

Santa Clara River Watershed Invasive Plant Treatment Project on the Santa Clara River/Mojave Ranger District, Angeles National Forest

Purpose and Need and Proposed Action Statement

Introduction

The Santa Clara/Mojave River District Ranger on the Angeles National Forest is proposing to initiate an invasive plant treatment project for the Santa Clara River watershed. The project covers the majority of the main drainages on the Santa Clara/Mojave Ranger District and is located in portions of T3N, R14, 15W; T4N, R11, 12, 13, 14W; T5N, R13, 14, 15, 16, 17W; T6N, R13, 14, 15, 16, 17W; T7N, R14, 15, 16, 17, 18W, SBM in Los Angeles County, California.

Background and Management Direction

Executive Order 13112 defines invasive plants as “non-native plants whose introduction does, or is likely to, cause economic or environmental harm or harm to human health,” (<http://ceq.hss.doe.gov/nepa/regs/eos/eo13112.html>). Some invasive plants can change ecosystem processes such as hydrology, fire regimes, native species recovery, and soil chemistry. These invasive plants have a competitive advantage because they are no longer controlled by their natural predators, and can quickly spread out of control. They spread with no consideration for land ownership boundaries. Furthermore, invasive plants that grow along stream channels can easily and often increase their infestation because their seeds, effortlessly, are capable of traveling downstream. In California, approximately 3 percent of the plant species growing in the wild are considered invasive, but they inhabit a much greater proportion of the landscape (California Invasive Plant Council, (Cal-IPC)).

The Santa Clara/Mojave Rivers Ranger District implemented an arundo (*Arundo donax*) eradication project between 1995 and 2005 in Soledad Canyon and San Francisquito Canyon. The District has been successful in controlling population expansion at treatment sites, but other invasive plant species, such as tamarisk and tree-of-heaven, have become established. Also many other species such as yellow star thistle and tree tobacco continue to invade portions of the Santa Clara watershed. The original decision is over 15 years old. The purpose of this environmental assessment is to update and expand the original project’s purpose and need, project area, and approved activities.

The original 1995 decision was made to control only arundo but it has become clear many other invasive species are serious problems in the Santa Clara watershed. Some of the most serious invasive plants are tamarisk (*Tamarix* spp.), tree-of-heaven (*Ailanthus altissima*), castorbean (*Ricinus communis*), Spanish broom (*Spartium junceum*), fountain grass (*Pennisetum* sp.), eupatory (*Ageratina adenophora*), English ivy (*Hedera helix*), cape ivy (*Delairea odorata*), periwinkle (*Vinca major* .), tree tobacco (*Nicotiana glauca*), Himalaya blackberry (*rubus armeniacus*), and gorse (*Ulex europaeus*). This list is not complete and there are still some populations of arundo remaining in these drainages.

It is anticipated other invasive plant species will invade and/or expand into these drainages (e.g. yellow star thistle [*Centaurea solstitialis*], Euphorbia [*Euphorbia terracina* and *E. dendroides* sp.], Dalmatian toadflax [*Linaria dalmatica*], cardaria [*Cardaria* sp.], perennial pepperweed [*Lepidium latifolium*]).

If the invasive species are left unchecked, the ecosystem in these drainages could be dramatically changed. Invasive plants could create a host of adverse environmental effects, including: displacement of native plants; alteration of the hydrology of riparian habitat, and reduction in habitat and forage for

wildlife (including threatened, endangered, and sensitive species); reduction in water quantity; potential reduction in soil productivity; and potential changes in the intensity and frequency of wildland fires. After wildland fires in this area, non-native plant species typically re-establish more rapidly than native plants, suppressing the recovery of the native vegetation and allowing the invasive plants to expand their range. In addition, when wildland fires occur too frequently (tamarisk and arundo-dominated communities experience higher fire frequencies than native riparian communities), some of the native vegetation lose the ability to recover, effectively converting high diversity native plant communities into low diversity non-native communities.

The Angeles National Forest Land Management Plan (Forest Plan) states some of the greatest threats to riparian and aquatic habitats are from the invasion of nonnative plant species, particularly tamarisk, arundo, and cape ivy within the stream channels (Forest Plan, Part 1, p. 41; USFS 2005).

The Federal Noxious Weed Act of 1974 (7 USC 214), Section 15, requires Federal land management agencies to develop and establish a management program for control of undesirable plants that are classified under State or Federal law as undesirable, noxious, harmful, injurious, or poisonous, on Federal lands under the agency's jurisdiction (7 USC 2814(a)) and requires the Federal land management agencies to enter into cooperative agreements to coordinate the management of undesirable plant species on Federal lands where similar programs are being implemented on State and private lands in the same area (7 U.S.C. 2814(c)).

The Wyden Amendment (Public Law 105-277, Section 323 as amended by Public Law 109-54, Section 434) authorizes the Forest Service to enter into cooperative agreements to benefit resources within watersheds on National Forest System lands. Agreements may be with willing Federal, Tribal, State, and local governments, private and nonprofit entities, and landowners to conduct activities on public or private lands for the protection, restoration, and enhancement of fish and wildlife habitat and other resources; reduction of risk from natural disaster where public safety is threatened; or, a combination of both.

Executive Order 13112 of February 3, 1999, Invasive Species, is intended to prevent the introduction of invasive species and provide for their control, and to minimize the economic, ecological, and human health impacts that invasive species cause. Agencies shall identify which actions could affect the status of invasive species; use an integrated weed management approach to managing invasive species; and, not authorize, fund, or carry out actions that would likely cause or promote the introduction or spread of invasive species unless it can be shown the actions clearly outweigh the potential harm caused by invasive species.

The National Fire Plan 10-year Comprehensive Strategy Implementation Plan (USFS 2001) includes an action to eradicate or minimize the rate of spread of invasive species that negatively impact natural fire cycles and fire-adapted ecosystems.

Forest Service National Strategic Plan (USFS 2007) includes objectives to reduce adverse impacts from invasive and native species, pests, and diseases, and restore and maintain healthy watersheds and diverse habitats.

