Invasive Plant Treatment Project on the San Gabriel River Ranger District, Angeles National Forest and San Dimas Experimental Forest

Purpose and Need and Proposed Action Statement

Introduction

The San Gabriel River District Ranger on the Angeles National Forest and the Project Leader for the San Dimas Experimental Forest, are proposing to initiate an invasive plant treatment project for the San Gabriel, Big and Little Dalton, and San Dimas drainages. The project is located in portions of T 1N, R8W, R9W, R10W, and R11W; T2N, R8W, R9W, R10W, and, R11W; and, T3N, R8W, R9W, and R10W, SBM in Los Angeles and San Bernardino Counties, California.

Background

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 invasives can change ecosystem processes such as hydrology, fire regimes, 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 (Cal-IPC).

The San Gabriel River Ranger District has been implementing an arundo (*Arundo donax*) eradication project since 1998. The District has been successful in controlling the expansion of the populations, but the invasive plant species has not been completely eradicated from the District and needs continued treatment. The original decision is over 10 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.

Current and Potential Future Conditions

Since the 1997 Eradication of *Arundo donax* Environmental Assessment was published and Decision Notice was signed, several invasive plant species have invaded and/or expanded in the San Gabriel, Big and Little Dalton, and/or San Dimas drainages, including 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* sp.), tree tobacco (*Nicotiana glauca*) and gorse (*Ulex europaeus*). In addition, there are still small 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* 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 plant 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 increase in changes in the intensity and frequency of wildland fires. After wildland fires, 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 2005, Part 1, p. 41).

Management Direction

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 for 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 invasives.

The National Fire Plan *10-year Comprehensive Strategy Implementation Plan* (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 (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 (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); and 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 tree-of-heaven, tamarisk, and arundo in San Gabriel, Big and Little Dalton, and San Dimas canyons.

Desired Condition

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

Purpose and Need for Action

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

- Eradicate, control, contain, and/or suppress[1] existing invasive plant species in the San Gabriel, Big and Little Dalton, and San Dimas canyon drainages 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 tree-of-heaven, tamarisk, and arundo).
- Cooperate with state and county agencies and private landowners interested in managing invasive weeds within the project area.

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

- 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.

[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..

- 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 Responsible Officials (San Gabriel River District Ranger and San Dimas Experimental Forest Project Leader) with the Forest Service are proposing 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 (such as tree-of-heaven, tamarisk, and arundo) in the San Gabriel, Big and Little Dalton, and San Dimas canyon drainages from the Forest boundary to their headwaters (see Figure 1 for a map of the project area). The width of the project area would include these channels and average 100 to 350 feet from the edge of the high water mark (with areas that go beyond a quarter mile from the edge of the high water mark). Treatment areas would include non-National Forest System lands if the landowners/managers would like to enter into a cost-share agreement authorized under the Wyden Amendment. The project would be a long-term commitment for invasive weed management in the project area due to new species entering into the project area, reintroductions of treated species, and expansion of existing populations. 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.

