These sites are made up of rhizomatous species and are greater than 0.10 acre. Physical+ methods are not as effective as herbicides in treating rhizomatous species; thus, the treatment goal would be only 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 FEIS. Proposed treatment under Early Detection – Rapid Response would be capped at 100 acres per year or 200 acres total over the life of the Alternative. 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.
- A description is given in Table 2-8.
- Design standards applicable to this Alternative are listed in Table 2-4.
- Retreatment of the treated sites until weeds are eliminated is not counted as new acres treated.

Table 2 - 8. Alternative 5 Site-Specific Treatment Information[1]

Species	Trmt. Code	Distance to Water	Rhizom / non Rhizom	Number of Sites	Surveyed Acres	Proposed Treatment Acres
Musk Thistle	G	H2O>10ft	non rhizom	1	5.21	5.21
Scotch Thistle	G	H2O>10ft	non rhizom	4	36	36
Summary for Goat Grazing Treatment These sites may also be treated using physical +.				5	41.21	41.21
Canada Thistle	LT	H2O>10ft	rhizom	3	10.31	1
Crupina	LT	H2O<10ft	non rhizom	1	158.65	2
Dalmatian Toadflax	LT	H2O<10ft	rhizom	4	901.76	13
Dyer's woad	LT	H2O>10ft	non rhizom	1	5657.75	84
Summary for LT Treatment Limited treatment will consist of physical + treatments along major travel ways and around the perimeter of these sites to reduce potential for spread of and to contain the infestations. The estimated number of acres treated would be 100 acres. This acreage was chosen due to budgetary concerns and the acreage is estimated proportionally to the size of each of the nine sites.				9	6728.47	100
Canada Thistle	P+	H2O>10ft	rhizom	25	2.32	2.32
Canada Thistle	P+	H2O<10ft	rhizom	5	0.46	0.46
Dalmatian Toadflax	P+	H2O>10ft	rhizom	8	0.69	0.69
Diffuse Knapweed	P+	H2O<10ft	non rhizom	5	2.48	2.48
Diffuse Knapweed	P+	H2O>10ft	non rhizom	7	1.29	1.29
Dyer's woad	P+	H2O<10ft	non rhizom	33	42.58	42.58
Dyer's woad	P+	H2O>10ft	non rhizom	30	24.96	24.96
Klamath Weed	P+	H2O<10ft	non rhizom	9	2.61	2.61
Mediterranean Sage	P+	H2O<10ft	non rhizom	15	6.44	6.44
Mediterranean Sage	P+	H2O>10ft	non rhizom	11	2.47	2.47
Musk Thistle	P+	H2O<10ft	non rhizom	4	0.45	0.45
Musk Thistle	P+	H2O>10ft	non rhizom	7	3.65	3.65
Plumeless Thistle	P+	H2O<10ft	non rhizom	1	0.09	0.09
Scotch Thistle	P+	H2O<10ft	non rhizom	86	15.77	15.77
Scotch Thistle	P+	H2O>10ft	non rhizom	250	25.45	25.45
Spotted Knapweed	P+	H2O<10ft	non rhizom	4	1.26	1.26
Spotted Knapweed	P+	H2O>10ft	non rhizom	10	2.57	2.57
Squarrose Knapweed	P+	H2O<10ft	non rhizom	3	0.27	0.27
Squarrose Knapweed	P+	H2O>10ft	non rhizom	2	0.18	0.18
Tall Whitetop	P+	H2O>10ft	rhizom	2	0.19	0.19
Yellow Starthistle	P+	H2O<10ft	non rhizom	4	1.3	1.3
Yellow Starthistle	P+	H2O>10ft	non rhizom	6	1.27	1.27

Species	Trmt. Code	Distance to Water	Rhizom / non Rhizom	Number of Sites	Surveyed Acres	Proposed Treatment Acres
Summary for P+ treatment P+ Treatments can include hand pulling, hoeing, grubbing, clipping seed head or plant, hand-held string trimmer, and/or mulching/tarping.				527	138.75	138.75
Total sites and acres considered in this Alternative				541	6908.43	279.96
Early Detection – Rapid Response						200
Total sites and acres being treated under this Alternative				541	6908.43	479.96

1. Explanation of treatment codes: P – hand pulling, hoeing, grubbing. P+ (physical plus) – hand pulling, hoeing, grubbing, clipping seed head or plant, trimming with string trimmer, covering with mulch or tarp. H – herbicide. NT – no treatment. LT – limited treatment. G – goat grazing. PT-H – partial treatment of site with herbicides. NT – not treated.

Alternative 6

Alternative 6 responds to comments on the DEIS that requested the consideration of additional herbicide formulations, while treating fewer acres with herbicides; and the consideration of additional Physical+ treatment methods. Alternative 6 responds to Significant Issues 1, 2, 3 and 4. It provides the opportunity to use three additional herbicide formulations not included in Alternatives 2 and 4. Alternative 6 also includes the additional Physical+ treatment methods and the Early Detection - Rapid Response Strategy included in Alternative 5.

During analysis of responses to the DEIS, the Agency determined that it was economically prohibitive to treat the entire 5,658-acre site DH013ISTI of dyer's woad with either herbicide or Physical+ methods. Under Alternative 6, only the perimeter of this site would be treated. Therefore under Alternative 6, the Modoc National Forest proposes to treat noxious weeds on a total of 541 existing sites comprising approximately 341 acres through Physical+, goat grazing, and herbicide methods over a 10-year time frame. Listed below are features of Alternative 6.

Alternative 6 would:

- Treat 541 sites on 541 acres (includes 200 acres treated through Early Detection-Rapid Response), for 14 currently identified species of noxious weeds.
- Treat 116 inventoried sites (19 acres) using Physical + methods, including hand pulling, grubbing, hoeing, clipping, string trimmers, and placing of mulch or tarps.
- Treat 371 inventoried sites (116 acres) using the physical + methods described above, with herbicides, or both.
- Treat 46 inventoried sites (65 acres) using herbicide methods.
- Treat 5 inventoried sites (41 acres) using goat grazing or Physical+ and/or herbicide methods.
- Treat 3 inventoried sites (5,658 acre dyer’s woad site, 159 acre common crupina site, and 850 acre Dalmatian toadflax site) using limited treatment methods along major travel

ways to reduce potential for spread. These sites would be treated around the borders to contain the infestations. The estimated area 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.

