

5.5.4 Invasive Non-native Plants

This section covers the impacts from invasive non-native plants, whose presence or increase in population could be related to VTP projects.

Under California law, certain invasive non-native plants are designated as noxious weeds (California State-listed Noxious Weeds) because they are, or are likely to be:

“troublesome, aggressive, intrusive, detrimental, or destructive to agriculture, silviculture, or important native species, and difficult to control or eradicate” (Title 3 CCR, FAC 5004).

These noxious weeds are ranked by the California Department of Food and Agriculture as A, B, C, or Q (refer to http://www.cdffa.ca.gov/phpps/ipc/noxweedinfo/noxweedinfo_hp.htm for most current list) which denotes the appropriate action (eradication, containment, etc.) to be taken when such species are detected.

In addition to designated noxious weeds, there are invasive non-native plants, termed “non-noxious invasive weeds”, that may have a significant negative impact on natural ecosystems. The nonprofit California Invasive Plant Council (Cal-IPC), in its “California Invasive Plant Inventory, Feb 2006”, maintains a database of these weeds. More information on invasive plants and levels of concern can be found at www.cal-ipc.org/inventory/weedlist.php

5.5.4.1 Significance Criteria

Based on Appendix G of the CEQA Guidelines, an impact from invasive non-native plants would be considered significant if the Proposed Program or the Alternatives would:

- a) Have an adverse effect, either directly or through habitat modification, on any species identified as a special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.
- b) Have an adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or US Fish and Wildlife Service.
- c) Create a public nuisance.

5.5.4.2 Determination Threshold

Impacts from the implementation of the program/alternatives can be beneficial or adverse but would be considered “significant” if:

- a) The net effect in a local project area was a substantial increase in the population of invasives AND this occurred on over 10% of a WHR Lifeform in a bioregion.

Under the Federal Endangered Species Act, activities may not result in the take, direct or indirect, of a special status species. Direct take involves the killing of a special status plant or animal. Indirect take includes the alteration of habitat, harassment, and any other activity that may contribute to the reduction in numbers of a special status species. Only indirect take, due to alteration of habitat by invasive non-native species, is applicable to activities affecting special status species under the Proposed Program or the Alternatives.

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5.5.4.3 Data & Assumptions

The reduction of noxious weeds and non-native invasive plants is an explicit goal of the Proposed Program as stated in Section 1.7 of this EIR. It is assumed that the environmental effects from VTP treatments that are intended to reduce the populations of, or eradicate, non-native plants are addressed in the appropriate subsections of Chapter 5. These VTP treatments targeting invasives will primarily be herbicide applications, but in some instances prescribed fire, grazing or hand treatments will be used.

The impacts from non-native invasive species are analyzed by changes in the structure and composition of these populations in relation to vegetation in the dominant natural plant community types. The effects of VTP projects can be analyzed as long as they are distinguishable from presumed changes in the pre-existing plant community composition without any VTP projects. The additive effects of past actions (such as wildfire suppression, timber harvest, mining, nonnative plant introductions, and ranching) have shaped the present landscape and corresponding populations of special status and invasive species.

For purposes of this analysis, beneficial effects are those where invasive non-native plants are either eradicated or their abundance and diversity are significantly reduced in relationship to native species. A significant beneficial impact would be a major reduction of invasive non-native plant populations sufficient to enable the natural plant community to dominate treated areas within the short-term (2-5 years).

Adverse effects are those where invasive non-native plants are able to either successfully invade or reinvade treatment areas and establish viable populations, either because the treatments prepared hospitable site conditions or left viable populations of invasive non-native plants intact and able to increase in extent. A significant adverse impact would be a major increase in population sufficient to enable invasive non-native plants to dominate the natural plant community within the short-term (2-5 years).

There are several landscape constraints and minimum management requirements (MMRs) described in Chapter 2 which will limit the potential impact from invasive species resulting from the implementation of projects. These include watercourse buffer zones, protection of special status plants & populations through DFG consultation, utilization of an integrated pest management approach, and utilization of only weed free straw and mulch. Additionally, MMR 14 requires that grazing animals used for prescribed herbivory *“be confined to forage that is free of invasive plants or seeds for at least four days before being introduced into project areas”*, which will help to reduce the potential spread of invasives.

The discussion in this section focuses on potential impacts that could occur even if all the constraints and MMRs are adhered to. The botanical resources section has already analyzed the potential impacts to special status plants and communities from program implementation and determined that the impacts are less than significant. The essential question for this section is whether or not the resulting spread of invasive species from particular VTP projects will be enough to push the conclusion regarding botanical resources to ‘significantly adverse’.