The Forest Plan (USFS 2005) has goals to reverse the trend of increasing loss of natural resource values due to invasive species (Goal 2.1), retain a natural evolving character within wilderness (Goal 3.2), improve watershed conditions through cooperative management (Goal 5.1), improve riparian conditions (Goal 5.2), and provide ecological conditions to sustain viable populations of native and desired nonnative species (Goal 6.2);

The Forest Plan Weed Management Strategy (Appendix M in the Forest Plan, Part 3) includes coordinating with the Los Angeles Weed Management Area (WMA) to continue controlling and/or removing German and English ivy, Vinca, and Spanish broom in Bouquet Canyon; yellow star-thistle on

the Santa Clara Mojave Rivers Ranger District; distaff thistle in San Francisquito Canyon; tree of heaven, tamarisk, and arundo in San Francisquito, Bouquet, and Soledad Canyon. Appendix M also directs the Forest to coordinate with State of California for tamarisk removal in upper Castaic Creek.

Appendix M in the Forest Plan, Part 3 also includes coordinating with the Los Angeles WMA to monitor status of halogeton along California State Highway 14 near national forest boundary, perennial pepperweed in the Santa Clara River near national forest boundary, and apiary sites for yellow star-thistle, spotted knapweed, and other invasive plants.

The desired conditions for the project area are to have structure, function, and composition of plant communities and wildlife habitat not be impaired by the presence of invasive non-native plants (Forest Plan, Part 1, p. 32; USFS 2005); to have the watercourses functioning properly with riparian vegetation consisting primarily of native species, with minimal or no presence of invasive non-native plants (Forest Plan, Part 1, p. 41; USFS 2005); and, to reduce and control exotic species over time to restore healthy riparian systems (Forest Plan, Part 2, pp. 42, 66; USFS 2005).

The Santa Clara River has been severely degraded by invasive, nonnative plants which have increased over time. In 2006, The Upper Santa Clara River Watershed Arundo/Tamarisk Removal Plan (SCARP) and EIR were completed by the Ventura County Resource Conservation District and dozens of federal, state and local cooperators. The Forest Service was a cooperator, but needed to complete National Environmental Policy Act compliance on National Forest administered land before on-the-ground projects could be completed. Subsequent to the SCARP, the Santa Clara River Invasive Plant Removal Project (SCIPR) was started, and now the entire Santa Clara River Watershed is covered from the headwaters to the coast. Projects are being implemented downstream of the National Forest, but the long term success in the watershed will largely be determined by the ability of the upstream landowners, like the Forest Service, to control invasive plants in the headwaters. Fish and Game, Fish and Wildlife Service, and the state and federal water management agencies are all partners in this Santa Clara River restoration effort, and these groups are extremely interested in the Forest Service treating invasive plants in the upper watershed.

Purpose and Need for Action

Based on national, agency, and forest direction, the needs for this project are to:

- Eradicate, control, contain, and/or suppress¹ existing invasive plant species in the Santa Clara River and its tributaries from the Forest boundary to their headwaters.
- Provide for aggressive treatment of new infestations of invasive plants (in terms of new areas and new species) to allow for rapid treatment and containment of small infestations before they become established.
- Focus on invasive plant species that are classified as undesirable, noxious, harmful, injurious, or poisonous, including but not limited to State listed high priority noxious weeds (such as arundo, tamarisk, and tree-of-heaven).
- Cooperate with state and county agencies and private landowners interested in managing invasive plants within the project area.

In meeting the needs for action, the following purposes (objectives) must be achieved:

¹ Eradicate is to totally eliminate an invasive plant species from the project area; control is to reduce the infestation over time but some level of infestation may be acceptable; contain is to prevent the spread of the invasive plants beyond the perimeter of patches or infestations presently existing; and, suppress is to prevent seed production throughout the target patch and reduce the area coverage, preventing the invasive species from dominating the vegetation in the area where low levels may be acceptable.

- Improve riparian habitat, aquatic conditions, and the overall quality and quantity of water.
- Contain and/or eradicate highly flammable and fire-adapted invasive plant species (e.g. arundo, tamarisk) that have the potential to increase fire severity and increase the frequency in occurrence of damaging wildfires in these drainages.
- Minimize adverse impacts of invasive species to populations of threatened, endangered, and/or sensitive plant and wildlife species.
- Minimize adverse impacts from the project to populations of threatened, endangered, and/or sensitive plant and wildlife species.
- Improve the aesthetic quality of riparian and recreation areas.
- Minimize adverse impacts to the native riparian vegetation within the project area.
- Provide for health and safety during implementation of the project to nearby residents, forest visitors, and project implementers.

Proposed Action

The proposed action includes the eradication, control, containment, and/or suppression of existing and new infestations of invasive plant species that are undesirable, noxious, harmful, injurious, or poisonous, including but not limited to State listed high priority noxious weeds in Santa Clara River and its tributaries from the Forest boundary to their headwaters. The project would include riparian areas along each drainage as well as upland areas that support populations of priority invasive plants. Treatment areas would include non-National Forest System lands if the landowners/managers would like to enter into an agreement authorized under the Wyden Amendment.

The term of this project would be 15 years with the intent to review and, if needed, update the project, effects analysis, and possibly purpose and need after 15 years of implementation. Changed circumstances could result in a NEPA review and reanalysis before the 15 years is up. High priority for treatment would be: arundo (*Arundo donax*), tamarisk (*Tamarix* spp.) and tree-of-heaven (*Ailanthus altissima*). Moderate priority invasive plants would be perennial pepperweed (*Lepidium latifolium*) yellow star thistle (*Centaurea solstitialis*), tree tobacco (*Nicotiana glauca*), Spanish broom (*Spartium junceum*), castorbean (*Ricinus communis*), crimson fountaingrass (*Pennisetum setaceum*), Eutopary (*Ageratina adenophora*), English ivy, Algerian ivy (*Hedera* sp.), fennel (*Foeniculum vulgare*), Himalaya blackberry (*Rubus armeniacus*), Italian ryegrass (*Lolium multiflorum*), cape-ivy (*Delairea odorata*), castorbean (*Ricinus communis*), and pampas grass (*Cortaderia* sp.).

The project incorporates an adaptive management strategy that allows the project to be modified based on invasive plant expansion, new infestations of invasive plants in the project area, and new and more effective treatment methods.

Prescriptions for treatment would follow integrated weed management (IWM) for each treatment site. Proposed treatment methods include biological control (e.g. insects, pathogens), manual/mechanical removal, fire-wilting, and herbicide. Depending on the size of the treated material (invasive plants), additional treatment of this material (biomass) could be required. This could include pile burning or hauling off of excess material.

Monitoring and restoration are also key components to the proposed action. Monitoring is intended to provide baseline information, determine the effectiveness of treatment, quickly treat new populations, monitor and possibly provide adaptive management based on unanticipated effects, and monitor the restoration of treated sites. To ensure treated areas are not re-established with invasive plant species, restoration activities may be required. All surveys/monitoring would be documented in the project files.