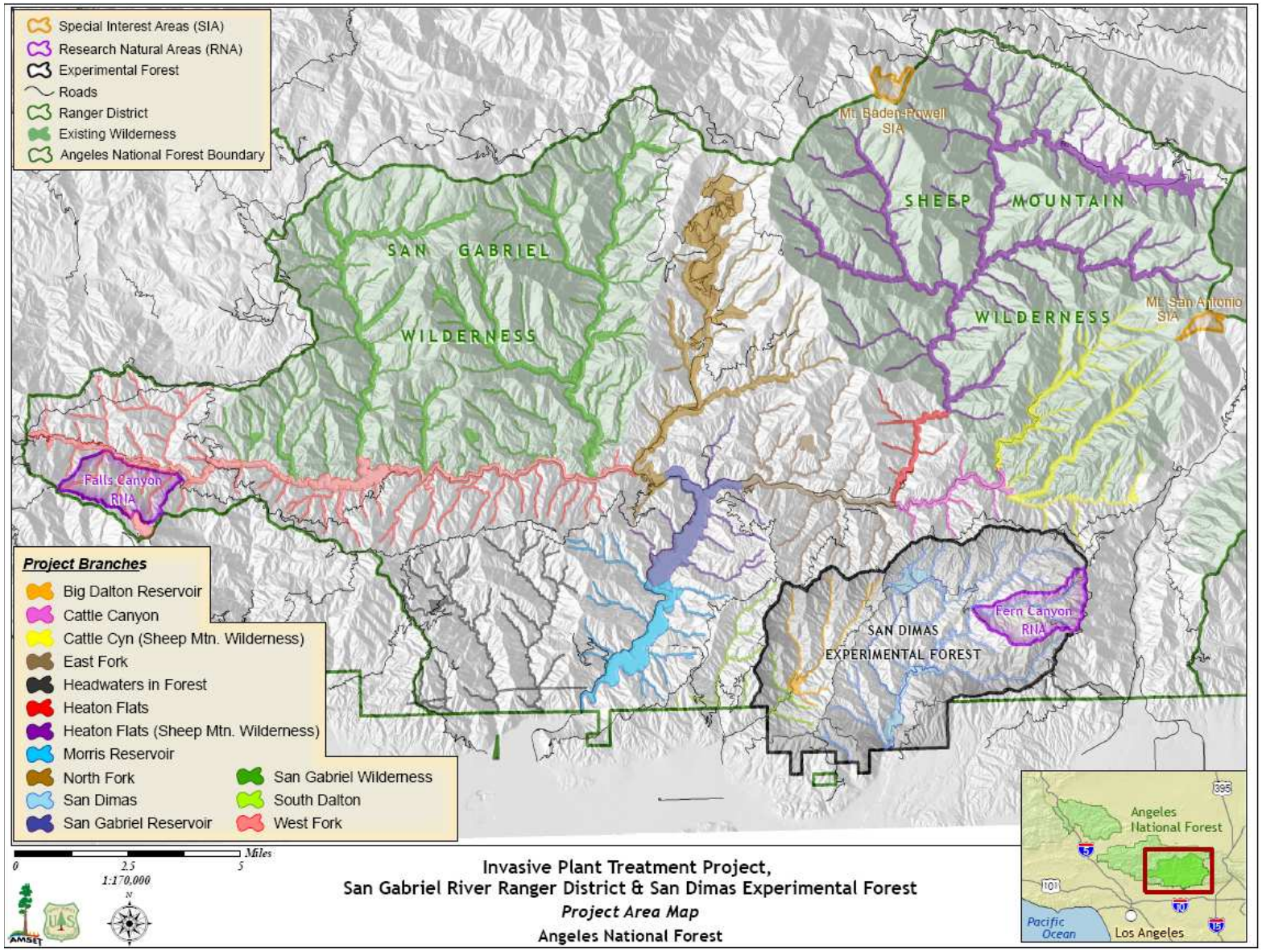

Figure 1. Project Area Map

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 weeds 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. For 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, these changes will be part of the proposed action as long as the scope of the treatment and the effects are within those addressed in this 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 planning 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 "broadcast" (including aerial) applications of herbicides; would not allow herbicide use during pre-emergence of vegetation (preventing the invasive weed from germinating); and, would not allow large and heavy equipment into the treatment areas (e.g. large bull dozers). The use of any new herbicides, broadcast applications, pre-emergent herbicide application, or use of large and heavy equipment would require new NEPA analysis, public involvement, documentation, and decision. Figure 2 provides a decision tree that incorporates the adaptive management strategy approach.

Decision Key/Tree

Step 1A	Determine the best treatment method based on the invasive plant species present, the size of the infestation, and the location of the population. Determine the treatment strategy (eradicate, control, contain, or suppress). Can the treatment strategy be achieved using non-herbicide treatment methods (i.e., can the treatment strategy be manual and/or mechanical, such as a chainsaw, or should biological control be considered)? Yes: Continue to Step 1B. No: Continue to Step 2.
Step 1B	Does the non-herbicide treatment method require some form of ground disturbance (e.g., manual and/or mechanical) Yes: Continue to Step 4 No: Continue to Step 9
Step 2	Have any conditions within the treatment area changed from what is described in this EA? Does the treatment area have an invasive species not specifically addressed in the EA? Is the proposed herbicide use (i.e., concentration or application method) different that what was proposed in the EA? Yes: Continue to Step 3. No: Continue to Step 6.

Step 3	Is the herbicide treatment method analyzed in this EA (e.g., foliar herbicide application)? Yes: Continue to Step 4. No: Choose another treatment method OR conduct additional NEPA.
Step 4	Are there any unforeseen changed conditions (e.g. disturbance, new federal listing[2] of an animal and/or plant species) from what was addressed in this EA,)? Yes: Conduct additional NEPA to address the area of change OR abandon treatment in that area. No: Continue to Step 5A.
Step 5A	Is the treatment site in a designated Wilderness Area? Yes: Continue to Step 5B. No: Continue to Step 6.
Step 5B	If action is not taken, would the natural processes of the Wilderness Area be adversely affected? Yes: Continue to Step 6. No: Continue to Step 5C.
Step 5C	Is there an imminent risk of invasive plants spreading outside the Wilderness Area? Yes: Continue to Step 6. No: Monitor invasive plant infestation.
Step 6	Are special status[3] fish, wildlife or plant species, designated critical and essential fish habitat, or cultural resources present? Yes: Use treatment methods that pose low to negligible risk to fish, wildlife, and plant species and cultural resources. Examples include use of selected herbicides (e.g. aquatic imazapyr, or aquatic glyphosate) manual or mechanical treatments, in conjunction with the appropriate design features and or mitigation measures that are part of the NEPA decision for this document. No: Continue to Step 7.
Step 7	Are surveys required for special status species? Yes: Conduct necessary surveys during the appropriate time of year prior. Evaluate results of surveys. If surveys illustrate a risk to the species surveyed, use treatment methods that pose low or negligible risk to fish, wildlife, and/or plant species. Examples include use of selected herbicides (e.g. aquatic imazapyr or aquatic glyphosate) manual or mechanical treatments, in conjunction with the appropriate design features and/or mitigation measures that are part of the NEPA decision for this document. No: Continue to Step 8.
Step 8	Is the proposed treatment within the maximum annual treatment acres for that branch? Yes: Continue to Step 9. No: Conduct additional NEPA on additional treatment areas OR abandon treatment for that year.

[2] Federal listed species is a threatened, endangered, or proposed species protected under the Endangered Species Act.
[3] Special Status is defined as threatened, endangered, and proposed species, Forest sensitive species, management indicator species, or other rare or endemic species of concern.