- Herbicides authorized for specific weeds and locations are 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).
- Herbicides would only be applied using hand-held spray equipment with directed spray and wicking treatments.
- Implement an Early Detection - Rapid Response Strategy. This strategy provides the opportunity to treat new sites of the 14 currently identified noxious weed species, new acres of weed expansion at existing sites, and occurrences of new noxious weed species if they can be effectively treated using the methods and Design Standards authorized under Alternative 6. Acres treated under Early Detection - Rapid Response would be capped at no more than 100 acres treated in any given year, and no more than 200 acres in total.

Table 2 - 9. Alternative 6 Site-Specific Treatment Information[1]

Species	Trmt. Code	Rhizom / non Rhizom	Distance to Water	>25ft H2O	>10ft and <100ft H2O	>100ft H2O	Number of Sites	Surveyed Acres	Proposed Trmt. Acres	Potential Total Amount of Herbicide Application2
Musk Thistle	G or H	non rhizom	H2O>10ft			Yes	1	5.21	5.21	3.9 - 5.21 oz ai Chlorsulfuron, or 1.30 – 10.42 lbs ae Dicamba, or 2.61 – 10.42 lbs ae 2, 4-D, or 0.52 – 1.30 lbs ae Clopyralid, or Mix 1(3.91 – 5.21 oz ai Chlorsulfuron + 2.61 – 7.82 lbs ae 2, 4-D), or Mix 2 (1.3 – 5.21 oz ai Dicamba + 2.61 – 7.82 lbs ae 2, 4-D)
Scotch Thistle	G or P+ or H	non rhizom	H2O<10ft				2	21.29	21.29	P+ (5.3-42.6 lbs ae Dicamba, or 10.65 – 42.58 lbs ae 2, 4-D, or 2.13 – 5.32 lbs ae Clopyralid, or Mix 1 (15.97 – 21.29 oz ai Chlorsulfuron + 10.65 – 31.94 lbs ae 2, 4-D) or Mix 2 (5.32 – 21.29 oz ai Dicamba + 10.65 – 31.94 lbs ae 2, 4-D) >10ft H2O)
Scotch Thistle	G or H	non rhizom	H2O>10ft			Yes	2	14.71	14.71	3.8 - 29.4 lbs ae Dicamba, or 7.36 – 29.42 lbs ae 2, 4-D, or 1.47 – 3.7 lbs ae Clopyralid, or Mix 1 (11.03 – 14.71 oz ai Chlorsulfuron + 7.36 – 22.07 lbs ae 2, 4-D), or Mix 2 (3.68 – 14.71 oz ai Dicamba + 7.36 – 22.07 lbs ae 2, 4-D)
Summary for Goat Grazing Treatment These sites may also be treated with herbicides and/or P+ methods.							5	41.21	41.21	3.9 - 5.21 oz ai Chlorsulfuron, 9.1 - 72 lbs

Species	Trmt. Code	Rhizom / non Rhizom	Distance to Water	>25ft H2O	>10ft and <100ft H2O	>100ft H2O	Number of Sites	Surveyed Acres	Proposed Trmt. Acres	Potential Total Amount of Herbicide Application2
										ae Dicamba
Crupina	LT	non rhizom	H2O<10ft				1	158.65	3	1.5 - 11.25 lbs ae Aquatic Glyphosate, or Mix 2 (2.25 – 3 oz ai Dicamba + 1.5 – 4.5 lbs ae 2, 4-D), or 0.3 – 0.75 lbs ae Clopyralid, or 1.5 – 4.5 lbs ae Triclopyr
Dalmatian Toadflax	LT	rhizom	H2O<10ft	Yes			1	850.82	13	3.25 - 26 lbs ae Dicamba, or 6.5 – 48.75 lbs ae Glyphosate
Dyer's Woad	LT	non rhizom	H2O>10ft		Yes		1	5657.75	97	48.5 - 194 lbs ae 2, 4-D, or 72.75 – 97 oz ai Chlorsulfuron, or 48.5 – 194 lbs ae 2, 4-D
Summary for LT Treatment Limited treatment will consist of herbicide treatments along major travel ways and around the perimeter of these sites to reduce potential for spread of and to contain the infestations. The estimated number of acres treated would be 100 acres. This acreage was chosen due to budgetary concerns and the acreage is estimated proportionally to the size of each of the three sites.							3	6667.22	100	1.5 - 11.25 lbs ae Aquatic Glyphosate, 3.25 - 26 lbs ae Dicamba; 42 - 164 lbs ae 2, 4-D
Diffuse Knapweed	P+	non rhizom	H2O<10ft				2	0.18	0.18	
Dyer's woad	P+	non rhizom	H2O<10ft				22	2.3	2.3	
Dyer's woad	P+	non rhizom	H2O>10ft				1	0.99	0.99	
Klamath Weed	P+	non rhizom	H2O<10ft				9	2.61	2.61	
Mediterranean Sage	P+	non rhizom	H2O<10ft				13	2.07	2.07	
Musk Thistle	P+	non rhizom	H2O<10ft				2	0.18	0.18	