5.5.4.4 Direct & Indirect Effects Common to all Bioregions From Implementing the Program/ Alternatives

See Section 4.5.4 for a background on invasive plants in California rangelands.

Invasive non-native plant species can be threats to natural habitats in California. Many of these species colonize habitats following ground disturbance when seeds are introduced from regions where these species are common. The introduction of invasive non-native species into natural habitats is considered a potentially significant impact.

Most notably, invasions have altered fuels, and therefore fire regimes, in many ecosystems. Grasslands previously characterized by frequent surface fires have been converted to shrublands and woodlands as fire suppression has facilitated establishment of native woody plants. Concomitant alterations in fuel have decreased fire frequencies in former grasslands, and have contributed to high-intensity crown fires in some woodlands (McPherson, 2002). Fire can also facilitate non-native plant invasion by reducing competition from native species and increasing the availability of soil nutrients.

Invasive plant species occur predominantly in plant communities subject to periodic natural disturbance such as stream channels, in areas adjacent to development (e.g., coastal bluffs, coastal terrace, valley bottoms), and in areas where native species cover and natural regeneration has been displaced, thereby providing an opening for non-native species invasions (USDI National Park Service, 2005). This situation can occur as a result of some VTP projects, particularly prescribed burning and associated fire lines. An unintended consequence of extensive fuel break construction and maintenance may be the establishment of non-native plant species.

Although there is some variability in numbers and types of invasive plants between bioregions, all bioregions contain non-native plants with the potential to act as seed sources for the spread of invasives. Table 5.5.4.1 shows the number of state-listed invasive species by life form and bioregion.

Noxious Weed Rating	Life Form	Habitat	Bioregion											
			North Coast	Modoc	Sacto Valley	Sierra	Bay Delta	San Joaquin Valley	Central Coast	Mojave	South Coast	Colorado Desert		
A	Forb	disturbed areas, fields, rangelands, grasslands, roadsides	19	14	19	16	22	17	20	13	11	2		
		lakes, ponds, wet areas	2	1	1	3	2	2	4	5	4	2		
		sandy washes			1	1	1		1	1	1	1		
		scrubland	1	1	1	1			1	1	1			
		woodlands/forest (damp areas)										1		
	Grass	disturbed areas, fields, rangelands, grasslands, roadsides				1	1	1	1	1	2	1		
	Shrub	scrubland			3	1	3	3		2	3	3		
		lakes, ponds, wet areas							2					
		disturbed areas, fields, rangelands, grasslands, roadsides	19	9	26	19	28	18	25	13	19	5		
		wet meadows, riparian	3		3	3	2	4	2	1	3	1		
B	Forb	sandy washes		3				1	3	1	1			
		scrubland	1		1	1	1							
		woodlands/forest (damp areas)	1				2	1	1					
		cultivated				1								
		Grass	disturbed areas, fields, rangelands, grasslands, roadsides	9	3	8	10	9	7	6	8	8	6	
	Shrub	scrubland	2	2	2	2	3	1	2	1	2			
		lakes, ponds, wet areas	1		1	1	1	1	1	1	1	1		
		woodlands/forest (damp areas)	1	1	5	3	3	4	4	3	5	2		
		C	Forb	disturbed areas, fields, rangelands, grasslands, roadsides	9	3	10	10	8	10	8	9	7	2
				wet meadows, riparian	6		8	6	7	7	7	6	6	1
sandy washes				1										
scrubland	1				1	2	1	1	1	1	1			
		woodlands/forest (damp areas)	1			1	1	1	3	2	2			
		parasitic	1	1			1	1	1	1	1	1		
		Grass	disturbed areas, fields, rangelands, grasslands, roadsides	3	2	4	4	7	4	5	3	5	2	
		Shrub	scrubland	1		1	1	1	1	1	1			
			woodland, forests	1		1	1	1	1	1	1	1		

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	Tree	woodlands/forest (damp areas)				1	1	1	1	1	1	
Q	Forb	disturbed areas, fields, rangelands, grasslands, roadsides	1		1	1	2	2	6	4	5	
		wet meadows, riparian	2		2		3	2	3	1	3	
		sandy washes	1	1	1	1	1	1	1	1	1	1
		woodlands/forest (damp areas)							1			
		parasitic						1				
	Grass	disturbed areas, fields, rangelands, grasslands, roadsides					1		2		1	
		wet meadows, riparian							1			
	Shrub	scrubland			1		1	1	1		2	
	Tree	woodlands/forest (damp areas)					2	2			2	
		Habitat Total	87	49	102	92	117	97	117	82	101	31

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Effects from Fuel Break Construction and Maintenance

Disturbance is considered one of the primary factors promoting non-native invasion (Rejmanek, 1989, Hobbs and Huenneke, 1992), and a number of studies have documented an association of non-native plant species with disturbed areas similar to fuel breaks, such as logging sites, roads, trails, and pipeline corridors (D'Antonio, 1999).