Step 9	Document treatment methods for each treatment area each year. If treatment is based on the adaptive management approach, prepare a document demonstrating how the change is within the scope of the NEPA decision for this document. Documentation would be a letter to the files and available for public review upon request. Continue to Step 10.
Step 10	Implement invasive plant treatment and all the appropriate design features and/or mitigation measures that are part of the NEPA decision. Is active restoration necessary? Yes: Implement appropriate restoration strategies as outlined in the proposed action. Continue to Step 11. No: Allow passive restoration to revegetate treatment site. Continue to Step 11.
Step 11	Implement monitoring framework as outlined in the proposed action. Are invasive plants present at the time the treatment area is monitored? Yes: Continue to Step 1. No: Continue to Step 12.
Step 12	Implement monitoring framework for restoration as outlined in the proposed action. Is the restoration strategy effective? Yes: Healthy, native plant communities and function have been restored. No: Continue to Step 10.

Figure 2. Decision key/tree for invasive plant treatments.

Eradicate, Control, Contain, and/or Suppress

Presently invasive plant species known to exist within the project area include arundo, tamarisk, tree-of-heaven, Spanish broom, castorbean, fountain grass, eupatory, English ivy, cape ivy, periwinkle, and tree tobacco. It is anticipated these species cover approximately 3,200 acres within the project area along 145 miles of channel. Many of these species are quick invaders to new areas, especially 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 1-5 percent annually.

Most treatment strategies would be intended to eradicate or control the invasive plant species. In rare circumstances (dependent on location, invasive plant species, and for biological control), the strategy to manage the 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. 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 organisms and their habitats (Colorado Natural Areas Program 2000).

Treatment Methods

Proposed treatment methods include biological control (e.g. insects, pathogens), manual/mechanical, flaming torch method, and herbicide. These treatment methods are divided up further into specific types of treatment methods and are summarized in Table 1. 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).

Depending on the size of the treated material (invasive weeds), additional treatment of this material (biomass) could include pile and burning adjacent to or at the treatment area (at a minimum, outside the 25-year floodplain), drag and remove off site (if vehicle access is adjacent to treatment area), or helicopter sling load material out 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. Sprayed tamarisk plants will not be burned or cut for two growing seasons after treatment, because disturbing the treated plants can induce some to resprout.

The selection of treatment method would be dependent on: time of year; severity of infestation; presence of sensitive resource areas (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 1. Summary of treatment methods proposed.

Method	Description
Biological Control Method	
Biological Control Agents	Biological control agents are normally insects or pathogens that attack specific invasive plant species. Prior to allowing use, US Department of Agriculture, Agriculture Plan Health and Insect 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 Use of this method would comply with the APHIS NEPA document and decision. 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.

Method	Description
Manual/Mechanical Methods	
Hand Pulling	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. 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 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.
Pulling Using Tools	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. 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 increases the project cost and frequency of disturbance to the treatment area. Could spread weeds to other sites if equipment is not cleaned before leaving an infected site.
Clipping and Pulling	“Clipping and pulling” requires cutting a portion of the invasive plant stem and pulling it from its substrate, generally the bole of the tree with a plant-pulling tool. Advantages and disadvantages are similar to the “pulling using tools” method as noted above.

Method	Description
Tarping	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. 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.
Fire-wilting Method	
Flaming Weed Torch	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 indiviudal. 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). 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.
Herbicide Methods	
Hand/Selective	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. Hand/selective methods could be implemented under more variable conditions than spot spraying. Specific methods include: 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) 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.

Method	Description
	c) 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 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. d) Cut, Resprout, and Spray or Paint/Daub – Cut 1-2 months prior to 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. e) Stem Injection – Herbicides can be injected into stems using a needle, syringe, or special cutting tools, such as basal injectors or breast height injectors. 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). For immediate herbicide treatment after cutting, coordinating cutting and herbicide application in a timely fashion would be difficult.

Depending on the invasive plant species, overtime, 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 seven herbicides that are considered as treatment options in the Proposed Action include: glyphosate, triclopyr, imazapyr, sulfometuron methyl, aminopyralid, hexazinone, 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 weed control (Tu et al. 2001). In some cases, the herbicide will already have the surfactant included, but in other cases, it will 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.

Herbicide treatment would comply with state and federal pesticide laws, would be applied strictly in accordance with the label directions, and would be applied under the direction of a licensed applicator. Table 2 summarizes the active ingredients, commercial 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 2. 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:
Aminopyralid (e.g. Milestone®, Milestone VM®) Mimics natural plant hormones.	Selective systemic herbicide.	Use for annual, biennial, and perennial broadleaf species.
Chlorsulfuron (e.g. Telar® DF, Glean®, Corsair ™ Inhibits amino acid synthesis.	Absorbed by the leaves and translocated throughout the plant.	Use for broadleaf species and grasses.
Glyphosate (e.g. Accord®, Roundup®, Aquamaster®, Rodeo®) Inhibits 3 amino acids and protein synthesis.	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.	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®).
Hexazinone (e.g. Pronone®, Velpar®) Photosynthesis inhibitor.	It is water soluble and does not bind strongly with soils. Can leave residues.	Controls annual, biennial, perennial and woody species.