Species	Trmt. Code	Rhizom / non Rhizom	Distance to Water	>25ft H2O	>10ft and <100ft H2O	>100ft H2O	Number of Sites	Surveyed Acres	Proposed Trmt. Acres	Potential Total Amount of Herbicide Application2
Plumeless Thistle	P+	non rhizom	H2O<10ft				1	0.09	0.09	
Scotch Thistle	P+	non rhizom	H2O<10ft				57	8.93	8.93	
Scotch Thistle	P+	non rhizom	H2O>10ft				1	1.42	1.42	
Spotted Knapweed	P+	non rhizom	H2O<10ft				3	0.27	0.27	
Squarrose Knapweed	P+	non rhizom	H2O<10ft				3	0.27	0.27	
Yellow Starthistle	P+	non rhizom	H2O<10ft				2	0.18	0.18	
Summary for physical + Treatment Physical + methods can include hand pulling, hoeing, grubbing, clipping of the seed head or plant, mowing with string trimmers, and/or mulching/tarping.							116	19.49	19.49	
Canada Thistle	H	rhizom	H2O>10ft			Yes	14	1.3	1.3	1 - 1.3 oz ai Chlorsulfuron, or 0.13 – 0.33 lbs ae Clopyralid, or 0.33 – 2.6 lbs ae Dicamba, or 0.65 – 4.88 lbs ae Glyphosate, or Mix 1 (0.98 – 1.3 oz ai Chlorsulfuron + 0.65 – 1.95 lbs ae 2, 4-D), or Mix 2 (0.33 – 1.3 oz ai Dicamba + 0.65 – 1.95 lbs ae 2, 4-D)
Canada Thistle	H	rhizom	H2O>10ft		Yes		4	0.44	0.44	0.33 - 0.44 oz ai Chlorsulfuron, or 0.04 – 0.11 lbs ae Clopyralid, or 0.11 – 0.88 lbs ae Dicamba, or Mix 1 (0.33 – 0.44 oz ai Chlorsulfuron + 0.22 – 0.66 lbs ae 2, 4-D), or Mix 2 (0.33 – 1.3 oz ai

Species	Trmt. Code	Rhizom / non Rhizom	Distance to Water	>25ft H2O	>10ft and <100ft H2O	>100ft H2O	Number of Sites	Surveyed Acres	Proposed Trmt. Acres	Potential Total Amount of Herbicide Application2
										Dicamba + 0.65 – 1.95 lbs ae 2, 4-D)
Canada Thistle	H	rhizom	H2O<10ft				15	11.35	11.35	5.68 - 42.56 lbs ae Aquatic Glyphosate
Dalmatian Toadflax	H	rhizom	H2O>10ft			Yes	8	0.69	0.69	0.17 - 1.4 lbs ae Dicamba, or 0.35 – 2.59 lbs ae Glyphosate
Dalmatian Toadflax	H	rhizom	H2O<10ft				3	50.94	50.94	25.47 – 191.03 lbs ae Aquatic Glyphosate, or 12.74 - 101.88 lbs ae Dicamba (>25 ft H2O)
Tall Whitetop	H	rhizom	H2O>10ft			Yes	2	0.19	0.19	0.14 - 0.19 oz ai Chlorsulfuron, or 0.10 – 0.38 lbs ae 2, 4-D, or 0.10 – 0.71 lbs ae Glyphosate
Summary for Herbicide Treatment Herbicides available for use in this Alternative include Chlorsulfuron, Clopyralid, Dicamba, Glyphosate, Triclopyr, 2-4-D, and two herbicide mixtures (Mix 1: Dicamba + 2, 4-D, and Mix 2: Chlorsulfuron + 2, 4-D).							46	64.91	64.91	1.47 – 1.93 oz ai Chlorsulfuron, 31.15 – 233.59 lbs ae Aquatic Glyphosate, 0.17 - 1.4 lbs ae Dicamba
Diffuse Knapweed	P+ or H	non rhizom	H2O>10ft			Yes	5	1.11	1.11	0.56 - 2.22 lbs ae 2, 4-D, or 0.28 – 2.22 lbs ae Dicamba, or 0.11 – 0.28 lbs ae Clopyralid, or Mix 2 (0.28 – 1.11 oz ai Dicamba + 0.56 – 1.67 lbs ae 2, 4-D)
Diffuse Knapweed	P+ or H	non rhizom	H2O>10ft		Yes		2	0.18	0.18	0.09 - 0.36 lbs ae amine 2, 4-D, or 0.02 – 0.05 lbs ae Clopyralid, or 0.05 – 0.36 lbs ae Dicamba, or Mix 2 (0.05 – 0.18 oz ai Dicamba + 0.09 – 0.27 lbs ae 2, 4-D)

Species	Trmt. Code	Rhizom / non Rhizom	Distance to Water	>25ft H2O	>10ft and <100ft H2O	>100ft H2O	Number of Sites	Surveyed Acres	Proposed Trmt. Acres	Potential Total Amount of Herbicide Application2
Diffuse Knapweed	P+ or H	non rhizom	H2O<10ft				3	2.3	2.3	1.15 - 8.63 lbs ae Aquatic Glyphosate
Dyer's woad	P+ or H	non rhizom	H2O>10ft			Yes	23	15.03	15.03	7.52 - 30.10 lbs ae 2, 4-D, or 11.27 – 15.03 oz ai Chlorsulfuron
Dyer's woad	P+ or H	non rhizom	H2O>10ft		Yes		6	8.94	8.94	4.47 - 17.88 lbs ae amine 2, 4-D, or 6.71 – 8.94 oz ai Chlorsulfuron
Dyer's woad	P+ or H	non rhizom	H2O<10ft				11	40.28	40.28	P+ (20.14 - 80.56 lbs ae 2, 4-D, or 30.21 – 40.28 oz ai Chlorsulfuron >10ft H2O)
Mediterranean Sage	P+ or H	non rhizom	H2O>10ft			Yes	10	1.81	1.81	0.45 - 3.62 lbs ae Dicamba, or 0.91 – 3.62 lbs ae 2, 4-D, or Mix 2 (0.45 – 1.81 oz ai Dicamba + 0.91 – 2.72 lbs ae 2, 4-D)
Mediterranean Sage	P+ or H	non rhizom	H2O>10ft		Yes		1	0.66	0.66	0.33 - 1.32 lbs ae 2, 4-D, or 0.17 – 1.32 lbs ae Dicamba, or Mix 2 (0.17 – 0.66 oz ai Dicamba + 0.33 – 0.99 lbs ae 2, 4-D)>25ft H2O
Mediterranean Sage	P+ or H	non rhizom	H2O<10ft				2	4.37	4.37	P+ (2.19 - 8.74 lbs ae 2, 4-D >10ft H2O, or 1.09 – 8.74 lbs ae Dicamba, or Mix 2 (1.09 – 4.37 oz ai Dicamba + 2.19 – 6.56 lbs ae 2, 4-D) >25 ft H2O)
Musk Thistle	P+ or H	non rhizom	H2O>10ft			Yes	5	1.2	1.2	0.9 - 1.2 oz ai Chlorsulfuron, 0.3 – 2.4 lbs ae Dicamba, or 0.12 – 0.3 lbs ae Clopyralid, or 0.6 – 4.5 lbs ae Glyphosate