In many cases, non-native species are well adapted to fire and can invade fire-prone ecosystems, particularly when natural fire regimes have been altered through fire suppression, increased human-caused ignitions, or by feedback effects from changes in plant species composition (D'Antonio and Vitousek, 1992, Brooks et al., 2004). Merriam et al., 2006 conducted a study of plant species composition on fuel breaks in a variety of habitats around California. They found that non-native plants were present in 49% of the study plots, but differed significantly between vegetation types. Fuel breaks in coastal scrub habitats had the highest relative non-native cover (68.3% +/- 4.0%), followed by chaparral (39.0% +/- 2.4%), oak woodland (25.0% +/- 2.5), and coniferous forests (4.0% +/- 1.1%) (Merriam et al., 2006).

Fuel breaks thinned with rubber-tired logging equipment and chainsaws had significantly lower relative non-native cover than fuel breaks constructed by either bulldozers or hand crews. It is apparent that bulldozers scraping off the duff layer and/or topsoil created conditions favorable to invasives, but why non-native cover was higher in fuel breaks constructed by hand crews is not so clear. The study found that environmental variables significantly associated with non-native species presence and abundance, including overstory canopy, litter cover, and duff depth, were significantly lower on fuel breaks than in adjacent wildlands. These findings suggest that fuel break construction and maintenance strategies that retain some overstory canopy and ground cover may reduce the establishment and widespread invasion of non-native plants (Merriam et al., 2006). It also suggests that fuel break maintenance projects may need to include noxious weed eradication as an integral component.

Other relevant conclusions of their study are that non-natives become increasingly dominant over time and may thrive on fuel breaks because they can more easily tolerate frequent disturbances caused by fuel break maintenance. Fuel breaks may act as points of introduction for non-natives because they receive external inputs of nonnative seeds through vehicles, equipment, or humans traveling on them (Schmidt, 1989; Lonsdale and Lane, 1994). Equipment may disperse the seeds of non-native plants into fuel breaks during construction and maintenance. The establishment of alien plants within fuel treatments is a serious concern because many treated areas extend into remote, pristine wildland areas. If alien species can establish a seed source in fuel breaks, adjacent wildland areas might become be more susceptible to widespread invasion, particularly following widespread disturbances such as natural or prescribed fires (Merriam, Keeley & Beyers, 2006).

Effects from Prescribed Burning

Fire can be used to either control invasive species or to restore historical fire regimes. However, the decision to use fire as a management tool must consider the potential interrelationships between fire and invasive species. Historical fire regimes did not occur in the presence of many invasive plants that are currently widespread, and the use of fire may not be a feasible or

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appropriate management action if fire-tolerant invasive plants are present (Brooks & Pyke, 2001). The use of prescribed burning to reduce non-native plant populations can be complicated by the positive effect of fire on many invasive plants, and the subsequent effects of invasives on post-fire establishment by native species. In a series of controlled burns in Sequoia Kings Canyon National Park, Keeley and others (2003) found that non-native species respond positively to fire in conifer forests, and this response is greater under higher intensity fires (D'Antonio et al., 2002). This would mean the effects from a cooler burning prescribed fire would be preferable to the effects from a wildfire of higher intensity.

Invasive alien grasses especially benefit from fire, and promote recurrent fire, in many cases to the point where native species cannot persist and native plant assemblages are converted to alien-invaded annual grasslands (Brooks & Pyke, 2001). The management of fire and invasive plants must be closely integrated for each to be managed effectively.

The best and most recent thorough study of the relationship between fire and invasive species in California is a chapter from "The Landscape Ecology of Fire" (Keeley et al., 2011). Essentially, it is much more complicated than previously understood. Some of the conclusions are worth including here.

- Fires are natural ecosystem processes on many landscapes. Perturbations to the fire regime, such as increased fire frequency and fire suppression, are the real "disturbances" to these systems and can lead to alien plant invasions.
- In forests, both too little fire and too much fire can enhance invasions. Restoration of historical fire regimes may not be the best way to balance these two risks.
- Repeated fires in shrublands decrease fuel volumes, decrease fire intensity and increase alien plant invasion. Decreasing fire frequency may be the best means of reducing alien invasions.
- Prescription burning that targets noxious species in grasslands is often not sustainable unless coupled with restoration.