Active Ingredient, examples of brand names, action	Properties	General uses/known to be effective on:
Imazapyr (e.g. Aresenal®, Chopper®, Stalker®, Habitat®) Amino acid synthesis inhibitor.	Broad-spectrum, non-selective, pre- and post-emergent herbicide. 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.	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.
Sulfometuron methyl (e.g. Oust®, Oust XP®) Inhibits amino acid synthesis.	Broad spectrum, pre- and post-emergent herbicide.	Use to control grasses.
Triclopyr (e.g. Garlon®, Access®) Mimics the plant hormone auxin, causing uncontrolled plant growth.	Selective systemic herbicide.	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.

Treatment Areas

For analysis purposes, the project area has been divided into fourteen branches and maximum treatment acres and miles have been included in the project design. The branches include Morris Reservoir, San Gabriel Reservoir, West Fork, San Gabriel Wilderness, North Fork, East Fork, Heaton Flats, Heaton Flats-Sheep Mountain Wilderness, Cattle Canyon, Cattle Canyon-Sheep Mountain Wilderness, South Dalton, Big Dalton Reservoir, San Dimas, and Headwaters in Forest. Table 3 shows these branches and the total miles and acres in each branch. Figure 1, Project Area Map, shows the branches within the project area. In general, the proposed action would cap the maximum treatment of the invasive plant species populations and future expansions of these species to 145 miles and/or 3,200 acres annually, depending on funding and staffing.

Table 3. Distances (in miles) and acres by branch name.

Branch Name	Total Acres by Branch	Total Miles by Branch
San Gabriel Drainage		
Morris Reservoir	1,100	23
San Gabriel Reservoir	1,190	16
West Fork	2,690	64
San Gabriel Wilderness	4,720	123
North Fork	2,740	40
East Fork	820	24
Heaton Flats	310	7
Heaton Flats-Sheep Mountain Wilderness	3,970	88
Cattle Canyon	370	8
Cattle Canyon-Sheep Mnt Wilderness	1,210	34
Dalton Drainage		
South Dalton	290	13
Big Dalton Reservoir	260	11
San Dimas Drainage		
San Dimas	1,150	40
Headwaters in Forest	830	35
TOTAL	**21,650**	**526**

It is likely many of these areas would need multiple treatments to eradicate the invasive species from that site. It is anticipated 95 percent of the treatment acres would need reentry for additional treatment annually until the invasive plant species are eradicated, controlled, contained, or suppressed. Depending on the method (e.g. "cut, resprout, and spray") treatments could require a minimum of two entries in any given year.

Treatment Priorities and Maximum Annual Miles/Acres of Treatment by Branch

Table 4 provides the estimated amount (miles/acres) of invasive plants anticipated to occur by priority of treatment within each branch and the maximum annual treatment miles/acres (by treatment type) within each branch. The bottom row provides a total by each category. Priority for treatment, from highest to lowest is as follows: arundo, tamarisk, tree-of-heaven, woody invasive plant species and forbs. It is assumed, with the successful treatment of the invasive plants, the maximum treatment acres would decrease over the life of the project, depending on funding.

Table 4. Maximum annual treatment by invasive plant treatment priorities and treatment type within each branch.

BRANCH NAME (drainage; project miles; acres; % of overlap[4])	Treatment type	Arundo		Tamarisk		Tree-of-Heaven		Woody Invasives		Forb Invasives	
		Approx. Infestation Size in miles/ acres[5]	Maximum miles/ acres treated/ year[6]	Approx. Infestation Size in miles/ acres[5]	Maximum miles/ acres treated/ year[6]	Approx. Infestation Size in miles/ acres[5]	Maximum miles/ acres treated/ year[6]	Approx. Infestation Size in miles/ acres[5]	Maximum miles/ acres treated/ year[6]	Approx. Infestation Size in miles/ acres[5]	Maximum miles/ acres treated/ year[6]
Morris Reservoir (San Gabriel; 23 mi; 1100 ac; 85%)	Herbicide	2/1	0	4/300	<1/50	0	0	7/200	1/20	7/200	4/100
	Combination herbicide/hand/mech-anical treatments		2/1		3/200		0		5/150		<1/25
	Hand treatment		0		<1/50		0		1/30		2.5/75
San Gabriel Reservoir (San Gabriel; 16 mi; 1190 ac; 85%)	Herbicide	3/1	0	3.5/300	<1/50	0	0	3.5/200	<1/20	3.5/200	2.25/100
	Combination herbicide/hand/mech-anical treatments		3/1		2.5/200		0		2.5/150		<1/25
	Hand treatment		0		<1/50		0		<1/30		1/75
West Fork (San Gabriel; 64 mi 2690 ac; 5%)	Herbicide	<1/1	0	0	0	0	0	<1/2	<1/0.5	1/2	<1/1
	Combination herbicide/hand/mech-anical treatments		<1/1		0		0		<1/1		<1/<1
	Hand treatment		0		0		0		<1/<1		<1/<1
San Gabriel Wilderness (San Gabriel; 123 mi; 4720 ac; 100%)	Herbicide	0	0	0	0	0	0	<1/20	<1/5	1/20	<1/10
	Combination herbicide/hand/mech-anical treatments		0		0		0		<1/10		<1/5
	Hand treatment		0		0		0		<1/5		<1/5

[4] Percentage of overlap is the percentage of acres/miles in which 2 or more of the 5 invasive plant categories overlap within the infestation (e.g. 85% of the total acres within the Morris Reservoir Branch overlap and 15% of the infestation area has only one invasive plant category). Overall, overlap of invasive weed categories is estimated at approximately 85%.

[5] Infestation areas are estimates based on local knowledge of the area.