Species	Trmt. Code	Rhizom / non Rhizom	Distance to Water	>25ft H2O	>10ft and <100ft H2O	>100ft H2O	Number of Sites	Surveyed Acres	Proposed Trmt. Acres	Potential Total Amount of Herbicide Application2
Musk Thistle	P+ or H	non rhizom	H2O>10ft		Yes		2	2.45	2.45	1.8 - 2.45 oz ai Chlorsulfuron, or 0.25 – 0.61 lbs ae Clopyralid, or 1.23 – 9.19 lbs ae Glyphosate, or 0.61 – 4.9 lbs ae Dicamba (>25ft H2O)
Musk Thistle	P+ or H	non rhizom	H2O<10ft				2	0.27	0.27	0.14 - 1.01 lbs ae Aquatic Glyphosate
Scotch Thistle	P+ or H	non rhizom	H2O>10ft			Yes	196	19.27	19.27	3.85 - 38.54 lbs ae Dicamba, or 9.64 -38.54 lbs ae 2, 4-D, or 1.93 – 4.82 lbs ae Clopyralid, or Mix 2 (4.82 – 19.27 oz ai Dicamba + 9.64 – 28.91 lbs ae 2, 4-D)
					Yes		53	4.76	4.76	1.19 - 9.52 lbs ae Dicamba, or 2.38 – 9.52 lbs ae 2, 4-D, or 0.48 – 1.19 lbs ae Clopyralid, or Mix 2 (>25ft H20, 1.19 – 4.76 oz ai Dicamba + 2.38 – 7.14 lbs ae 2, 4-D)
Scotch Thistle	P+ or H	non rhizom	H2O<10ft				29	6.84	6.84	P+ (0.68 - 1.71 lbs ae Clopyralid >25 ft H2O)
Spotted Knapweed	P+ or H	non rhizom	H2O>10ft			Yes	9	2.56	2.56	1.28 - 5.12 lbs ae 2, 4-D, or 0.64 – 5.12 lbs ae Dicamba, or 0.26 – 0.64 lbs ae Clopyralid, or Mix 2 (0.64 – 2.56 oz ai Dicamba + 1.28 – 3.84 lbs ae 2, 4-D)

Species	Trmt. Code	Rhizom / non Rhizom	Distance to Water	>25ft H2O	>10ft and <100ft H2O	>100ft H2O	Number of Sites	Surveyed Acres	Proposed Trmt. Acres	Potential Total Amount of Herbicide Application2
Spotted Knapweed	P+ or H	non rhizom	H2O>10ft		Yes		1	0.01	0.01	0.003 - 0.02 lbs ae Dicamba (>25ft H2O), or 0.01 – 0.02 lbs ae amine 2, 4-D, or 0.001 – 0.003 lbs ae Clopyralid, or Mix 2 (>25ft H2O, 0.003 – 0.01 oz ai Dicamba + 0.01 – 0.02 oz ae 2, 4-D)
Spotted Knapweed	P+ or H	non rhizom	H2O<10ft				1	0.99	0.99	0.5 - 3.71 lbs ae Aquatic Glyphosate
Squarrose Knapweed	P+ or H	non rhizom	H2O>10ft			Yes	2	0.18	0.18	0.09 - 0.36 lbs ae 2, 4-D, or 0.05 – 0.36 lbs ae Dicamba, or Mix 2 (0.05 – 0.18 oz ai Dicamba + 0.09 – 0.27 lbs ae 2, 4-D), or Mix 1 (0.14 -0.18 oz ai Chlorsulfuron + 0.09 – 0.27 lbs ae 2, 4-D), or 0.02 – 0.05 lbs ae Clopyralid
Yellow Starthistle	P+ or H	non rhizom	H2O>10ft			Yes	6	1.27	1.27	0.6 - 2.54 lbs ae 2, 4-D, or 0.32 – 2.54 lbs ae Dicamba, or Mix 2 (0.32 – 1.27 oz ai Dicamba + 0.64 – 1.91 lbs ae 2, 4-D), or Mix 1 (0.95 – 1.27 oz ai Chlorsulfuron + 0.64 – 1.91 lbs ae 2, 4-D), or 0.64 – 1.91 lbs ae Triclopyr, or 0.95 – 1.27 oz ai Chlorsulfuron
Yellow Starthistle	P+ or H	non rhizom	H2O<10ft				2	1.12	1.12	0.56 - 4.2 lbs ae Aquatic Glyphosate

Species	Trmt. Code	Rhizom / non Rhizom	Distance to Water	>25ft H2O	>10ft and <100ft H2O	>100ft H2O	Number of Sites	Surveyed Acres	Proposed Trmt. Acres	Potential Total Amount of Herbicide Application2
Summary for P+ or H Treatment Treatments for sites in this treatment category may be treated with any of the treatment methods available in the physical + or Herbicide treatment categories. Following the Design Standards, sites under this category treated with herbicides may be treated with P+ methods as the size and density of weeds decreases.							371	115.6	115.6	32.71 - 131.32 lbs ae 2, 4-D, 4.56 - 18.24 lbs ae amine 2, 4-D, 2.35 - 17.55 lbs ae Aquatic Glyphosate, 5.5 - 42.18 lbs ae Dicamba, 2.7 - 3.65 oz ai Chlorsulfuron
Total sites and acres considered in this Alternative							541	6908.43	341.21	
Early Detection – Rapid Response									200	
Total sites and acres being treated under this Alternative							541	6908.43	541.21	16.07 - 125.98 lbs. ae Dicamba, 8.07 - 10.79 oz ai Chlorsulfuron, 35 – 262.39 lbs ae Aquatic Glyphosate, 81.21 - 325.32 lbs ae 2, 4-D, 4.56 - 18.24 lbs ae amine 2, 4-D

Notes:

1. The treatment method is listed for each site. Herbicide treatments are listed in order of preference according to Table 2-3, along with other effective herbicides that may be used. The most effective herbicide is in bold.