Restoration activities could include such things as seeding and planting native species to give them a head start over the invasive plants.

No new permanent or temporary roads are being proposed with this action. Any access would be by foot or by vehicles using existing roads. All terrain vehicles such as quads may be approved on a very limited basis to access some remote sites. Helicopters may be used for transportation in remote areas where access is difficult, including possibly the wilderness.

Adaptive Management Strategy

Invasive plant infestations constantly change and evolve, as do the infestations of individual invasive plant species and treatment methods, including herbicide use (i.e., concentrations of herbicide and application methods). Early detection and rapid containment of invasive plants is the most efficient method for controlling their spread. A new project addressing these changes could take at least a year or more for a decision. The proposed action includes an adaptive management strategy that addresses these types of changes over the life of this project to allow for a rapid response for control and/or containment.

New treatment methods (including change in concentrations or application methods of approved herbicides and/or biological control agents analyzed and approved for use by the US Department of Agriculture, Agricultural Plant Health and Insect Services), treatment of new species, and/or treatment of new areas within the project area will be part of the proposed action as long as the scope of the treatment and the effects are within those addressed in the NEPA document. Any new information would be reviewed by an appropriate interdisciplinary team; documented; and, treatment approved by the appropriate Responsible Official through a letter to the files. The documentation would be included in the project record available for public review.

This strategy would not allow for the use of new herbicides not addressed in this document; would not allow for aerial applications of herbicides; would not allow herbicide use during pre-emergence of vegetation (preventing the invasive plant from germinating); and, would not allow large heavy equipment into the treatment areas (e.g. large bull dozers). The use of any new herbicides, aerial applications, pre-emergent herbicide application, or use of large heavy equipment would require new NEPA analysis, public involvement, documentation, and decision.

Eradicate, Control, Contain, and/or Suppress

Presently, invasive plant species known to exist within the project area include a large variety of species including, but not limited to: arundo, tamarisk, tree-of-heaven, perennial pepperweed, yellow star thistle, Spanish broom, castorbean, tree tobacco, fountain grass, eupatory, English ivy, periwinkle, fennel, Himalaya blackberry, Italian ryegrass and pampas grass. . This Forest has tentatively divided invasive plant species into three categories: high, moderate, and non-priority species. Table 1 provides a summary of the high and moderate priority species that presently exist within the project area. Many of these species are quick invaders to new areas, including arundo and tamarisk. It is anticipated even with early treatments, tamarisk and other invasive plants will continue to expand in the project area due to the proliferation of seed and seed dispersal by wind and water, or in the case of arundo, through rhizomes or stem segments. Expansion of invasive plants will vary depending on species. It is anticipated invasive plants in the project area would generally expand at a rate of approximately one to five percent annually.

Table 1. List of high and moderate priority invasive plants.

Common name	Taxon name
High Priority Invasive Plant Species	
Giant Reed	<i>Arundo donax</i>
Saltcedar, Tamarisk	<i>Tamarix spp.</i>
Tree of Heaven	<i>Ailanthus altissima</i>
Perennial Pepperweed	<i>Lepidium latifolium</i>
Spanish Broom	<i>Spartium junceum</i>
Yellow star thistle	<i>Centaurea solstitialis</i>
Moderate Priority Invasive Plant Species	
Eupatory	<i>Ageratina adenophora</i>
Pampas Grass	<i>Cortaderia spp.</i>
Cape-ivy, German-ivy	<i>Delairea odorata</i>
Fennel	<i>Foeniculum vulgare</i>
English Ivy, Algerian ivy	<i>Hedera helix, H. canariensis</i>
Italian Ryegrass	<i>Lolium multiflorum</i>
Tree Tobacco	<i>Nicotiana glauca</i>
Crimson Fountaingrass	<i>Pennisetum setaceum</i>
Castorbean	<i>Ricinus communis</i>
Himalayan Blackberry	<i>Rubus armeniacus (Rubus discolor)</i>
Bigleaf Periwinkle	<i>Vinca major</i>

Most treatment strategies would be intended to eradicate or control the high priority invasive plant species. Dependent on location, invasive plant species, and potential vectors in the area, the strategy to manage the moderate and low priority invasive plant species would consider containing and/or suppressing.

Treatment Prescriptions

Prescriptions for treatment would follow integrated weed management (IWM) for each treatment site. No single management technique is perfect for all invasive plant treatment situations. Multiple management actions are required for effective treatment. Integrated weed management includes an approach for selecting methods for eradicating, containing, controlling, and/or suppressing invasive plants in coordination with other resource management activities to achieve optimum management goals and objectives. This approach uses a combination of treatment methods, that when taken together, would eradicate, contain, control, or suppress a particular invasive plant species or infestation efficiently and effectively, with minimum adverse impacts to non-target organisms. This approach contrasts with the traditional approach of using a single treatment type, such as applying herbicides, to treat all invasive plant problems. Herbicides are one useful technique, but they are not the only method to control invasive plants and may not always be the most effective. In addition, there are multiple herbicides that can be effective treating a given invasive plant species. Integrated weed management is species-specific, tailored

to exploit the weaknesses of a particular invasive plant species, site-specific, and designed to be practical with minimal risk to the native organisms and their habitats (Colorado Natural Areas Program 2000).

Treatment Methods

Proposed treatment methods include biological control (e.g. insects, pathogens), manual/mechanical, fire wilting, and herbicide. These treatment methods are divided up further into specific types of treatment methods and are summarized in Table 2. The timing of herbicide treatments would be dependent on the invasive plant species, location of the population, temperature extremes, as well as wind and rain restrictions (which vary by herbicide). The Regional Forester must pre-approve any herbicide treatment in Wilderness Areas (FSH 2109.14, 13.4). This approval would apply to the Magic Mountain Wilderness and would occur before any project level activity begins.

Depending on the size of the treated material (invasive plants), additional treatment of this material (biomass) could include pile and burning adjacent to or at the treatment area, drag and remove off site (if vehicle access is adjacent to treatment area), or helicopter sling load material out of the treatment area for disposal off site (if the access is poor and pile and burning in place is not an option). If the biomass material is minimal, the material could be scattered above the high waterline to dry and decompose.

The selection of treatment method would be dependent on: time of year; severity of infestation; presence of sensitive resources (e.g. native plants and wildlife species, including protected species); degree of intermixing of invasive species with sensitive native habitats; access; proximity to surface water; and, budget.