[6] Should new infestations be found where none presently occur, a maximum of 1 mile annually (per branch) would be treated and is incorporated into this analysis.

BRANCH NAME (drainage; project miles; acres; % of overlap[7])	Treatment type	Arundo		Tamarisk		Tree-of-Heaven		Woody Invasives		Forb Invasives	
		Approx. Infestation Size in miles/ acres[8]	Maximum miles/ acres treated/ year[9]	Approx. Infestation Size in miles/ acres[5]	Maximum miles/ acres treated/ year[6]	Approx. Infestation Size in miles/ acres[5]	Maximum miles/ acres treated/ year[6]	Approx. Infestation Size in miles/ acres[5]	Maximum miles/ acres treated/ year[6]	Approx. Infestation Size in miles/ acres[5]	Maximum miles/ acres treated/ year[6]
North Fork (San Gabriel; 40 mi; 2740 ac; 90%)	herbicide	0	0	0	0	1.5/5	<1/1	22/300	2/50	22/300	15/175
	Combination herbicide/hand/mechanical treatments		0		0		1.25/3		18/200		1/25
	Hand treatment		0		0		<1/1		2/50		6/100
East Fork (San Gabriel; 24 mi; 820 ac; 95%)	herbicide	0	0	3/100	<1/25	0	0	3/200	<1/50	3/300	1.5/175
	Combination herbicide/hand/mechanical treatments		0		2/50		0		1.5/100		<1/25
	Hand treatment		0		<1/25		0		<1/50		1/100
Heaton Flats (San Gabriel; 7 mi; 310 ac; 95%)	herbicide	0	0	3/150	<1/25	0	0	3/100	<1/25	3/100	1.5/50
	Combination herbicide/hand/mechanical treatments		0		1.5/75		0		1.5/50		<1/10
	Hand treatment		0		1/50		0		<1/25		1.25/40
Heaton Flats-Sheep Mountain Wilderness (San Gabriel; 88 mi; 3970 ac; 95%)	herbicide	0	0	34/500	10/150	0	0	15/200	3.5/50	15/200	9/125
	Combination herbicide/hand/mechanical treatments		0		17/250		0		8/100		<1/10
	Hand treatment		0		7/100		0		3.5/50		5.5/65

[7] Percentage of overlap is the percentage of acres/miles in which 2 or more of the 5 invasive plant categories overlap within the infestation (e.g. 85% of the total acres within the Morris Reservoir Branch overlap and 15% of the infestation area has only one invasive plant category). Overall, overlap of invasive weed categories is estimated at approximately 85%.

[8] Infestation areas are estimates based on local knowledge of the area.

[9] Should new infestations be found where none presently occur, a maximum of 1 mile annually (per branch) would be treated and is incorporated into this analysis.

BRANCH NAME (drainage; project miles; acres; % of overlap[10])	Treatment type	Arundo		Tamarisk		Tree-of-Heaven		Woody Invasives		Forb Invasives	
		Approx. Infestation Size in miles/ acres[11]	Maximum miles/ acres treated/ year[12]	Approx. Infestation Size in miles/ acres[5]	Maximum miles/ acres treated/ year[6]	Approx. Infestation Size in miles/ acres[5]	Maximum miles/ acres treated/ year[6]	Approx. Infestation Size in miles/ acres[5]	Maximum miles/ acres treated/ year[6]	Approx. Infestation Size in miles/ acres[5]	Maximum miles/ acres treated/ year[6]
Cattle Canyon (San Gabriel; 8 mi; 370 ac; 95%)	herbicide	0	0	2.5/125	<1/25	0	0	2.5/75	<1/25	2.5/75	1.5/50
	Combination herbicide/hand/mechanical treatments		0		1.5/75		0		1/25		<1/5
	Hand treatment		0		<1/25		0		<1/25		<1//20
Cattle Canyon-Sheep Mnt Wilderness (San Gabriel; 34 mi; 1210 ac; 95%)	herbicide	0	0	13/300	1/50	0	0	5/75	1.5/25	5/75	3/50
	Combination herbicide/hand/mechanical treatments		0		11.5/225		0		1.5/25		<1/5
	Hand treatment		0		<1/25		0		2/25		1.5/20
South Dalton (Dalton; 13 mi; 290 ac; 5%)	herbicide	1/100	0	4/20	1/5	0	0	0	0	0	0
	Combination herbicide/hand/mechanical treatments		1/100		2/10		0		0		0
	Hand treatment		0		1/5		0		0		0
Big Dalton Reservoir (Dalton; 11 mi; 260 ac; 75%)	herbicide	<1/<1	0	1/20	<1/5	0	0	5.5/100	1.5/25	5.5/100	3/60
	Combination herbicide/hand/mechanical treatments		<1/<1		<1/10		0		3/55		1/10
	Hand treatment		0		<1/5		0		1/20		1.5/30

[10] Percentage of overlap is the percentage of acres/miles in which 2 or more of the 5 invasive plant categories overlap within the infestation (e.g. 85% of the total acres within the Morris Reservoir Branch overlap and 15% of the infestation area has only one invasive plant category). Overall, overlap of invasive weed categories is estimated at approximately 85%.

[11] Infestation areas are estimates based on local knowledge of the area.

[12] Should new infestations be found where none presently occur, a maximum of 1 mile annually (per branch) would be treated and is incorporated into this analysis.