Effects from Mastication (Mechanical Treatments)

Mastication treatments can also create a risk of invasive species colonization and spread. Mastication of surface and ladder fuels results in a short to medium term increase in fire severity potential. If prescribed fire were planned to follow mastication, then the potential for colonization by exotic species would be high due to the more severe burn that would result (Bradley et al., 2006). Severe burns consume a much greater portion of the native vegetation, increase recovery time for native species, and create opportunity for non-natives to invade if they exist nearby. Research shows that 'time since fire' is the most critical factor in alien invasion and colonization. Apparently, it is the closed canopy of pre-fire shrublands that reduces alien populations and thus limits the alien seed bank present at the time of fire (Bradley et al., 2006).

Effects from Prescribed Herbivory

The estimated 21,000 acres/year of prescribed grazing or herbivory will have a range of vegetation treatment goals, with the reduction of invasive plants being an important one. The challenges of controlling invasive plants on rangelands include vast roadless areas that limit access for weed control. These challenges limit the feasibility of chemical and mechanical treatments and

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favor use of biological control (Launchbaugh, 2006). An unknown proportion of herbivory treatments will target the spread of non-native species, and this proportion will vary between alternatives. Overall, prescribed herbivory treatments are expected to have a net beneficial effect on the status of non-native plant populations since they will often be used to reduce them. MMR 14, which mitigates against the spread of non-native seeds in livestock, will minimize potential negative effects from the movement of animals during implementation of projects.

Prescribed grazing is an effective technique, rivaling traditional chemical and mechanical control methods, for the management of deleterious invasive plants including leafy spurge, spotted knapweed, yellow starthistle, cheatgrass, salt cedar, and kudzu (Pittroff, 2006). Its use has been increasing in the last few years and is expected to be a particularly important technique in Alternative 2 which precludes herbicide use. Prescribed grazing is viewed as an “environmentally friendly” alternative to traditional methods because it leaves no chemical residue, does not utilize potentially toxic substances, and can mimic natural disturbance processes.

“Current research is beginning to lay the foundation for herbivory management strategies capable of being (a) selective against undesired species, and (b) selective in favor of desired species. Thus, understanding prescribed herbivory (and prescribed fire, for that matter) as planned disturbances and studying their effects on plant communities has the potential to significantly contribute to better understanding of ecosystem level processes underpinning weed invasion” (Pittroff, 2006).

There is variation in growth curves and life cycles amongst plants in all plant communities. The timing and intensity of herbivory can be used to fine-tune and steer grazing selectivity. In particular, goats are extremely selective and thus ideally positioned to become rather highly specific biocontrol agents (Pittroff, 2006).

Effects of Program

Although implementation of the Proposed Program does create the indirect effect of encouraging the spread of invasive species, much of this potential impact is balanced by the VTP projects designed to reduce or eradicate invasive species. In fact, by including both treatments that favor and treatments which inhibit invasive species under one program, managers have the ability to coordinate projects to complement each other and deal with the impacts either immediately or in follow up treatments. As long as the mitigation measures designed to limit invasive species are followed, long-term and widespread increases in their populations as a result of the proposed program should remain at a less than significant level.

Proposed Program Effects and Goals

Goal 7 directly relates to invasive species. The Proposed Program would help to achieve this goal directly by applying projects to eradicate invasives. In areas where other types of vegetation treatments are successfully implemented, following the MMRs and mitigation measures will minimize impacts from invasives. Restoring the natural range of fire-adapted plant communities will take multiple treatments spread over a significant portion of a bioregion, but when accomplished, this would also inhibit the spread of invasives.

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Alternatives Effects and Goals

Implementation of Alternative 2 would not meet goal 7 at the same rate and to the same extent as the Proposed Program because herbicides are the most common and inexpensive way of eradicating invasives. Alternative 3 would initially meet this goal at approximately the same rate and to the same extent as the Proposed Program. However, over the long term, Alternative 3 only treats about 13.7 million acres with prescribed fire and mechanical treatments which is only about 40% of the acres that would be treated under the Program, thus, this Alternative over the long term would not meet goal 7 as effectively as the Proposed Program. Alternative 1 would not meet goal 7 at the same rate or to the same extent as the Proposed Program since it would treat so few acres and substantially more acres would likely burn at high intensity, which encourages the spread of invasives. Alternative 4, like Alternative 1 would not meet the goal at the same rate or to the same extent as the Proposed Program since it would treat so few acres and substantially more acres would likely burn at high intensity.