Table 2. Summary of treatment methods proposed.

Method	Description
Biological Control Method	
Biological Control Agents	<p>Biological control agents are normally insects or pathogens that attack specific invasive plant species. Prior to allowing use, US Department of Agriculture, Animal and Plant Health and Inspection Service (APHIS) is required to complete NEPA analysis and documentation. The current website of approved biological control agents is http://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/enviro_docs.shtml</p> <p>Use of this method would comply with the APHIS NEPA document and decision.</p> <p>Advantages and disadvantages –suppresses the spread of infestations but would not likely eradicate the invasive plant populations. If successful, can provide permanent, widespread control with a favorable cost:benefit ratio.</p>
Manual/Mechanical Methods	
Hand Pulling	<p>Pulling or uprooting plants can be effective against some shrubs, tree saplings, and herbaceous invasive plants. Annuals and tap-rooted plants are particularly susceptible to control by hand pulling. It is not as effective against many perennial invasive plants with deep underground stems and roots that are often left behind to resprout.</p> <p>The advantages of pulling include its initial small ecological impact, minimal damage to neighboring plants, and little (or no) cost for equipment or supplies. Normally effective with small populations and/or where a large pool of volunteer</p>

Method	Description
	<p>labor is available. 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. Disadvantages are that this method is labor and time intensive. Often times there are low mortality rates which require repeated re-treatments to be effective, which could increase the project cost and frequency of disturbance to the treatment area.</p>
<p>Pulling Using Tools</p>	<p>Most plant-pulling tools are designed to grip the plant stem and provide the leverage necessary to pull its roots out. Tools vary in their size, weight, and the size of the invasive plant they can extract. The Root Talon is inexpensive and lightweight, but may not be durable or effective as the all-steel Weed Wrench, which is available in a variety of sizes. Both work best on firm ground as opposed to soft, sandy, or muddy substrates and in small areas with easy access.</p> <p>Advantages are initial small ecological impact and minimal damage to neighboring plants. Normally effective with small populations and/or where a large pool of volunteer labor is available. Disadvantages include; both tools can be cumbersome and difficult to carry to remote sites, this method can be labor and time intensive, often requires repeated re-treatments to be effective, which could increase the project cost and frequency of disturbance to the treatment area. Could spread invasive plants to other sites if equipment is not cleaned before leaving an infected site.</p>
<p>Clipping and Cutting</p>	<p>“Clipping and Cutting” requires cutting a portion of the invasive plant stem, generally cutting the bole of the tree/plant with cutting tools such as chainsaws, weed wacker/whip/eater.</p> <p>Advantages and disadvantages are similar to the “pulling using tools” method as noted above.</p>
<p>Girdling</p>	<p>For trees (e.g. tamarisk, tree-of-heaven), the main trunk of the trees would be stripped of the bark (consisting of secondary phloem tissue, cork cambium, and cork) around a tree’s outer circumference, causing its death. Death occurs from the inability of the leaves to transport sugars (primarily sucrose) to the roots.</p> <p>Advantages to this treatment method are minimal ground disturbance and effective in killing larger sized trees. A disadvantage is that it takes time for the tree to die and during that time the tree can still produce seed.</p>
<p>Tarping</p>	<p>Invasive plants would be cut back within inches of the ground and opaque thick tarps or pond liners would be staked or weighed down over the treatment area. The tarp(s) would be applied in late spring/early summer and remain for up to 5 months, usually from June to November. This treatment is best used in small areas (less than 0.25 acres) where there is not an intermix of native plants.</p> <p>Advantages to this treatment method are minimal ground disturbance and it has been known to be effective in small areas. Disadvantages are limited size of treatment area, could damage soil microorganisms, and high monitoring needs in high public use areas to ensure the tarp is left in place.</p>
<p>Fire-wilting Method</p>	

Method	Description
Flaming Weed Torch	<p>The weed torch is a treatment method that utilizes a propane torch to kill individuals but not ignite them This treatment is known as flaming, wilting, or blanching and the equipment can be carried by an individual. The weed torch would only be used during times of low fire danger and in areas where there is low potential to carry fire. The most effective application is for the control of small diameter woody vegetation (1 inch in diameter or less) such as French broom, other broom species and gorse, seedlings, and nonwoody grasses and forbs. To reduce potential for wildfire, ‘flaming’ is typically only undertaken when vegetation is very wet- either during or immediately after a rain event, or when vegetation is damp from fog and on low wind days (less than 5 mph is preferable).</p> <p>An advantage to this form of treatment is that it has very minimal environmental impact. A disadvantage is the limited window of opportunity for treatment.</p>
Herbicide Methods	
Hand/Selective	<p>Treatment of individual plants to avoid spraying other desirable plants. There is a low likelihood of drift or delivery of herbicides away from treatment sites. This method is used in sensitive areas, such as near water, to avoid getting any herbicide on the soil or in the water. Specific methods include:</p> <ul style="list-style-type: none"> a) Foliar Application – These methods apply herbicide directly to the leaves and stems of a plant. An adjuvant or surfactant is often needed to enable the herbicide to penetrate the plant cuticle, a thick, waxy layer present on leaves and stems of most plants. These applicators range from backpack sprayer, to hand-pumped spray or squirt bottles, which can target very small plants or parts of plants. b) Spot spraying – Spot spraying is similar to foliar spraying but would be for larger sized plants and/or population of plants. The focus still is on treating individual plants (instead of broadcast spraying) but over a larger area. Applicators would typically be backpack sprayers. Because of the potential to treat larger areas and larger sized vegetation, this method has a higher potential for drift. c) Frill or Hack and Squirt – The frill method, also called the “hack and Squirt” treatment, is often used to treat woody species with large, thick trunks. The tree is cut using a sharp knife, saw, or ax, or drilled with a power drill or other device. Herbicide is then immediately applied to the cut with a backpack sprayer, squirt bottle, syringe, or similar equipment. d) Cut-Stump – This method is often used on woody species that normally resprout after being cut. Cut down the tree or shrub, and immediately spray, paint or squirt herbicide on the exposed cambium (living inner bark) of the stump. The herbicide must be applied to the entire inner bark (cambium) within minutes after the trunk is cut. The outer bark and heartwood do not need to be treated since these tissues are not alive, although they support and protect the tree’s living tissues. The cut stump treatment allows for a great deal of control over the site of herbicide application; therefore, has a low probability of affecting non-target species or contaminating the environment. It also requires only a small amount of herbicide to be effective. e) Cut, Resprout, and Spray or Paint/Daub – Cut 1-2 months prior to

Method	Description
	<p>spraying. Apply herbicide when resprouts are 2-4 feet tall, but most effective in early fall through winter when plant energy is transferred to roots. Herbicide should be applied on dry days and during low winds.</p> <p>f) Stem Injection – Herbicides can be injected into stems using a needle, syringe, or special cutting tools, such as basal injectors or breast height injectors.</p> <p>Advantages include little soil disturbance, highly selective with little risk of drift of herbicide onto non-target species. Disadvantages include very labor intensive and weather conditions must be suitable for herbicide application (and for stem injections, equipment could be expensive).</p>

Depending on the invasive plant species, over time, the amount and concentration of herbicide would likely decrease and the amount of manual treatment could increase as the project enters into a monitoring and management phase with only small pockets needing treatment.