BRANCH NAME (drainage; project miles; acres; % of overlap[13])	Treatment type	Arundo		Tamarisk		Tree-of-Heaven		Woody Invasives		Forb Invasives	
		Approx. Infestation Size in miles/ acres[14]	Maximum miles/ acres treated/ year[15]	Approx. Infestation Size in miles/ acres[5]	Maximum miles/ acres treated/ year[6]	Approx. Infestation Size in miles/ acres[5]	Maximum miles/ acres treated/ year[6]	Approx. Infestation Size in miles/ acres[5]	Maximum miles/ acres treated/ year[6]	Approx. Infestation Size in miles/ acres[5]	Maximum miles/ acres treated/ year[6]
San Dimas (San Dimas; 40 mi; 1155 ac; 60%)	herbicide	1/100	0	2/40	<1/10	1.5/5	<1/1	25/300	4.5/50	25/300	16/200
	Combination herbicide/hand/mechanical treatments		1/100		1/20		1/3		16/200		4/40
	Hand treatment		0		<1/10		<1/1		4.5/50		5/60
Headwaters in Forest (misc. 35 mi; 830 ac; 95%)	herbicide	0	0	0	0	0	0	10/20	2/5	10/20	5/10
	Combination herbicide/hand/mechanical treatments		0		0		0		5/10		1.5/3
	Hand treatment		0		0		0		3/5		3.5/7
TOTALS (526 mi; 21650 ac;	**herbicide**	**<8.5/ 203**	**0**	**70/1855**	**16/ 395**	**3/10**	**<1/2**	**103/1790**	**19/350**	**103/1892**	**65/1106**
	Combination herbicide/hand/mechanical treatments		**<8.5/ 203**		**43/ 1115**		**2/6**		**64/1076**		**11/190**
	Hand treatment		**0**		**12/ 345**		**<1/2**		**20/365**		**27/597**

[13] Percentage of overlap is the percentage of acres/miles in which 2 or more of the 5 invasive plant categories overlap within the infestation (e.g. 85% of the total acres within the Morris Reservoir Branch overlap and 15% of the infestation area has only one invasive plant category). Overall, overlap of invasive weed categories is estimated at approximately 85%.

[14] Infestation areas are estimates based on local knowledge of the area.

[15] Should new infestations be found where none presently occur, a maximum of 1 mile annually (per branch) would be treated and is incorporated into this analysis.

Restoration

To ensure treated areas are not re-established with invasive plant species, restoration activities may be required. This 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 weed removal on steep slopes could decrease slope stability.

Where invasive weed 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. 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), size of treatment area, method 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 is 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 occur in the Experimental Forest to determine if the treatments have direct and or indirect adverse effects to on-going experiments that were unanticipated. If the effects are found to have or potentially have unacceptable impacts to such experiments, treatment in these areas would stop and only continue if the effects could be reduced to a level that is acceptable to the Project Leader for the Experimental Forest.

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

All surveys/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 be by foot or by vehicles using existing roads. Helicopters may be used for transportation in remote areas were access is difficult.

Design Features

General

1. Ground disturbance will be limited to the absolute minimum necessary for effective treatments (Forest Plan, Part 2, p. 100).
2. 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. At a minimum, the Plan will include:
    a) Application of herbicides will follow all local, state, and federal laws and regulations as they apply to pesticides and all label language for the herbicide will be followed (BMP 5-8).
    b) No more than daily use quantities of herbicides will be transported to the project site.
    c) Equipment used for transportation, storage, or application of herbicides will be maintained in a leak-proof condition.
    d) Herbicide containers must be secured and prevented from tipping during transport.
    e) 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.
    f) No herbicide application will occur if precipitation is occurring or is imminent within 24 hours.
    g) 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.
    h) 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.
    i) Small quantity (3 gallons or less) fueling of gas-powered machinery would 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-approval is provided by a Forest Service hydrologist or biologist.
    j) If foliar application is required, herbicides will not be applied when conditions are windless or when winds are greater than 10 miles per hour (mph).
    k) All hazardous spills will be reported immediately to the Forest Hazardous Spill Coordinator.
3. An annual pre-operations briefing would be required prior to treatment between the project manager and personnel implementing the project. The briefing would 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, etc). Additional briefings will occur throughout the implementation period to ensure the treatments comply with the project design.
4. 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 only in these resource sensitive areas.

Biology Resources

Special Status Wildlife and Plant Species

5. Prior to treatment, surveys will be conducted to determine whether any threatened, endangered and/or Forest Service sensitive wildlife and plant species are present in the treatment area. Surveys will be conducted during a season when they are identifiable. For annual and geophytic[16] 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.
6. 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 consultation with USFWS may be reinitiated.
7. Conduct on-site environmental training to aid workers in recognizing and avoiding special status species that may occur in the project area.
8. If any of these species are observed in the project area during implementation, work in the area should stop and the Forest Service biologist or designee should be notified immediately to determine appropriate action.
9. 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 consultation will occur, if applicable.

Threatened, Endangered, and/or Forest Service Sensitive (TES) Plant Species

10. Threatened and Endangered Plants: spot herbicide application will not take place within 25 feet of Threatened and Endangered plant species. Non-herbicide treatments may be conducted throughout the plant locations with the presence of a Forest Service botanist.
11. Sensitive Plants: spot herbicide application will be allowable within 10 feet of the sensitive plant location, with barriers set up to shield individuals. Non-herbicide treatments may be conducted throughout Forest Service Sensitive plant locations with the presences of a Forest Service botanist.