Bioregion	Prescribed Fire	Mechanical	Hand	Herbivory
Klamath North Coast	NA/NB	NA/NB	NA/NB	NA/NB
Modoc	NA/NB	NA/NB	NA/NB	NA/NB
Sacramento Valley	NA/NB	NA/NB	NA/NB	NA/NB
Sierra	NA/NB	NA/NB	NA/NB	NA/NB
Bay Area	NA/NB	NA/NB	NA/NB	NA/NB
San Joaquin	NA/NB	NA/NB	NA/NB	NA/NB
Central Coast	NA/NB	NA/NB	NA/NB	NA/NB
Mojave	NA/NB	NA/NB	NA/NB	NA/NB
South Coast	NA/NB	NA/NB	NA/NB	NA/NB
Colorado Desert	NA/NB	NA/NB	NA/NB	NA/NB

^{1/} Key to effects; adverse effects are those effects which degrade the diversity, structure, size, integrity, abundance or number of; or are outside the natural range of variability, for the resource at issue. Beneficial effects are those effects that improve the diversity, structure, size, integrity, abundance or number of; or are within the natural range of variability, for the resource at issue. SA/SB – significant adverse effects are those effects that are substantial, highly noticeable, at the watershed scale; and often irreversible. MA/MB - moderately adverse or beneficial effects - those effects that can be detected beyond the affected area, but are transitory and usually reversible. NA/NB - negligible adverse or beneficial effects - those effects that are imperceptible or undetectable.

5.5.4.5 Effects of Alternatives

All the alternatives would be expected to have similar effects from/to invasive species except for possibly Alternative 2, the “no herbicide” alternative. Alternative 2 has all the same constraints as the proposed program but with about 6% more prescribed fire treatments and about 20% more mechanical treatments. The greater amount of mechanical treatments creates the potential for increased spread of invasives. However, since it does not allow projects using herbicides to be funded, other methods would have to be used in projects treating invasives. Hand treatments using volunteers have proven to be effective on a small scale but would likely be impractical or too expensive to meet the need for non-native eradication projects statewide. Prescribed herbivory is

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the most logical and cost effective treatment to be used for treating populations of non-native species under Alternative 2. The result would likely be similar to the other alternatives with only a negligible potential increase in non-native invasive species in any single bioregion.

5.5.4.6 Determinations Regarding Invasive Species

The Proposed Program and Alternatives will not cause a net substantial increase in the population of invasives sufficient to have a substantial long-term adverse effect on any species identified as a candidate, sensitive, or special status plant species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service. Due to implementation of MMR 5, 13 & 14, as well as the mitigation measures outlined below, VTP treatments will not adversely affect sufficient acres in any bioregion to cause a negative change in the state rank of any special status plant species.

The determination threshold of increasing invasive species populations on over 10% of a WHR Lifeform in a bioregion will certainly not be reached under any of the alternatives. Only a very few lifeforms, primarily in the Sacramento Valley, even have this much area treated in a decade within a bioregion (see Tables 5.5.3.2 through 11). In these cases virtually all VTP projects would have to cause increases in invasive species for this threshold to be crossed. Importantly, projects that specifically target invasive species will limit the potential impact from invasive species outbreaks facilitated by VTP projects.

The program and alternatives will not cause a net substantial increase in the population of invasives sufficient to have a significant adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or US Fish and Wildlife Service. Compliance with Landscape Constraints 1-3 dealing with riparian and wet areas along with implementing projects to specifically control populations of invasives, will ensure that VTP treatments do not have a net adverse effect on sufficient acres in any bioregion or habitat type sufficient to threaten to eliminate any plant community.

5.5.4.7 Mitigation Measures and Checklist Items

Mitigation Measure 5.5.3-2 has previously been described and its implementation will help reduce potentially significant treatment effects due to invasives to less than significant.

Mitigation Measure 5.5.4-1: Equipment shall be thoroughly cleaned offsite before beginning ground-disturbing activities when such equipment has previously worked within the last year in an area with invasive species. Equipment shall be thoroughly cleaned onsite before leaving the project area when the project area is infested with invasive species.

Rationale: Implementing this mitigation measure will reduce this impact to a less-than-significant level.

Mitigation Measure 5.5.4-2: When mechanical clearing is used in tree-dominated habitats subject to invasive species, the project proponent shall maintain a minimum of 60% tree canopy closure, or 100% of existing canopy if it is less than 60%, to minimize the amount of suitable habitat for invasive species.

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Mitigation Measure 5.5.4-3: Prior to implementing any project, which could create conditions favorable to invasive species, CAL FIRE/applicant shall contact the county Agriculture Dept. and any local groups concerned with noxious weed control, to ascertain the location and extent of known populations of non-native invasive species, which could provide a seed source for the project area.