Herbicide Treatment Method

The five herbicides that are considered as treatment options in the proposed action include: glyphosate, triclopyr, imazapyr, aminopyralid, and chlorsulfuron.

Herbicides generally need to be applied with an adjuvant. There are several types of adjuvants including surfactants, non-foaming agents, and colorants. A surfactant, or surface-acting agent, is any compound that is added to an herbicide formulation or tank mix to facilitate and enhance the absorbing, emulsifying, dispersing, spreading, sticking, wetting, or penetrating properties of herbicides. Surfactants are similar to detergents in their action, reducing water surface tension to allow wetting and penetration of the plant tissues. The surfactant helps to achieve optimum herbicide absorption into and adherence from the herbicide onto the plant. Surfactants may also improve an herbicide’s efficiency so that the concentration or total amount of herbicide required to achieve a given effect is reduced, sometimes as much as five- or ten-fold (Tu et al. 2001). In this way, adding an appropriate surfactant can decrease the amount of herbicide applied and lower total costs for invasive plant control (Tu et al. 2001). In some cases, the herbicide would already have the surfactant included, but in other cases, it would be necessary to buy one. Colorants can be added to herbicide solutions to enable spray crews to see where they have sprayed after initial evaporation of the solution. Where herbicides are used the Forest will generally utilize a biodegradable colorant to facilitate visual control of application. This increases efficiency, reduces the amount of herbicide used, and identifies areas to avoid until the plants dry.

Herbicide treatment would comply with local, state and federal pesticide laws and regulations, and would be applied strictly in accordance with the label directions (Best Management Practices (BMP) 5-8). At a minimum, only certified personnel or those under the supervision of a certified applicator would be allowed to use restricted-use pesticides (Forest Service Manual (FSM) 2154.2). Table 3 summarizes the active ingredients, examples of brand names, properties, and general uses of the herbicides that are included as part of the proposed action. All herbicides considered under the proposed action have human health and ecological risk assessments that are posted on the Forest Service website (<http://www.fs.fed.us/foresthealth/pesticide/risk.shtml>).

Table 3. Herbicides considered for use, including examples of trade names, and how they affect plants.

Active Ingredient, examples of brand names, action	Properties	General uses/known to be effective on:
<p>Aminopyralid (e.g. Milestone®, Milestone VM®) Mimics natural plant hormones.</p>	<p>Selective systemic herbicide.</p>	<p>Use for annual, biennial, and perennial broadleaf species.</p>
<p>Chlorsulfuron (e.g. Telar® DF, Glean®, Corsair™) Inhibits amino acid synthesis.</p>	<p>Absorbed by the leaves and translocated throughout the plant.</p>	<p>Use for broadleaf species and grasses.</p>
<p>Glyphosate (e.g. Accord®, Roundup®, Aquamaster®, Rodeo®) Inhibits 3 amino acids and protein synthesis.</p>	<p>A broad spectrum, non-selective, translocated herbicide. Translocates to roots and rhizomes of perennials. While considering non-selective, sensitivities do vary depending on species. Adheres to soil, which lessens or retards leaching or uptake by non-targets.</p>	<p>Most effective on perennial plants when applied in later summer and fall, when plants are entering dormancy (e.g. arundo). Some products have been approved for aquatic environments and can be used when surface water is present(e.g. Aquamaster®, Rodeo®).</p>
<p>Imazapyr (e.g. Aresenal®, Chopper®, Stalker®, Habitat®) Amino acid synthesis inhibitor.</p>	<p>Broad-spectrum, non-selective, pre- and post-emergent herbicide.² Most effective as a post-emergent. Low potential for leaching into ground water. Has low toxicity to invertebrates and is non-toxic to fish, mammals, and birds. It can damage non-target plants, by transfer between root networks.</p>	<p>Used for annual and perennial grasses, vines, brambles, and broadleaf species (e.g. tamarisk). Habitat® been approved for aquatic environments and can be used when surface water is present.</p>
<p>Triclopyr (e.g. Garlon®, Access®) Mimics the plant hormone auxin, causing uncontrolled plant growth.</p>	<p>Selective systemic herbicide.</p>	<p>Use to control woody and herbaceous broadleaf plants (e.g. tree-of-heaven). Has little or no impact on grasses. Product(s) has been approved for aquatic environments and can be used when surface water is present.</p>

Restoration

To ensure treated areas are not re-invaded with invasive plant species, restoration activities may be required. Restoration is a critical component to invasive weed management (Masters et al. 1996; Masters and Shelly 2001; Brooks et al. 2004). Treatment areas with gaps and bare soil would be open and vulnerable to further invasion of the same or other invasive plant species with no additional work. In addition, invasive plant removal on steep slopes could decrease slope stability.

Where invasive plant treatment occurs in the high water areas along the drainages, it is unlikely active restoration work would be required. Riparian vegetation, when given an opportunity, appears to re-establish in these areas without any additional work. Areas where flood waters have been eliminated or do not exist, or where receding flood flows do not occur when short-lived riparian plant seed are produced, active restoration may be necessary. This could include seeding (with local native weed-free seed), planting (where the native plant seed would be collected from a local seed source), and/or mulching (with weed-free material). Minimal site preparation would be expected (e.g. with seeding, use a hand rake or similar tool). Weed-free straw or other mulching may be applied. Any live vegetation would be planted with hand tools.

Monitoring

Monitoring is an important aspect of Integrated Weed Management. Annual monitoring reports would be completed for the treatment sites (e.g. location (using a GPS), target invasive species, size of treatment area, method of treatment, season of treatment, and if herbicides were used, the name of the herbicide and the amount used in that treatment site). Treated sites would be reviewed annually to determine if re-treatment and/or restoration areas would be necessary. The individual monitoring reports for newly found populations of invasive plant species that are classified as undesirable, noxious, harmful, injurious, or poisonous would be completed on the Natural Resource Information System (NRIS) Noxious Weed Inventory Form or modified to meet national monitoring data needs.