2. The total amount of herbicide application is based on the preferred herbicide for the given noxious weed species and is based on the application rates listed in Table 2-14 (in bold). The potential amounts of the other herbicides available for use are also listed. The summary and total amount of potential application is based on the most effective herbicide that is available for use. The effects analysis section evaluates the effects of all herbicides available for use.

3. Under Alternative 6, Design Standard-19a applies in the areas under the jurisdiction of the Lahontan Water Quality Control Board (east side of the Warner Mountains; see Figure 3-2): No treatments would occur from the high-water mark for a distance of 10 feet; only aquatic glyphosate would be used from 10 to 100 feet of the high-water mark; further than 100 feet from the high-water mark, the other herbicides displayed in the Alternative may be applied.

Alternatives Considered but Eliminated from Detailed Study

The National Environmental Policy Act directs agencies to inform decision makers and the public of reasonable Alternatives which avoid or minimize adverse impacts or enhance the quality of the human environment. Agencies shall focus on significant environmental issues and Alternatives and shall reduce paperwork and the accumulation of extraneous background data (40 CFR 1502.1). Public comments received in response to the Proposed Action provided suggestions for additional treatment methods within the existing Alternatives for achieving the Purpose and Need. Some of these methods may have been outside the scope of the need for the proposal, duplicative of the Alternatives considered in detail, or determined to be components that would cause unnecessary environmental harm. Complete new Alternatives were not proposed during the public comment period. Those treatments not considered for inclusion in Alternatives 2 through 6 are addressed in Table 2-10: Treatment Methods Eliminated from Consideration. The National Environmental Policy Act directs agencies to briefly discuss reasons for eliminating Alternatives from detailed consideration.

Table 2 - 10. Treatment Methods Eliminated from Consideration

Method	Description	Discussion
Mowing	Mowing can reduce seed production and restrict weed growth, especially in annuals cut before they flower and set seed. Some species however, re-sprout vigorously when cut, replacing one or a few stems with many that can quickly flower and set seed.	Mowing is not considered in this FEIS as the rocky terrain damages equipment and when the rocks are hit by mowing equipment fires can easily be started. In addition mowing adversely affects native plant populations. Mowing was not added to the analysis even though comments requested mowing be included due to the potentially adverse impacts to the environment and the small size of 85 % of the invested sites. This method may be used in the future after appropriate NEPA analysis.
Tilling	Tilling, or the turning-over of soil, is often used for weed control in agricultural crops.	Tilling destroys the soil profile and produces large bare areas for noxious weeds to invade. The extremely rocky and shallow soils of the Modoc National Forest do not lend to utilization of this method. This method may be used in the future after appropriate NEPA analysis.
Grazing animals intensely over large areas	Intensive grazing requires grazing livestock at levels above forest wide standard and guidelines to remove noxious weeds. Not practical as this method is non-selective and may provide for noxious weed reestablishment in a denser stand. Intensive grazing also damages watersheds and Increases soil compaction. “Cattle will graze invasive grasses, can trample inedible weed species, and can Incorporate native seeds into soil. Horses can also be used to control invasive grasses, but horses tend to be more selective than cattle.” (Tu et al. 2001)	Eliminated from consideration since this method is non-selective and may provide for noxious weed re-establishment in a denser stand. Intensive grazing also damages watersheds and increases soil compaction. This method may be used in the future after appropriate NEPA analysis as part of another project. Furthermore, the vast majority of noxious weed sites currently inventoried on the Modoc National Forest are 0.10 acre or less in size. If noxious weed sites increase in size, then a targeted grazing approach may be developed in the future to include appropriate environmental analysis in consultation with the Targeted Grazing Handbook (Targeted Grazing: A Natural Approach for Vegetation Management, Peischel and Henry eds. 2006).
Fertilization	Application of fertilizers to stimulate the growth of desired species.	While fertilization could improve the success of desirable species it could also improve growth and spread of noxious weeds.
Parasites, Predators,	Most effective when integrated with other strategies; does not achieve eradication; not	Biological Controls were analyzed and then dropped from inclusion within the Proposed

Method	Description	Discussion
and Pathogens	effective on all invasive plants; long term process required. “Biological control (biocontrol for short) is the use of animals, fungi, or other microbes to feed upon, parasitize or otherwise interfere with a targeted pest species. Successful biocontrol programs usually significantly reduce the abundance of the pest, but in some cases, they simply prevent the damage caused by the pest (e.g., by preventing it from feeding on valued crops) without reducing pest abundance (Lockwood 2000). Biocontrol is often viewed as a progressive and environmentally friendly way to control pest organisms because it leaves behind no chemical residues that might have harmful impacts on humans or other organisms, and when successful, it can provide essentially permanent, widespread control with a very favorable cost-benefit ratio. However, some biocontrol programs have resulted in significant, irreversible harm to untargeted (non-pest) organisms and to ecological processes. Of course, all pest control methods have the potential to harm non-target native species, and the pests themselves can cause harm to non-target species if they are left uncontrolled. Therefore, before releasing a biocontrol agent (or using other methods), it is important to balance its potential to benefit conservation targets and management goals against its potential to cause harm.” (Tu et al. 2001)	Action for the following reasons: Most of the weeds that have the potential for this type of treatment are .1 acre in size with the largest occurrence 7.5 acres, Usually Biological Controls are utilized on larger weed occurrences that can support insect population growth and dispersal over the time it takes for total control of the weed. A population of 50 plants for example may not have the resources to permit this to occur. Biological controls take years and sometimes decades to become effective. Insect populations must be of sufficient size that no seeds are allowed to mature and disperse (i.e. 100% of the seed source has been destroyed). Of greatest concern is the potential for introduced exotic biological agents to cause unanticipated negative effects on the environment. These effects could include, but are not limited to insects damaging native plant occurrences and indirect changes to the food web. This method may be used in the future after appropriate NEPA analysis in cooperation with APHS or State agencies.
Ground application with booms or broadcast applications of granules	Most appropriate for large areas on flat ground. Herbicide is delivered by tractor, truck, trailer or ATV mounted pressurized tanks with 6 foot or larger booms which spray all plants in an infested area.	Potential for effects on non-target species. Most infestation sites being considered for treatment are too small for consideration of boom application. This method may be used in the future after appropriate NEPA analysis.
Aerial application	Most appropriate for large, relatively inaccessible infestations.	Potential for off-site drift and effects on-non target species. Most infestation sites being considered for treatment are too small for consideration of aerial application. This method may be used in the future after appropriate NEPA analysis.
Prescribed Fire	Fire can be used to remove flammable fuels, such as stands of annual grasses, to reduce the risk of a wildfire. However, a single, low intensity fire will not effectively control most weeds because it does not get hot enough to prevent re-sprouting from crowns or re-establishment from seeds in the soil. Fire may create the type of disturbance that promotes the colonization of many weeds. However, when prescribed burns are coordinated in conjunction with other vegetation management techniques, it can be a very effective means of increasing the vulnerability and susceptibility of species such as Buffalo grass to other methods of control. (Tu et al. 2001). The FS must approve a Burn Plan	Site specific analysis needed since prescribed fire of existing weed sites may promote further introduction of new species or spread of existing noxious weed species into denser stands.