Invasive Plant Species

12. To reduce seed spread, disposal of invasive weeds removed will be as follows: If no flowers or seeds are present, pull the weed 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 weed, and place in an appropriate container for disposal.

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[16] 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.

13. Areas with bare soil created by the treatment of noxious weed will be evaluated for restoration to prevent further infestations by the same or new invasive weeds. 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.
14. Vehicles and all equipment must be washed before and after entering all project sites. This includes wheels, undercarriages, bumpers and all parts of the vehicle. In addition, all tools such as chain saws, hand clippers, pruners, etc must also be washed before and after entering all project sites. For example, vehicles traveling into contaminated areas are the main dispersal mechanism for yellow star-thistle. All washing must take place where rinse water is collected and disposed of in either a sanitary sewer or a landfill.
    The field project manager will keep written logs: When vehicles and equipment are washed, a daily log must be kept stating:
    - Location
    - Date and time
    - Methods used
    - Staff present
    - Equipment washed
    - Signature of responsible crew member

    These written logs will be turned in to the Forest project manager and Forest Botanist on a weekly basis.
15. 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).
16. Efforts will be made to insure that seeds and/or vegetative propagules[17] of invasive weeds will be removed from clothing and equipment prior to leaving treatment site.
17. Transport of removed invasive weeds with seeds or vegetative propagules will occur in enclosed disposal containers, or in an enclosed vehicle.
18. Invasive weeds to be disposed of off-site will be taken to a facility (i.e., landfill) that contains the disposed items.
19. If burning of removed noxious weeds is to occur, burn piles will be monitored the following year to assess potential needs for revegetation, or additional weed removal treatments.
20. All staging, parking and burn pile areas will be located away from known areas with noxious weed occurrences.
21. Where appropriate, barriers will be installed to limit illegal OHV activity after treatment is complete. Examples of barriers are large rocks, soil berms, cut vegetation.

Wildlife Species

22. Because many wildlife species are highly mobile, a qualified biologist should survey the sites prior to the initiation of work to document the occurrence of any threatened, endangered or Forest Service sensitive wildlife species. If any of these species are observed in the project area during these surveys, treatment methods will be chosen to minimize adverse impacts or these areas will be avoided.
23. To avoid attracting wildlife, all food and trash must be appropriately stored and removed from the project site at the end of each day.
24. Avoid adverse impacts to nesting birds per Migratory Bird Treaty Act (MBTA) when feasible, by avoiding treatment activities during bird breeding season (March 15 –

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

September15) whenever possible. If work is performed during the breeding season, surveys will be performed by a qualified biologist to determine presence/absence of nesting birds prior to undertaking work. Appropriate exclusionary buffers will be established around nests, if present.

25. A limited operating period (February 1 to August 15th) will apply during the breeding season for California spotted owls. Project activities will not be conducted during this period within a quarter mile of active California spotted owl nests and critical nest stands of protected activity centers (PACs) (Forest Plan S20, Part 3, p. 7).
26. In sensitive amphibian areas, vehicles and equipment will be parked or removed from the habitat before sunset.
27. 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. Depending on the species, some of the cut vegetation could be used as vertical mulch to minimize illegal off-highway vehicle (OHV) activity.
28. Protect known active or inactive raptor nest areas from project activities. A no-disturbance buffer around active nest sites will be required from nest-site selection to fledging (Forest Plan S18, Part 3, p. 7).
29. Pets shall not be allowed on-site unless properly restrained and approved by the Responsible Official.
30. Avoid establishing staging areas or base camps within wildlife threatened, endangered, and/or Forest Service sensitive suitable or occupied habitats and riparian areas.
31. If vegetation removal results in the creation of pits, these should be backfilled to avoid the potential for entrapment of reptiles, amphibians and small mammals. Before backfilling, pits must be checked to ensure they do not contain any live reptiles, amphibians or mammals. If any live individuals are found, they are to be removed prior to backfilling.

Hydrology Resource

32. 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:
    a) Hand crews will stay out of flowing or ponded water whenever possible.
    b) If hand removal requires entry into flowing or ponded water, keep the time in the water to a minimum.
    c) Only herbicides and adjuvants approved for aquatic use will be used within the banks of rivers and tributaries.
    d) 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 provided by a Forest Service hydrologist or biologist.
    e) Every effort will be made to prevent herbicide(s) from being introduced into water.
    f) If herbicides must be applied over ponded or moving water, drip cards will be used to prevent herbicides from contacting water.
    g) Herbicides will be colored with a biodegradable dye to facilitate visual control of application.
    h) Herbicide usage will be limited to minimum amount required to be effective.

Worker and Public Safety

33. Maintain a Safety Plan specific to this project, including the use of herbicides that addresses risk and standard cleanup procedures (Forest Plan, Part 2, p. 106; FSM 2153.3; FSH 2109.14,16).
34. Permit only certified personnel or those under the supervision of a certified applicator to use restricted-use pesticides (FSM 2154.2).

Special Land Designations

Research Natural Areas

35. The Pacific Southwest (PSW) Station Director will be notified, via the Research Natural Areas (RNA) Committee, before any eradication work begins within the boundaries of the Fern Canyon or Falls Canyon Research Natural Areas. The San Dimas Experimental Forest manager also will be notified before work begins in Fern Canyon RNA.
36. Staging of crews or materials will not occur within Research Natural Areas except in areas that are already developed (e.g. existing roadbeds) at the edges of the RNAs. No camping is allowed in Brown's Flat in the Fern Canyon RNA.
37. Best Management Practices will be implemented to minimize disturbance of native vegetation and riparian resources within the RNAs so as to retain their value as undisturbed reference sites.