Monitoring would also occur in sensitive environments (e.g., threatened, endangered and/or Forest Service sensitive species habitat, heritage resource sites) during herbicide applications or other treatment methods in order to detect and evaluate unanticipated effects (FSM 2150).

All surveys and monitoring would be documented in the project files. Monitoring is intended to determine the effectiveness of treatment, quickly treat new populations, monitor and possibly provide adaptive management based on unanticipated effects, and monitor the restoration of treated sites.

Access

No new permanent (classified or System) or temporary (unclassified or non-System) roads are being proposed with this action. Any access will generally be by foot or by vehicles using existing roads. Helicopters and all terrain vehicles may be used for transportation in remote areas where access is difficult if approved.

Design Features

General

1. Ground disturbance will be limited to the absolute minimum necessary for effective treatments (Forest Plan, Part 2, p. 100; USFS 2005).
2. An annual pre-operations briefing will be required prior to treatment between the project manager and personnel implementing the project. The briefing will include a review of sensitive resource locations, the identification characteristics of sensitive resources that could be found in the project

area, and all operational details (including safety issues, locations, timing, treatment methods, herbicides approved for use, law enforcement coordination needs, awareness of other project activities in the area, etc). Protective measures (e.g. use of personal protective equipment, proper worker hygiene practices, proper handling of the herbicide) will be emphasized with the use of herbicides. Additional briefings will occur throughout the implementation period to ensure the treatments comply with the project design.

3. Where feasible, select existing hardened surfaces or disturbed sites for staging areas. Just prior to treatment, mark points of access, parking, and treatment areas in resource sensitive areas with signs, staking, and flagging to keep project activities confined to designated areas. Advise all project personnel to conduct work activities within the defined work area in these resource sensitive areas.
4. For small quantities (5 gallons or less), fueling of gas-powered machinery will not occur within 25 feet of any body of water or stream channel to maintain water quality. All other fueling must occur at a minimum of 150 feet from any body of water or stream channel unless prior-approved by a Forest Service hydrologist or biologist.
5. Biological control methods are permitted when their introductions will have no greater than minor adverse effects on the native plant and animal communities.
6. The Herbicide Transportation, Handling, and Emergency Spill Response Plan and spill kit will be on-site when herbicide treatment methods occur. The Plan will include reporting procedures, project safety planning, methods of clean-up of accidental spills, and information including a spill kit contents and location as noted in Forest Service Manual (FSM) 2150 (USFS 1994b), Pesticide-Use Management and Coordination and Handbook (FSH) 2109.14 (USFS 1994a).
7. Equipment used for transportation, storage, or application of herbicides will be maintained in a leak-proof condition.
8. Herbicide containers must be secured and prevented from tipping during transport.
9. To reduce the potential for spills, impervious material, such as a bucket or plastic, will be placed beneath mixing areas in such a manner as to contain any spills associated with mixing/refilling.
10. No herbicide application will occur if precipitation is occurring or is imminent within 24 hours.
11. Immediate control, containment, and cleanup of fluids and herbicides due to spills or equipment failure (broken hose, punctured tank, etc.) will be implemented. All contaminated materials will be disposed of promptly and properly to prevent contamination of the site. All hazardous spills will be reported immediately to the Forest Hazardous Spill Coordinator.
12. Herbicide spray equipment will not be washed or rinsed within 150 feet of any body of water or stream channel. All herbicide containers and rinse water will be disposed of in a manner that would not cause contamination of waters (Best Management Practices [BMP] 5-11³).
13. Mixing and loading of herbicide(s) will take place a minimum of 150 feet from any body of water or stream channel unless prior approval is obtained from a Forest Service hydrologist or biologist.
14. If foliar application is required, the following techniques will be used to minimize drift (BMP 5-13):
15. All label directions including but not limited to wind speed and temperature will be followed.
16. Within Riparian Conservation Areas herbicides will only be sprayed in a downward direction. If target plants are taller than three feet, the plants will be laid down and sprayed.
17. Only aquatically approved herbicides (e.g. Habitat[®], Aquamaster[®], Renovate 3[®]) and low-risk aquatically approved surfactants (e.g. Agri-Dex[®], Class Act[®] NG[®], Dyne-Amic[®], Competitor[®])⁴ will be allowed near streams, lakes and reservoirs.

³ Best Management Practices can be found on the internet at http://www.fs.fed.us/r5/publications/water_resources/waterquality/

⁴ R-11 surfactant has a higher risk of adversely affecting aquatic wildlife species.

Worker and Public Safety

18. Maintain a safety plan specific to this project that includes a job hazard analysis, including personal protective equipment/clothing (PPE) needs (FSH 6709.11; USFS 1999) and addresses risk and standard cleanup procedures (Forest Plan, Part 2, p. 106; FSM 2153.3 [USFS 1994b]; FSH 2109.14,16 [USFS 1994b]).
19. Recently herbicide treated areas should not be reentered, at a minimum, until the herbicide has dried. If the herbicide label specifies a reentry period, treated areas must be posted with signs warning visitors and others not to enter the treated area. The signs should indicate that the area has been treated with an herbicide, what materials were used, and the name and telephone number of a contact person.