Method	Description	Discussion
	prior to any burn activities.	
Burning using torches	Directed-burning of noxious weeds with a propane torch can be more cost effective and easier than implementing a prescribed fire (permits are still required), but is only effective when the infestation is small. Directed-burning can be used to burn individual plants, groups of plants in a small area, or to ignite brush piles. Propane torches can be used in areas where there is little or no fine fuel to carry a prescribed burn, and can also be used to kill plants when conditions are wet. (Tu et al. 2001)	Cost of implementation, burn plan development, and limited burn days may be too restrictive. Burning can unexpectedly promote an invasive, such as when their seeds are specially adapted to fire, or when they re-sprout vigorously.
Native American Burning		Cost of implementation, burn plan development, and limited burn days may be too restrictive. Description of how this proposal varies from Forest Service Prescribed Fire was not available for analysis.
Burning using Laser	Use of laser technology to cut or kill specific plants.	Sufficient scientific documentation concerning the effects, efficiency, costs, and dangers of utilizing laser technology is not available for analysis during this effort.
Burning using steam	Use of trailer mounted boiler and steam pressure to kill plants with steam.	Distance to available clean water to refill steam equipment is a limiting factor. Cost of implementation, burn plan development, and limited burn days may be too restrictive. Steam burning can unexpectedly promote an invasive, such as when their seeds are specially adapted to heat, or when they re-sprout vigorously. Further analysis of effectiveness, availability, and costs would be necessary.

Comparison of Alternatives

A number of different tables are included in this section. Each of these tables compares different aspects of the Alternatives that are being considered.

Table 2 - 11. Comparison of Treatment Methods by Number of Sites and Acres

	Alternative 1 (No Action)		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
Treatment Time Frame	Ongoing		5 years		10 years		10 years		10 years		10 years	
	Sites	**Acres**	**Sites**	**Acres**	**Sites**	**Acres**	**Sites**	**Acres**	**Sites**	**Acres**	**Sites**	**Acres**
Physical– hand pulling, hoeing, grubbing	0	0	161	31	494	5993	161	31	0	0	0	0
Physical+ --clipping seed head or plant, using hand-held string trimmer, placing mulch or tarp		20-30/yr	0	0	0	0	0	0	527	139	116	19
Herbicide and/or Physical + Treatments	0	0	333	5961	0	0	333	5961	0	0	371	116
Herbicide	0	0	42	907	0	0	42	907	0	0	46	65
Limited Treatment[1]	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	5	41
Total Sites and Acres Potentially Treated with Herbicides (includes ED-RR acres)	0	0	355	6868 [2]	0		355	7068 [3]	0	0	425	522 [4]
Total Inventoried Acres Treated	0	0	536	6899	494	5993	536	6899	532	280	541	341

[1] 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.

[2] This includes acres under the physical and/or herbicide method, plus the herbicide-treated acres.

[3] This includes acres under the physical and/or herbicide method, the herbicide-treated acres, and the potentially treated areas under Early Detection – Rapid Response (200 acres).

[4] This acreage 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 potentially treated under Early Dection – Rapid Response.

Total Inventoried Weeds (2004): 541 sites covering 6908 acres.

Table 2 - 12. Comparison of Extent of Weed Treatments (Full, Partial, Limited, No Treatment)

	Alternative 1 (No Action)		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
Treatment Time Frame	Ongoing		5 years		10 years		10 years		10 years		10 years	
	Sites	**Acres**	**Sites**	**Acres**	**Sites**	**Acres**	**Sites**	**Acres**	**Sites**	**Acres**	**Sites**	**Acres**
Inventoried Weeds Full Treatment		20-30/yr[1]	520	5995	494	5993	520	5995	520	180	538	241
Inventoried Weeds Partial Treatment	0	0	16 [2]	904 [3]	0	0	16 [2]	904 [5]	0	0	0	0
Inventoried Weeds Limited Treatment	0	0	0	0	0	0	0	0	9	100	3	100 [6]
Not Inventoried - Treated Through Early Detection – Rapid Response (100 acres max/yr) [8]	0	0	0	0	0	0		200		200		200
Total Acres of Weeds Treated		20-30/yr		6899		5993		7099		480		541
Total Acres of Inventoried Weeds Treated		20-30/yr		6899		5993		6899		280		341
% of Total Inventoried Weeds Treated		.3 - .4%		87%		87%		99%		4%		5%
Inventoried Weeds with No Treatment		6878	5 [2]	9	47 [4]	916	5 [2]	9	5 [2]	5515		6567 [7]
Total Inventoried Weeds (2004)			541	6908	541	6908	541	6908	541	6908	541	6908

[1]Under current management, approximately 20 to 30 acres of noxious weeds ares 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] Excluded 5 sites of rhizomatous species that are within 10' of live water, and partial acreage of 16 sites of rhizomatous species that are within 10' of live water. Rhizomatous species will not be treated by physical means.

[3] These sites have rhizomatous species that occur within 10' of water. Acreage within that zone would not be treated. Acreage outside the zone would receive partial treatment with herbicides.

[4] Excluded 47 sites of rhizomatous species composed of 916 acres.