San Gabriel River Wild and Scenic River Eligibility

38. Best Management Practices will be implemented to retain the eligibility of the San Gabriel River (North, East and West Forks) for various potential designations under the Wild and Scenic River Act as noted in the Forest Plan (Part 2, p. 84). This project will be designed to perpetuate free-flowing conditions and proposed classifications and, protect and enhance outstanding and remarkable values and water quality of this area so they will not be adversely affected (Forest Plan S59, Part 2, p. 13).

Inventoried Roadless Areas

39. Best Management Practices will be implemented to retain the wilderness and roadless qualities of several inventoried roadless areas within the project area. This project will be designed to protect these existing qualities so they are not adversely affected.

Wilderness Areas

40. District Ranger will determine the appropriate locations for temporary remote base camps and helicopter drop-off and haul sites, if necessary, to facilitate invasive weed removal or treatment. Locations will be based upon concentrations of invasive weeds, public use, natural resource and wilderness resource concerns.
41. 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.
42. Open campfires and glass containers will not be allowed within the designated wilderness areas (ANF S2, Part 2, p. 79).
43. Prior to project implementation, the Wilderness Ranger 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.

44. The Wilderness Ranger will be periodically consulted during the implementation of this project and will be adequately informed about the approved treatment actions. The Ranger, in part, will serve as an observer and monitor for the implementation project manager.

Visual Resource

45. 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.
46. Lop and scatter large plants so they are placed away from established trails or roads.
47. For those areas greater than one acre in size that do not naturally rehabilitate within one year, plant and/or seed with native vegetation.

Recreation Resource

48. Within areas of concentrated public use and developed recreation sites, operation of equipment and work crews 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.
49. Chipping activities will be located at least 500 feet from established recreation facilities. The District Ranger will determine appropriate locations of chipping sites within areas of concentrated public use.
50. Motorized equipment will be equipped with appropriate mufflers and spark arrestors in good working condition to minimize noise levels and fire risks.
51. If practical, treat invasive weeds within the designated San Gabriel Off-Highway Vehicle (OHV) area during non-use days.
52. If necessary, temporarily close the San Gabriel OHV area to public use to protect the safety of work crews. The closure period will be limited to the minimum time needed to treat the invasive weeds.
53. Work crews driving vehicles within the West Fork of San Gabriel Canyon (West Fork National Scenic Bikeway) will be specifically cautioned about combined bike and hiker use on this road and the need to drive slowly. Information signing will be installed at the West Fork Trailhead to specifically address the increased vehicle dangers of commingling vehicles, bikers and hikers. District employees will monitor potential safety conflicts and act accordingly, including the use of temporary closures to public use, if necessary.
54. 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.
55. In advance of initiating treatment work, interpretive signing will be placed in developed recreation sites and areas of concentrated public use such as West Fork Trailhead, East Fork Trailhead, Oaks Picnic Area, Heaton Flats, San Gabriel OHV Area and other selected areas along the East Fork of San Gabriel River. 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 these sites, a minimum of one week in advance of herbicide treatment, along with other access points to these treatment areas and appropriate Forest offices.
56. 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 outside the

floodplain and in areas which are not highly visible or heavily used. Each staging area should accommodate vehicle parking to minimize the impacts of work vehicles and equipment in developed recreation sites such as the East Fork and West Fork Trailheads. Employees should be car pooled from off the Forest. The District staff will monitor these impacts and the Ranger will impose further restrictions if necessary.

57. Temporary sanitary and trash facilities will 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.
58. Off-highway motorized equipment use will not be permitted for implementing this project, except in the San Gabriel OHV Area. On a case by case basis, the Responsible Officials will determine if other exceptions are needed.
59. Every effort will be made to avoid accidental herbicide spills and the possible exposure of the public to them.

Land Use

60. In areas where treatment adjoins residential private lands such as in the East Fork of San Gabriel, 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.
61. The District Staff will make every reasonable effort to acquire voluntary written agreements with private land owners to access and treat invasive weeds on these lands at no cost to the private property owners. Agreements should ideally be for the duration of this project (15 years) to ensure its maximum effectiveness.
62. 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.

Cultural and Historic Resources

63. Prior to treatment, archaeological surveys will be conducted to determine whether any cultural and/or historic resource sites are present in the treatment area.
64. Known heritage resource sites shall be protected unless found to be ineligible to the National Register of Historic Places (Forest Plan S60, Part 3, p. 13).
65. If unanticipated heritage resource sites 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.
66. Protect the use of known sensitive traditional tribal use areas (Forest Plan S61, Part 3, p. 13).

Fire Resource

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

Air Quality Resource

68. The Smoke Management Plan shall be prepared and made part of the Prescription Burn Plan. 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 recorded, inspected, documented, and maintained to assure proper notification to the public. The Smoke Management Plan will, at a minimum, include the following:
    a) Conduct a prescribed burn only when the meteorological conditions are expected to disperse the emissions away from urban receptors.
    b) Visibility protection of the adjacent Class I wilderness can 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.
    c) Identify and address visible smoke column emissions and general smoke nuisance concerns on a site and time specific manner.