Biology Resources

Special Status Wildlife and Plant Species

20. Prior to treatment, surveys will be conducted if needed to determine whether any threatened, endangered and/or Forest Service sensitive plant species are present in the treatment area. Surveys will be conducted during a season when they are identifiable. For annual and geophytic⁵ plant species, surveys will be conducted following a season with adequate precipitation to stimulate germination/flowering. If any threatened, endangered and/or Forest Service sensitive species are present, protective measures may include, but are not limited to the following: (a) flag and avoid; (b) relocation; (c) seasonal restrictions; or (d) treatment methods will be designed to eliminate or minimize negative impacts.
21. Prior to treatment, habitat surveys will be conducted by a qualified wildlife biologist to determine whether habitat is present in the treatment area for threatened, endangered, or sensitive wildlife species. If suitable habitat is found, protective measures may include but are not limited to the following: (a) flag and avoid; (b) seasonal restrictions; or (c) treatment methods will be designed to eliminate or minimize negative impacts.
22. If suitable southwestern willow flycatcher or least Bell's vireo habitat is located in a project area, the suitable habitat will be excluded from treatment during the breeding season (vireo March 15-Sept. 15 and flycatcher May 1-Aug. 31). If the removal of invasives from the suitable habitat will render the habitat unsuitable for a period of time, additional consultation with the US Fish and Wildlife Service (USFWS) will be required prior to treatment.
23. The occurrence of federally listed (threatened, endangered, and/or proposed) species that had not been identified and consulted with US Fish and Wildlife Service (USFWS) earlier may require additional analysis, and re-initiation of consultation.
24. Conduct on-site environmental training to aid workers in recognizing and avoiding special status species that may occur in the project area.
25. If any of these species are observed in the project area during implementation, work in the area that could adversely impact the species should stop and the Forest Service biologist or designee should be notified immediately to determine appropriate action.
26. In the event of the change in a plants and/or wildlife protection status to becoming threatened, endangered, or Forest Service sensitive, additional analysis will be completed to determine potential impacts. Reinitiating US Fish and Wildlife Service consultation will occur, if applicable.

⁵ A geophyte is an herbaceous plant with an underground storage organ. Storage organs are reserves of carbohydrates, nutrients, and water, and may be classified as bulbs, corms, tubers, rhizomes, tuberous roots, and enlarged hypocotyls.

Invasive Plant Species

27. To reduce seed spread, disposal of invasive plants removed will be as follows: If no flowers or seeds are present, pull the plant and place it on the ground to dry out only if species is not rhizomatous and there is no potential for re-sprouting. If flowers or seeds are present and have the potential for the seed to be widely dispersed during treatment (e.g. Spanish broom, eupatory), remove the flowering head and place in container then pull the plant, and place in an appropriate container for disposal.
28. Areas with bare soil created by the treatment of invasive plants will be evaluated for restoration to prevent further infestations by the same or new invasive plant(s). Whenever possible, protect non-target vegetation in order to minimize the creation of exposed ground and the potential for re-infestation. A Forest Service botanist will be consulted prior to any restoration implementation.
29. Vehicles and all equipment must be washed before entering project site if coming from other sites with invasive plant infestations.
30. Certified weed-free mulches (or rice straw and mulch), and local weed-free seed sources will be used in restoration or soil stabilization efforts (Forest Plan S6, Part 3, p. 5; USFS 2005).
31. Efforts will be made to insure that seeds and/or vegetative propagules⁶ of invasive plants will be removed from clothing and equipment prior to leaving the treatment site.
32. Transport of removed invasive plants with seeds or vegetative propagules will occur in enclosed disposal containers, or in an enclosed vehicle.
33. Invasive plants to be disposed of off-site will be taken to a facility (i.e., landfill or dumpster) that contains the disposed items.
34. If burning of removed invasive plants is to occur, burn pile areas will be monitored the following year to assess potential needs for revegetation or additional invasive plant removal treatments.
35. All staging, parking and burn pile areas will be located away from known areas with noxious plant occurrences.
36. Where appropriate, barriers will be installed to limit illegal OHV activity after treatment is complete. Examples of barriers are large rocks, soil berms, and cut woody vegetation.

Wildlife Species

37. All trash generated from this project will be collected and properly disposed of on a daily basis. Upon completion of the project, all unused material and equipment shall be removed from the site.
38. To avoid attracting opportunistic predators such as coyotes, domestic and feral dogs and cats, opossums, skunks and raccoons, all food and trash must be appropriately stored in closed containers and removed from the project site at the end of each day.
39. Avoid adverse impacts to nesting birds where practicable per Migratory Bird Treaty Act (MBTA). Appropriate exclusionary buffers will be established around nests, if located during a pre-project walk-through of the project area by a wildlife biologist.
40. In sensitive amphibian areas, vehicles and equipment will be parked or removed from the habitat before sunset.
41. Whenever possible, vegetation piled on site for later removal or burning should be treated as soon as possible after piling in order to minimize colonization by wildlife. Prior to removing or burning brush piles, disturb the piles of brush and pull them apart slightly to encourage animals to move out of the piles (e.g. salamanders, lizards, small mammals). Depending on the plant species, some of the cut vegetation could be used as vertical mulch to minimize illegal off-highway vehicle (OHV) activity.

⁶ A propagule is a structure (as a cutting, a seed, or a spore) that reproduces a plant sexually or asexually.

42. Protect known active or inactive raptor nest areas from project activities during the nesting season. A no-disturbance buffer around active nest sites will be required from nest-site selection to fledging (Forest Plan S18, Part 3, p. 7; USFS 2005).
43. Pets shall not be allowed on-site during the project unless properly restrained and approved by the Responsible Official.
44. Avoid establishing staging areas or base camps within threatened, endangered, and/or Forest Service sensitive species suitable or occupied habitats and riparian areas where practicable.

Hydrology Resource

45. Appropriate Best Management Practices (BMPs) will be followed throughout the project to reduce or prevent negative impacts to non-target resources. BMPs include the following:
46. Hand crews will stay out of flowing or ponded water whenever possible.
47. If hand removal requires entry into flowing or ponded water, keep the time in the water to a minimum.
48. If crews must enter flowing or ponded water in multiple drainages the same day, boots and equipment will be treated to prevent transfer of undesirable invasive plants, animals or diseases from drainage to drainage.

Special Land Designations

Special Interest Areas

49. Aliso-Arrastre Middle and North is a Special Interest Area. It is known for its heritage resource values. Any work performed in this section will require careful coordination with the Forest Archeologist.

Wilderness Areas

50. District Ranger will determine the appropriate locations for temporary remote base camps and helicopter drop-off and haul sites, if necessary, to facilitate invasive plant removal or treatment. Locations will be based upon concentrations of invasive plants, public use, natural resource and wilderness resource concerns.
51. Operation of work crews and equipment will be limited to weekdays (Monday-Friday) and non-holidays during daylight hours. Avoid other heavy use periods, such as spring breaks.
52. Prior to project implementation, the wilderness ranger and wilderness volunteers will be sufficiently trained to identify the most aggressive invasive species (e.g. tamarisk, arundo, tree-of-heaven, castorbean) and other species as the Forest Botanist determines to be of concern. This knowledge will provide increased information about the presence and distribution of these species so that treatment plans and/or actions can be taken or modified.
53. The Wilderness Ranger will be periodically consulted during the implementation of this project and will be adequately informed about the approved treatment actions. The Wilderness Ranger, in part, will serve as an observer and monitor for the implementation project manager.

Scenic Resource

54. Where practical, piles prepared for physical removal, burning, or chipping will be located away from established trails or highly visible areas, such as within areas of concentrated public use. If this is not practical, pile in the most suitable locations and complete the disposal phase at the earliest opportunity.
55. When lop and scattering large plants, place the material away from established trails or roads.

56. For those areas greater than one acre in size that do not naturally rehabilitate, plant and/or seed with native vegetation.

Recreation Resource

57. Within areas of concentrated public use and developed recreation sites, implementation of this project will be limited to weekdays and non-holidays (Monday-Friday) during daylight hours. Avoid other heavy use periods such as spring and summer school breaks.
58. Motorized equipment will be equipped with appropriate mufflers and spark arrestors in good working condition to minimize noise levels and fire risks.
59. Temporary public use closures are permitted in areas where the public and workers commingle and public safety is compromised because of operating equipment or hand tools. The District Ranger will monitor potential conflicts and act accordingly.
60. In advance of initiating treatment work, interpretive signing will be placed in developed recreation sites and areas of concentrated public use. Interpretation will be presented in English and Spanish and will focus on the purpose, need and the environmental benefits of invasive weed treatments. If herbicides are included as part of the treatment, a list of the herbicides to be used, treatment dates, and name and phone number of Forest contact will be provided at appropriate sites, a minimum of one week in advance of herbicide treatment, along with other access points to these treatment areas and appropriate Forest offices.
61. Staging areas for equipment and crew congregation will be located in areas where there is minimum conflict with public use and other resources. These should be some distance from the stream above the high water mark and in areas which are not highly visible or heavily used. Existing disturbed areas should be used if available. Each staging area should accommodate vehicle parking to minimize the impacts of work vehicles and equipment in developed recreation sites. Employees should be car pooled from off the Forest if practicable. The District staff will monitor these impacts and the Ranger will impose further restrictions if necessary.
62. Temporary sanitary and trash facilities may be required to accommodate workers and/or trash will be packed out after each work day to avoid adversely impacting public sanitary and trash collection facilities.

Land Use

63. In areas where treatment adjoins residential private lands the use of equipment and work crews will be limited to weekdays (Monday-Friday) between the hours of 7:00AM to 7:00 PM. Prior to project implementation, the project coordinator shall coordinate with the residents to ensure minimum noise and disturbance levels are considered.
64. The District Staff will make every reasonable effort to acquire voluntary written agreements with adjoining private land owners to access and treat invasive weeds on these lands if they are a threat to the National Forest. Agreements should ideally be for the duration of this project (15 years) to ensure its maximum effectiveness. If Agreements cannot be obtained, the District Staff will take reasonable effort to reach an understanding with the private landowners regarding the locations of applicable private property boundaries. These boundaries will be flagged immediately prior to implementing project work to avoid possible trespass onto private lands. Surveying to cadastral survey standards is not planned.

Heritage Resources

65. Prior to treatment, archaeological surveys will be conducted if needed to determine whether any cultural and/or historic resource sites are present in the treatment area that could be adversely impacted by the treatment. .

66. If unanticipated heritage resource sites that could be adversely affected by the treatment are found during implementation, all work shall stop in the area that could affect the site(s). The Forest Heritage Program Manager will be contacted immediately, and work will not precede in this area without his/her approval.
67. Protect the use of known sensitive traditional tribal use areas (Forest Plan S61, Part 3, p. 13; USFS 2005).
68. All known historic properties within an Area of Potential Effect (APE) shall be clearly delineated with appropriate buffers prior to implementing any associated activities that have the potential to adversely affect historic properties. All proposed ground disturbance shall avoid historic properties. Avoidance means that no activities associated with an undertaking that may adversely affect historic properties shall occur within a historic property's boundaries, including any defined buffer zones [unless specifically identified in the First Amended Regional Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region California State Historic Preservation Officer, And Advisory Council On Historic Preservation (2001)]. Portions of undertakings may need to be modified, redesigned, or eliminated to properly avoid historic properties.
69. Buffer zones may be established to ensure added protection where the Forest Heritage Program Manager or other professional archaeologist determines that they are necessary.
70. When any changes in proposed activities are necessary to avoid historic properties (e.g., project modifications, redesign, or elimination; removing old or confusing project markings within site boundaries; revising maps or changing specifications), these changes shall be completed prior to initiating any activities.
71. Heritage resource monitoring may be used to enhance the effectiveness of protection measures in conjunction with other measures.
72. The Forest Heritage Program Manager may provide written approval for any additional work within the boundaries of historic properties, under carefully controlled conditions.

Fire/Fuels

73. Burn piles will be burned in compliance with Forest approved project specific burn plan(s).

Air Resource

74. Prior to prescribed fire activities, the Smoke Management Plan shall be prepared, approved by the SCAQMD, and made part of the Prescription Burn Plan if piles are burned. Fire perimeter observers shall record smoke conditions during the burn. The weather observations used to establish the burn status prior to the burn shall be recorded and maintained. The deployment of posted signs and notices to the potentially impacted urban interface and general public shall be inspected, maintained and documented to assure proper notification to the public. The Smoke Management Plan will, at a minimum, include the following:
 75. Conduct a prescribed burn only when the meteorological conditions are expected to disperse the emissions away from urban receptors and only on approved burn days by the SCAQMD.
 76. Visibility protection of the adjacent Class I wilderness will be provided in part through its inclusion as a smoke sensitive area in the required Smoke Management Plan (which will be part of the Prescribed Burn Plan). Other smoke sensitive areas include private land, occupied recreation sites, and highways.
 77. Identify and address visible smoke column emissions and general smoke nuisance concerns on a site and time specific manner.
 78. Visual smoke observations are monitored on site during burn implementation to insure that smoke dispersion remains within identified parameters as stated in the smoke management plan.

79. Safety signing, lights, and other devices are employed along traffic routes if piles are large enough to affect visibility on travel routes, as stated in a smoke management plan.
80. For areas below 3,000 feet in elevation the following features will be included in the design: driving speeds on native surface roads will not exceed 15 miles per hour; native surfaced roadways will be watered to suppress dust when needed to mitigate for project effects, and, track-out onto public roadways will be monitored and removed if necessary.
81. Fuel moisture evaluation of the proposed burn piles shall be performed and recorded by the Forest Service. Burning would not be schedule or initiated unless fuel moisture content is within the parameters established in the burn prescription.
82. A residual mop-up plan shall be incorporated with the burn prescription with the objective to stop all smoke and smoldering