[5] These sites have rhizomatous species that occur within 10' of water. Acreage within that zone would not be treated. Acreage outside that zone would receive partial treatment and be treated with herbicides.

[6] These sites will receive limited treatment around the perimeter, estimated at 100 acres proportionally distributed based on the size of these sites.

[7] Excluded 5,658 acres of dyer's woad, 850 acres of Dalmatian toadflax, and 159 acres of crupina.

[8]Acres treated with Early Detection – Rapid Response may use any of the methods approved for use in this decision.

Re-treatment of the Same Acres in all Alternatives is not considered new acres treated.

Table 2 - 13. Comparison of Treatment Priorities

Alternatives 2 through 4		
Priority for Treatment	**Category**	**Treatment (in order of preference)**
First	Species with limited site occurrences Modoc County Category A species	1. Use physical methods to treat isolated plants on sites less than 1/10 acre and fewer than 100 plants. 2. Use herbicides.
Second	Category B species	1. Use physical methods to treat isolated plants. 2. Use herbicides on roadsides and Category A weeds.
Third	Treatment of Category C species	1. Use physical methods to treat isolated plants or plant clumps. 2. Use herbicides.

Alternatives 5 and 6		
Priority for Treatment	**Category**	**Treatment (in order of preference)**
First	Isolated plants or sites less than 1/10 acre, new species, and new infestations, or species with fewer than 25 plants. Areas of high traffic and sources of infestation, parking lots, trailheads, horse ramps, gravel pits. Areas of special concern such as botanical areas or Research Natural Areas.	1. Use Physical+ methods to treat isolated plants where effective. 2. Use herbicides. 3. Remove seed heads.
Second	Containment of existing infestations Roadsides Category A species	1. Use Physical+ methods to treat isolated plants 2. Use herbicides on roadsides and Category A weeds.
Third	Control or Eradication of existing infestations Treatment of Category B species	1. Use Physical+ methods to treat isolated plants or plant clumps. 2. Use herbicides. 3. Use goat grazing. 4. Use hand-held string trimmers.
Fourth	Control of Category C and	1. Use Physical+

Alternatives 2 through 4		
Priority for Treatment	**Category**	**Treatment (in order of preference)**
Fourth	not applicable	not applicable

Alternatives 5 and 6		
Priority for Treatment	**Category**	**Treatment (in order of preference)**
Fourth	Eradication of Category A	methods to treat small areas along highways to prevent spread. 2. Use herbicides along perimeters

Table 2 - 14. Comparison of Herbicides and Application Rates for Alternatives 2, 4, and 6

	Chlorsulfuron	**Clopyralid**	**Dicamba**	**Glyphosate**	**Triclopyr**	**2, 4-D**	**Mix 1: Chlorsulfuron and 2, 4-D**	**Mix 2: Dicamba and 2, 4-D**
Typical Application Rates	0.75 – 1.0 oz ai/ac	0.10 to 0.25 lbs ae/ac	.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 oz ai/ac + 2, 4-D 0.5-1.5 lbs ae/ac	Dicamba 0.25-1.0 oz ai/ac + 2, 4-D 0.5-1.5 lbs ae/ac
Canada Thistle	6	2,4,6	2,4,6	2,4,6			6	6
Common Crupina	6	2,4,6	6	2,4,6	2,4,6	6	6	6
Dalmatian Toadflax	6		6	2,4,6			6	
Diffuse Knapweed		2,4,6	2,4,6	6		2,4,6	6	6
Dyer's Woad	6	2,4	2,4,6	2,4,6	2,4	2,4,6	6	
Klamath Weed or St. Johnswort	6						6	
Mediterranean Sage		2,4	2,4,6	6		2,4,6	6	6
Musk Thistle	6	2,4,6	2,4,6	2,4,6		2,4,6	6	6
Plumeless Thistle	6	2,4,6	2,4,6	6		2,4,6	6	6
Scotch Thistle	6	2,4,6	2,4,6	2,4		2,4,6	6	6
Spotted Knapweed		2,4,6	2,4,6	2,4,6	6	2,4,6	6	6

	Chlorsulfuron	Clopyralid	Dicamba	Glyphosate	Triclopyr	2, 4-D	Mix 1: Chlorsulfuron and 2, 4-D	Mix 2: Dicamba and 2, 4-D
Typical Application Rates	0.75 – 1.0 oz ai/ac	0.10 to 0.25 lbs ae/ac	.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 oz ai/ac + 2, 4-D 0.5-1.5 lbs ae/ac	Dicamba 0.25-1.0 oz ai/ac + 2, 4-D 0.5-1.5 lbs ae/ac
Squarrose Knapweed	6	2,4,6	2,4,6	2,4,6		2,4,6	6	6
Tall White Top (Perennial pepperweed)	6		2,4,6	2,4,6		2,4	6	
Yellow Star Thistle		2,4,6	2,4,6	2,4,6	2,4,6	2,4,6	6	

Note: The information for Alternatives 2 and 4 in this table was developed from information in the DEIS and the 2002 Modoc National Forest Weed Management Strategy and Action Plan. The information for Alternative 6 in this table was developed based on information provided by the UC Davis Extension Agent for Modoc County, Don Lancaster, and is based on label instructions for the herbicides.

Table 2 - 15. Total Herbicide Application for Alternatives that Utilize Herbicide Treatments

Herbicide	Modoc County 2005 Data*	Alternative 2	Alternative 4	Alternative 6
Clopyralid	48.5 lbs ae/55 acres	0.08 - 0.2 lbs ae/0.81 acres	0.08 - 0.2 lbs ae/0.81 acres	n/a
Dicamba	947.40 lbs ae/9,963 acres	13.46 – 105.7 lbs ae/52.85 acres	13.46 – 105.7 lbs ae/52.85 acres	16.07 - 125.98 lbs ae/62.54 acres
Glyphosate	4,195.49 lbs ae/3,456 acres	483.64 – 3,640.98 lbs ae/970.59 acres	483.64 – 3,640.98 lbs ae/970.59 acres	35 – 262.39 lbs ae/69.97acres
2, 4-D	8,913.34 lbs ae/10,419 acres	2,843.5 – 11,371.2 lbs ae/5685.6 acres	2,843.5 – 11,371.2 lbs ae/5685.6 acres	85.77 - 443.56 lbs ae/171.58 acres
Chlorsulfuron	0.51 lbs ae/50 acres	n/a	n/a	8.07 - 10.79 oz ai/10.79 acres
Total Herbicide Application	14,105 lbs ae	3,341– 15,118 lbs ae	3,341– 15,118 lbs ae	137 – 832 lbs ae; 8 - 11 oz ai

* Data is from California Department of Pesticide Regulation 2005 Annual Pesticide Use Report for Modoc County.

Table 2 - 16. Contribution to Total Herbicide Application in Modoc County for Alternatives that Utilize Herbicides

Year	Total Herbicide Modoc County (lbs ae)*	Alternative 2	Alternative 4	Alternative 6
2003	232,839 lbs ae	1.4% - 6.4%	1.4% - 6.4%	0.06% - 0.36%
2004	385,516 lbs ae	0.86% - 3.9%	0.86% - 3.9%	0.04% - 0.22%
2005	440,263 lbs ae	0.80% - 3.4%	0.80% - 3.4%	0.03% - 0.12%

* Data is from California Department of Pesticide Regulation Annual Pesticide Use Reports for Modoc County. 117 chemical formulations were applied in Modoc County in 2005.

Table 2 - 17. Comparison of Cost (in 2006 dollars)

	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Estimated 5-year Discounted Cost	$135,670	$1,393,760	$2,225,190	$1,383,010	$533,420	$455,200
Estimated 10-year Discounted Cost	$247,920	N/A	N/A	$1,987,840	$900,230	$734,630
Estimated Cost per Effectively Treated Acre	$1,183	$243	$418	$241	$1,159	$660

Table 2 - 18. Comparison of Environmental Impacts and Significant Issues

Issues	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Issue 1 - The use of herbicides for noxious weed control may cause health problems for people who are exposed to the herbicides and/or treated areas. Although federal and state licensing and certification requirements for herbicide use builds in strict safety features before use (such as a minimum and maximum amount that can be applied), some people have reservations about the use of these products. If an Alternative is selected which authorizes the use of herbicides, there is a potential that health problems could surface.	Herbicides will not affect people; however the potential for increased exposure of people to the adverse effects of noxious weeds will increase.	There is a very little possibility of a small number of individuals to be affected by the use of herbicides.	Herbicides will not affect people; however the potential for increased exposure of people to the adverse effects of noxious weeds will increase.	There is a very little possibility of a small number of individuals to be affected by the use of herbicides.	Herbicides will not affect people; however the potential for increased exposure of people to the adverse effects of noxious weeds will increase.	There is a very little possibility of a small number of individuals to be affected by the use of herbicides.
Issue 2 - The proposed application of herbicides for weed control may affect the ability of Native Americans and others to collect plants for traditional uses or medicinal reasons in specific areas. Also herbicides may kill specific plants that are collected and used for medical or traditional purposes in specific areas.	May Not Affect. However, noxious weed infestations have the potential to displace culturally important plants and continue to encroach on trust lands.	May Affect Specific Sites for short period of time but will not eliminate any species over a large area.	May Not Affect	May Affect Specific Sites for short period of time but will not eliminate any species over a large area.	May Not Affect	May Affect Specific Sites for short period of time but will not eliminate any species over a large area.
Issue 3 - An Alternative is needed to respond to the need to evaluate an aggressive approach using additional treatment methods and adaptive management for treating more acres annually over a ten-year period to control and eradicate noxious weeds. The Proposed Action is seen as too limited and ineffective.	0	5 years of Treatments	5 years of Treatments	10 years of Treatments	10 years of Treatments	10 years of Treatments

Issues	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Issue 4 - The proposed application of herbicides for weed control has the potential to harm the physical and biological resources of the Forest. The use of herbicides has the potential to adversely affect on the soil and water resources and harms the native plants and animals	Herbicides will not affect the environment; however the potential for increased adverse effects of noxious weeds will increase.	There is very little possibility (but greater than Alternative 6) of the use of herbicides to adversely affect the environment.	Herbicides will not affect the environment; however the potential for increased adverse effects of noxious weeds will increase.	There is very little possibility (but greater than Alternative 6) of the use of herbicides to adversely affect the environment.	Herbicides will not affect the environment; however the potential for increased adverse effects of noxious weeds will increase.	There is a very little possibility of the use of herbicides to adversely affect the environment.
Impact to T&E Wildlife	Bald Eagle -May Affect, Not Likely to Adversely Affect. Northern Spotted Owl – No Effect. Shasta Crayfish – No Effect.	Bald Eagle - May Affect, Not Likely to Adversely Affect. Northern Spotted Owl – No Effect. Shasta Crayfish – No Effect.	Bald Eagle -May Affect, Not Likely to Adversely Affect. Northern Spotted Owl – No Effect. Shasta Crayfish – No Effect.	Bald Eagle -May Affect, Not Likely to Adversely Affect. Northern Spotted Owl – No Effect. Shasta Crayfish – No Effect.	Bald Eagle -May Affect, Not Likely to Adversely Affect. Northern Spotted Owl – No Effect. Shasta Crayfish – No Effect.	Bald Eagle -May Affect, Not Likely to Adversely Affect. Northern Spotted Owl – No Effect. Shasta Crayfish – No Effect.
Impact to T&E Aquatic Species	Lost River Sucker, Short Nose Sucker, Modoc Sucker, Warner Sucker - Not Likely to Adversely Affect	Lost River Sucker, Short Nose Sucker, Modoc Sucker, Warner Sucker - Not Likely to Adversely Affect	Lost River Sucker, Short Nose Sucker, Modoc Sucker, Warner Sucker - Not Likely to Adversely Affect	Lost River Sucker, Short Nose Sucker, Modoc Sucker, Warner Sucker - Not Likely to Adversely Affect	Lost River Sucker, Short Nose Sucker, Modoc Sucker, Warner Sucker - Not Likely to Adversely Affect	Lost River Sucker, Short Nose Sucker, Modoc Sucker, Warner Sucker - Not Likely to Adversely Affect
Impact to T&E Plants	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Impact to cultural plants	May Affect, Not Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect