

Terrestrial Resources

Chapter 10 evaluates potential impacts to terrestrial biological resources from LBAM Program implementation. Results of the evaluation are provided at the programmatic level. Section 10.1, Environmental Setting, presents an overview of the terrestrial habitats in the Program Area and life histories of representative special-status species; and contains federal, state, and local ordinances and regulations that are applicable to the Program. Section 10.2, Environmental Impacts and Mitigation Measures, presents the following:

- Environmental concerns and evaluation criteria: A determination of whether the Program alternatives would cause significant impacts to terrestrial biological resources
- Evaluation methods and assumptions
- Discussion of the impacts to terrestrial biological resources from the No Program and Program alternatives, and recommendations for mitigation, if required, for those impacts
- Cumulative impacts
- A summary of environmental impacts to terrestrial biological resources
- Monitoring of recommended mitigation measures

10.1 ENVIRONMENTAL SETTING

10.1.1 Terrestrial Habitats

Due to the extent of the Program Area, terrestrial habitats for this Program are described at the province level (McNab and Ayers 1996). The Program Area includes most of the nondesert areas below 5,000 feet in California. The immediate Program Area is located in the following 13 counties of the state where LBAM infestations presently occur (October 2008): Alameda, Contra Costa, San Francisco, Napa, Marin, Sonoma, Solano, San Mateo, Santa Clara, San Benito, Monterey, Santa Cruz, and Santa Barbara. The immediate Program Area includes all of these provinces, although only a small area of the Sierran Steppe–Mixed Forest–Coniferous Forest–Alpine Meadow Province is in the immediate Program Area.

10.1.1.1 Ecoregion Provinces in the Program Area

Figure 10-1 shows 5 ecoregions in the Program Area.

California Dry Steppe

The California Dry Steppe province once covered the Central Valley of California. Although much of the Central Valley is now subject to agricultural uses and grazing, it was originally dominated by native grasses and wildflowers, including bunchgrasses (McNab and Ayers 1996). While remnant stands of native grasslands remain, much of the uncultivated land in this valley is now dominated by exotic species such as wild oats (*Avena* spp.), brome grasses (*Bromus* spp.), filarees (*Erodium* spp.), Italian ryegrass (*Lolium multiflorum*), and both exotic and native fescues (*Vulpia* spp.). Native wildflowers and some native grasses

persist among the exotic species. Rivers in the Sacramento Valley and northern San Joaquin Valley are fringed with riparian vegetation, while freshwater marshes line the lower reaches of the San Joaquin and Sacramento rivers. Native vegetation in the southern San Joaquin Valley consists of both remnant grassland and remnant scrub, generally dominated by saltbush (*Atriplex* spp.) and other chenopod scrub species (Holland 1986). This entire province lies within the Program Area, and part of it is encompassed in the northeastern part of the immediate Program Area.

California Coastal Chaparral, Forest, and Scrub

The lands along the central and southern coasts of California, as well as the seaward side of the Coast Ranges in this area, are part of the California Coastal Chaparral, Forest, and Scrub province (McNab and Ayers 1996). A variety of plant communities are found in this province. Representative plant communities include chaparral types dominated by chamise (*Adenostoma fasciculatum*) and various manzanitas (*Arctostaphylos* spp.) and ceanothus (*Ceanothus* spp.) and coastal scrubs dominated by coyote bush (*Baccharis pilularis*), California sagebrush (*Artemisia californica*), and bush lupine (*Lupinus* spp.) or sages (*Salvia* spp.). Riparian forests and willow scrub grow along streams (Holland 1986). Gentler slopes support live oak and white oak woodlands and forests and coastal plains and valleys support grassland communities. However, much of the coastal plain and valley floors have been converted to agriculture or urban uses.

Except for mountainous areas above 5,000 feet in elevation, this entire province is within the Program Area. Much of the immediate Program Area is in this province.

California Coastal Steppe, Mixed Forest, and Redwood Forest Province

The California Coastal Chaparral, Forest, and Scrub province covers the lands along the north coast of California and the seaward side of the North Coast Ranges (McNab and Ayers 1996).

Redwood forests (*Sequoia sempervirens*) are typically found on the seaward slopes of coastal northwestern California. Associated species include Douglas fir (*Pseudotsuga menziesii*) and other conifers (Holland 1986). Inland slopes support a mixed evergreen forest dominated by coast live oak (*Quercus agrifolia*), tan oak (*Lithocarpus densiflorus*), madrone (*Arbutus menziesii*), and Douglas fir. Oaks may form distinct patches of oak woodland (Holland 1986).

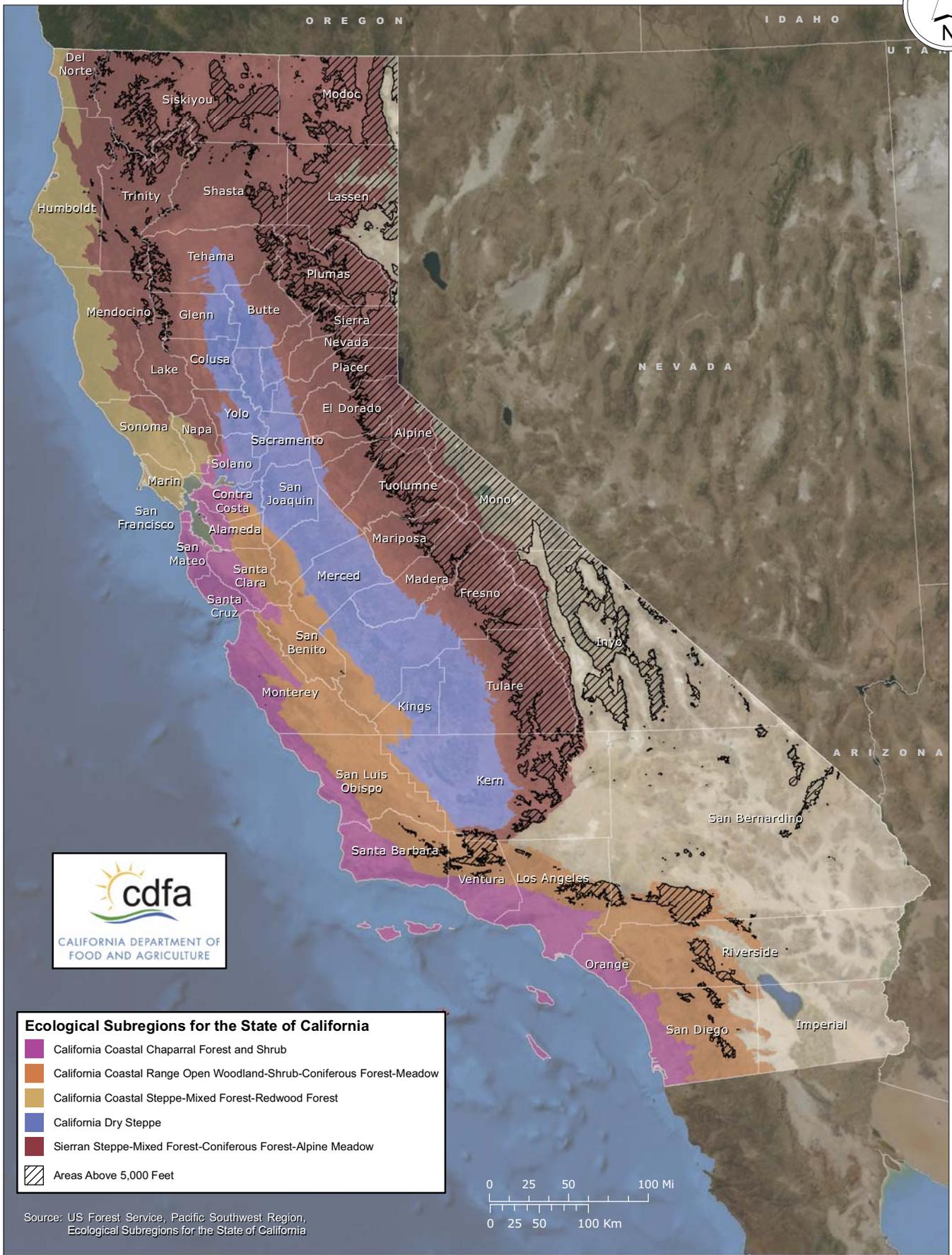
Except for extensive mountainous areas above 5,000 feet in elevation, this entire province is within the Program Area. The northwestern part of the immediate Program Area is in this province.

California Coastal Range Open Woodland-Shrub-Coniferous Forest–Meadow Province

The California Coastal Range Open Woodland-Shrub-Coniferous Forest–Meadow province covers the lands along the interior of the Central and South Coast ranges of California, including part of the Transverse Ranges of Southern California (MacNab and Ayers 1996).

This province also supports live oak forests, woodlands, and chaparral, but the conditions are drier than in the California Coastal Chaparral, Forest, and Scrub province. Interior live oaks (*Quercus wislizenii*) and other oaks are found here, in addition to coast live oak and madrone (Holland 1986). At higher elevations and near the ocean, chaparral may be interspersed with coniferous forests. Interior valleys support grassland and coastal scrub communities. As in the neighboring provinces, a riparian forest grows along streams.

Much of this province consists of mountainous areas above 5,000 feet in elevation or desert areas in Southern California, but parts of it are within the Program Area. Much of the eastern part of the immediate Program Area is in this province.



Light Brown Apple Moth Eradication Program PEIR

Figure 10-1: Ecoregions in Program Area

Sierran Steppe–Mixed Forest–Coniferous Forest–Alpine Meadow Province

The Sierran Steppe–Mixed Forest–Coniferous Forest–Alpine Meadow province covers most of interior Northern California, as well as the Sierra Nevada. It extends into southern Oregon (MacNab and Ayers 1996).

The lower slopes and foothills, from about 1,500 to 4,000 feet, are covered by shrub and conifer communities. On higher slopes, digger pine and blue oak often dominate, forming open woodlands. Chaparral covers extensive areas. Montane forests are found between about 2,000 and 6,000 feet in the Cascades, 4,000 and 7,000 feet in the Central Sierra, and 5,000 and 8,000 feet or more in the southern Sierra. The dominant trees are ponderosa pine (*Pinus ponderosa*), Jeffrey pine (*Pinus jeffreyi*), Douglas fir, firs (*Abies* spp.), and incense cedar (*Calocedrus decurrens*), but several other conifers also occur, including the giant sequoia (*Sequoiadendron giganteum*). Dense chaparral communities of manzanita, buckbrush, and buckthorn may carpet open slopes or provide understory in open forests (Holland 1986). Other communities are found at higher elevations and on the eastern, drier side of the Sierra Nevada. They are not described in this section because they are outside the Program Area.

Much of this province consists of mountainous areas above 5,000 feet in elevation but parts of it are within the Program Area. A small part of the immediate Program Area is in this province.

10.1.1.2 Sensitive Natural Communities

Sensitive Natural Communities include both occurrences of certain rarer community types, or specific stands of ecological importance for other community types. Approximately 74 types of natural communities that are tracked in the California Natural Diversity Database occur in the Program Area. These types include dune, scrub, chaparral, native grassland, wildflower, alkali, vernal pool, bog, seep, fen, marsh, riparian scrub, riparian woodland, riparian forest, and nonriparian forests and woodlands.

10.1.2 Species Life Histories

Many special-status terrestrial species occur in the Program Area, including 131 species that are listed as endangered or threatened under the federal or California Endangered Species Acts. A full list of these species is provided in Appendix E, Lists of Species. Representative threatened or endangered species, evaluated in Appendix F, Ecological Risk Assessment, are described below¹. Ecological receptors were selected to represent the diversity of animal and plant species likely to be exposed to any of the No Program and Program chemical treatment alternatives. Species selected for modeling were intended to provide an estimation of potential effect by ‘guild.’ Species grouped by guilds will exhibit similar life history and exposure characteristics that allow for interpretation of potential effects of nonmodeled species in the same guild.

Because lepidopterans (butterflies, skippers, and moths) are the species that are the most likely to be sensitive to treatments focused on another moth (LBAM), species life histories for all other California lepidopterans that are listed as endangered or threatened under the federal or California Endangered Species Acts are provided in Appendix E-2, Additional Species Life Histories.

¹ Because the reptiles evaluated in the Ecological Risk Assessment (Appendix F) were not threatened or endangered species, their life histories are not included here,

10.1.2.1 Plants

Ione Buckwheat (Eriogonum apricum var. apricum [including var. prostratum])

The Ione buckwheat is federally and state listed as endangered and is categorized by the California Native Plant Society (CNPS) as a List 1B species (Federal Register 1999; CNPS 2009; CDFG 2008a). No critical habitat has been proposed for this buckwheat. This species occurs in Amador and Sacramento counties at elevations from 195 to 475 feet. Ione buckwheat grows primarily on Ione soils associated with the Ione chaparral plant community (Holland 1986). This buckwheat is a perennial herb that flowers from July to October (CNPS 2009).

All known populations of Ione buckwheat are in the Program Area, but this species does not occur in the 13 counties that constitute the immediate Program Area.

Yadon's Rein Orchid (Piperia yadonii)

Yadon's rein orchid is federally listed as endangered and is categorized by the CNPS as a List 1B species (Federal Register 1998; CNPS 2009). Critical habitat has been designated for this species (Federal Register 2007). This species occurs in Monterey County along the Monterey Peninsula and north near the border of Santa Cruz County at elevations from 3 to 1,675 feet (CNPS 2009; USFWS 2004a). This orchid is primarily found in Monterey pine forest and maritime chaparral communities. In Monterey pine forests, this species is found growing through pine needle duff. In contrast, this species grows on sandstone ridges on shallow soils in the maritime chaparral habitat. Associated species in maritime chaparral include Pajaro manzanita (*Arctostaphylos pajaroensis*), chamise (*Adenostoma fasciculatum*), Monterey ceanothus (*Ceanothus cuneatus* var. *rigidus*), golden-yarrow (*Eriophyllum confertiflorum*), and bush monkeyflower (*Mimulus aurantiacus*). Yadon's rein orchid is a perennial herb that flowers from May to August. The plants are dormant from September to December (USFWS 2004a).

All known populations of Yadon's rein orchid occur in the immediate Program Area.

10.1.2.2 Invertebrates

Bay Checkerspot Butterfly (Euphydryas editha bayensis)

The bay checkerspot butterfly is federally listed as threatened (Federal Register 1987). Critical habitat has been designated and revised for this species (Federal Register 2001, 2008a). The historical range of this butterfly extended from San Francisco and Contra Costa counties south to Santa Clara County. Its distribution may have been more extensive prior to the introduction of invasive, nonnative grasses and other weeds in the 1700s. The current range of this species is limited to Santa Clara and San Mateo counties (USFWS 1998a). This species is found in areas with shallow, serpentine-derived or similar soils that support both the larval food plants for this species, as well as nectar-producing plants for adults. Habitats for the larval host plants include grassland, coastal sage scrub, foothill woodlands, and chaparral, below 2,500 to 3,000 feet in elevation.

This butterfly utilizes more than one larval host plant species. Adults emerge from pupae and breed in spring, typically in a 4- to 6-week period from late February to early May. Adults generally live only for about 10 days. Following mid-spring mating, the female butterflies lay their eggs on a native plantain (*Plantago erecta*). The eggs hatch and the larvae feed on this host until either they have developed to a point at which they may enter dormancy, or the host has begun to dry up from the summer heat. If the plantain is not sufficient for development, the larvae may move onto one of two species of owl's clover (*Castilleja densiflorus* or *C. exserta*), which remain palatable for a longer period. Generally, one season is not sufficient for completion of development and the larvae must enter dormancy during the summer until the following

autumn when the rains allow plant growth to begin again. The larvae then emerge to feed for a little longer, eventually pupating in late winter. (USFWS 1998a).

All known populations of the bay checkerspot butterfly occur in the immediate Program Area.

Kern Primrose Sphinx Moth (Euproserpinus euterpe)

The Kern primrose sphinx moth is federally listed as threatened (Federal Register 1980). No critical habitat has been proposed for this species. The distribution of this moth was originally thought to be restricted to a privately owned ranch in Walker Basin, Kern County. However, a new population was discovered within Carrizo Plain National Monument in San Luis Obispo County, 75 miles west of Walker Basin (Jump et al. 2006). Habitat elements that support the evening primrose and other food sources in the Carrizo Plain are typically gentle, sloping, sandy washes with young alluvial sandy soils (Jump et al. 2006).

Because the primary food source for the larvae in Walker Basin is the evening primrose (*Camissonia contorta epilobiodes*), it is essential to the survival of the Kern primrose sphinx moth (USFWS 2007a). In the Carrizo Plain area, the primary larval food source is another species of evening primrose (*Camissonia campestris*) (Jump et al. 2006). Adults feed during the morning hours on species such as filaree (*Erodium cicutarium*), goldfields (*Lasthenia chrysostoma*), baby blue-eyes (*Nemophila menziesii*), and miniature lupine (*Lupinus bicolor*) (USFWS 1984).

This diurnal (day flying) moth has a flight period ranging from late February to early April (USFWS 1984, 2007a). Females are able to breed as soon as they emerge from the pupal stage and lay their eggs on evening primrose (*Camissonia contorta epilobiodes*) and on filaree. Pupae are known to diapause (delay metamorphosis to adult form) underground during drought periods until the following spring, when they emerge as adults (Jump et al. 2006; Federal Register 1980).

The Carrizo Plain population of the Kern primrose sphinx moth is in the Program Area, including part of the immediate Program Area in Santa Barbara County.

Monarch Butterfly (Danaus plexippus)

The monarch butterfly is designated as a “special animal” by the State of California (CDFG 2008b). This general term is for animals that are considered sensitive regardless of their legal protection status. This species is not listed as an endangered, threatened, proposed, or candidate species by the USFWS or CDFG under the federal or state Endangered Species Acts. However, California law (AB 1671, September 1987) recognizes monarch butterfly overwintering colonies as “special [natural] resources” in California and encourages the protection of this winter habitat. Accordingly, the CDFG recognizes monarch butterfly winter roost sites as sensitive habitats. All known California winter roost sites occur in the Program Area, and many are in the immediate Program Area.

The distribution of the monarch butterfly in the breeding season is primarily determined by the distribution of its obligate larval host plants, the milkweeds (*Asclepias* spp.). This species is found throughout North and South America and is also distributed elsewhere around the world. Monarchs are found from sea level to 8,200 feet in elevation. The North American population is migratory, but populations in Mexico and Central America are sedentary (Commission for Environmental Cooperation 2008). In California, monarchs overwinter in large trees such as eucalyptus (*Eucalyptus* spp.), Monterey pine (*Pinus radiata*), and Monterey cypress (*Cupressus macrocarpa*).

10.1.2.3 Amphibians

Santa Cruz Long-Toed Salamander (Ambystoma macrodactylum croceum)

The Santa Cruz long-toed salamander is a federal and state endangered species, and is fully protected (CDFG 2008b; Federal Register 1967). Critical habitat has been proposed for this species (Federal Register 1978). This salamander is endemic to California, occurring in a narrow coastal region extending from southern Santa Cruz County into northern Monterey County. This species inhabits dense riparian vegetation such as willows, thick coastal scrub, and oak woodlands that are found near freshwater ponds and marshes in which it breeds (Zeiner et al. 1988).

A variety of arthropods provide the primary food supply for the Santa Cruz long-toed salamander. In drier months, this salamander feeds on spiders, insects, and isopods. This species feeds on both terrestrial insects and aquatic dipterans in wetter months when breeding occurs. The larvae and eat various aquatic crustaceans, dipterans, and tadpoles (Zeiner et al. 1988).

A substantial portion of the Santa Cruz long-toed salamander's life is spent underground in mammal burrows of mice, voles, moles, and gophers or in rock fissures. Annual breeding migration is primarily nocturnal and begins with the onset of heavy rains in mid- to late-November or December. Peak breeding occurs in January and February (USFWS 2004b). Adults may remain in breeding ponds for several days to a month. Females lay eggs singly or in loose clusters on the undersides of logs, woody debris, and emergent vegetation 2 to 3 inches below water surface. Eggs hatch after 15 to 30 days, and larval development depends on water temperature. Metamorphoses in larvae occur prior to the drying of breeding ponds (USFWS 2004b; Zeiner et al. 1988).

All known populations of the Santa Cruz long-toed salamander occur in the immediate Program Area.

California Red-Legged Frog (Rana aurora draytonii)

The California red-legged frog is federally listed as threatened (Federal Register 1996), and is a California species of special concern (CDFG 2008c; Williams 1986). Critical habitat has been designated and revised for this species and another revision to the critical habitat has been proposed (Federal Register 2006, 2008b). The historical range for this frog extends from Shasta and Mendocino counties to Fresno and San Diego counties.

This species is a large frog found in habitats characterized by dense, shrubby, riparian vegetation associated with deep (2.25 feet), still, or slow-moving water (Hayes and Jennings 1988). California red-legged frogs are usually confined to aquatic habitats such as creeks, streams, and ponds), and occur primarily in areas having pools approximately 3 feet deep, with adjacent dense emergent or riparian vegetation (Hayes and Jennings 1988). The primary food source for adult frogs is invertebrates, but they will forage secondarily on vertebrates such as Pacific tree frog and California mice. Larvae are algal grazers (USFWS 2002).

Breeding habitat for this frog includes streams, deep pools, backwaters within streams and creeks, marshes, dune ponds, lagoons, shrubby riparian vegetation, and emergent vegetation. Adult frogs move seasonally between their egg-laying sites and foraging habitat, but generally they rarely move large distances from their aquatic habitat (USFWS 2002). California red-legged frogs breed from November to March. Egg masses, containing 2,000 to 5,000 eggs, are attached to emergent vegetation (Jennings and Hayes 1994; USFWS 2002), and hatch within 14 days. Metamorphosis generally occurs between July and September.

Most extant populations of the California red-legged frog are in the Program Area, and many are in the immediate Program Area.

10.1.2.4 Birds

Least Bell's Vireo (Vireo bellii pusillus)

The least Bell's vireo is a federal and state endangered species (Federal Register 1986; CDFG 2008c). Critical habitat has been designated for this species (Federal Register 1994). This bird historically was a summer resident of the southern coast and Central Valley of California and wintered in southern Baja California (USFWS 1998b). In the 20th century, the breeding range contracted to the Southern California part of the historical range, but a breeding pair has recently been reported at the San Joaquin Wildlife Refuge in Stanislaus County (USFWS 1998b; Caine 2005). The least Bell's vireo can be found at elevations below 2,000 feet and prefers dense willow-dominated riparian habitat with well-developed understory vegetation, which lies adjacent to a water course (Federal Register 1986; CDFG 2008a). Willows are used primarily for nesting, while other riparian and adjacent chaparral habitat are used for foraging. This bird is insectivorous and primarily feeds on bugs, beetles, grasshoppers, moths, and particularly caterpillars, gleaning insects from foliage and branches (USFWS 1998b).

This species arrives on the Southern California breeding grounds mid-March to April and departs between July and September. Nests are typically built in dense thickets of willows up to 10 feet above the ground, but this vireo also nests in a variety of other shrubs, trees, and vines. Thickets used for nesting typically are in the immediate vicinity of watercourses and have well-developed understories and low densities of aquatic and herbaceous cover. Egg-laying activities peak during May into early June. Clutch size is usually 3 to 4 eggs and incubation usually lasts about 14 days. The young birds fledge 11 to 12 days after hatching (CDFG 2008a; USFWS 1998b). The least Bell's vireo leaves its breeding grounds in late August and September for its wintering range in Mexico.

Breeding habitat for this subspecies in California is primarily in the Program Area, and some locations are in the immediate Program Area.

10.1.2.5 Mammals

Buena Vista Lake Shrew (Sorex ornatus relictus)

The Buena Vista Lake shrew is federally listed as endangered and a California species of special concern (Federal Register 2002; CDFG 2008c; Williams 1986). Critical habitat has been designated for this species (Federal Register 2005). This shrew historically occurred in marshes and sloughs on the perimeter of Buena Vista Lake and may also have occurred in similar habitat elsewhere in the Tulare Basin of the southern San Joaquin Valley in California (USFWS 1998c). Currently, this species is only reported in the perimeter of marsh and slough habitats around the Kern Lake Preserve area and Kern National Wildlife Refuge. All known populations of the Buena Vista Lake shrew are in the Program Area, but this species does not occur in the immediate Program Area.

This shrew occurs in habitats in and adjacent to riparian and wetlands with dense vegetation cover that will allow for the soils to support and enhance the diversity of prey species for this shrew. The Buena Vista Lake shrew is an insectivore and feeds primarily on aquatic and terrestrial species such as snails, spiders, slugs, centipedes, earthworms, and various invertebrates (USFWS 1998c, 2008a).

Breeding season for this shrew may begin in the autumn and end in May or June, following the dry season. Reproduction occurs late February through September and early October. Up to two litters per year containing four to six young may be produced (USFWS 1998c, 2008a). Habitat quality, availability of water, diversity, and availability of insect prey are major factors that can affect breeding (Federal Register 2002).

San Joaquin Kit Fox (Vulpes macrotis mutica)

The San Joaquin kit fox is a federally listed endangered species, as well as a state threatened species (Federal Register 1967; CDFG 2008c). No critical habitat has been proposed for this species. This fox is mostly nocturnal, is active yearlong, and currently inhabits arid regions of Southern California, including the San Joaquin Valley from southern Kern County north to Contra Costa, Alameda, and San Joaquin counties (USFWS 1998c). Most known populations of this species are in the Program Area, and many are in the immediate Program Area.

This species is found in annual grasslands and prefers open areas consisting of grass, scattered brush, shrubs, and scrub vegetation. The San Joaquin kit fox is known to hunt in these habitat types, particularly where little human disturbance occurs. Food sources vary depending on geographic range, but include species such as kangaroo rats, pocket mice, white-footed mice, California ground squirrel, black-tailed hares, desert cottontails, ground nesting birds, insects, San Joaquin antelope squirrels, chukar, black-tailed hares, reptiles, bird eggs, insects, and grass (CDFG 2008d).

Breeding season for the San Joaquin kit fox typically occurs during the months of late December and March. Adult females require level areas with loose textured, sandy, and loamy substrate to excavate dens for their pups (CDFG 2008d). Litters of up to four pups are born between the months of February through April, following a median gestation period of about 48 to 55 days (USFWS 1998c).

10.1.3 Regulatory Environment

Federal regulations, standards, and guidelines, California state law, and LORs pertaining to potential Program effects on terrestrial biological resources are cited in this section. State law (California Food and Agricultural Code, Section 11501.1) limits the extent to which any local LORs may apply to pesticide use.

The regulatory environment for terrestrial biological resources is the same as the aquatic regulatory environment stated in Section 9.1.3 with the exceptions stated below, which only apply to terrestrial biological resources:

10.1.3.1 Federal

Migratory Bird Treaty Act (16 USC Section(s) 703-711; 50 CFR Subchapter B)

This law includes provisions for protection of migratory birds, including basic prohibitions against any taking not authorized by federal regulation. The administering agency is the USFWS.

Bald and Golden Eagles Protection Act (16 USC Section(s) 668; 50 CFR Part 22)

This act makes it illegal to import, export, take (which includes molest or disturb²), sell, purchase, or barter any bald eagle or golden eagle or part thereof. The golden eagle, however, is accorded somewhat lighter protection under this act than the bald eagle. The administering agency is the USFWS.

² “Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.”

Clean Water Act of 1977 [33 USC Section(s) 1251-1376; 30 CFR Section(s) 330.5 (a)(26)]

These sections provide for the protection of wetlands. The administering agency for the above authority is the U.S. Army Corps of Engineers (USACE).

Executive Order 11990, Protection of Wetlands (May 24, 1977)

This order provides for the protection of wetlands. The administering agency for the above authority is the USACE.

10.1.3.2 State

California Food and Agricultural Code, Section(s) 12976 and Section(s) 12981

This code states that no pesticide application should be made or continued when a reasonable possibility exists of damage to nontarget crops, animals, or other public or private property. The administering agency for the above authority is the DPR.

California Food and Agricultural Code, Section(s) 29102

This code provides for the protection of bees from pesticide use through notification of beekeepers and the establishment of citrus bee protection areas. Prohibited applications to citrus within a citrus/bee protection area include any pesticide toxic to bees, except those exempted in a subsequent subsection during a citrus bloom period, unless the need for control of lepidoptera larvae or citrus thrips has been established by written recommendation of a representative of the University of California, Agricultural Extension Service, or a licensed agricultural pest control adviser. The recommendation should state either that the citrus planting does not meet the citrus bloom period criteria, or why alternatives less hazardous to bees would not be effective. The administering agency for the above authority is the DPR.

Stipulated Injunction and Order, Protection of California Red-Legged Frog from Pesticides

On October 20, 2006, the U.S. District Court for the Northern District of California imposed no-use buffer zones around California red-legged frog upland and aquatic habitats for certain pesticides. This injunction and order will remain in effect for each pesticide listed in the injunction until the USEPA goes through formal 7(A)(2) consultation with the USFWS on each of the 66 active ingredients, and the USFWS issues a Biological Opinion including a “not likely to adversely affect” statement for the pesticides. Under the injunction and order, no-use buffer zones of 60 feet for ground applications and 200 feet for aerial applications apply from the edge of the following California red-legged frog habitats as defined by the USFWS and the Center for Biological Diversity: Aquatic Feature, Aquatic Breeding Habitat, Nonbreeding Aquatic Habitat, and Upland Habitat. These habitats are found in 33 counties of California. Chlproyrifos and permethrin are both on the list of pesticides subject to this limitation.

A series of documents that define Interim Measures for Use of Pesticides for various counties in California have been prepared by the CDFA. Interim measures have been defined for all 13 of the counties in the immediate Program Area.

10.1.3.3 Local

California state law (California Food and Agricultural Code, Section 11501.1) preempts local regulation and restriction of pesticide use. Local governing bodies may pass ordinances that regulate or restrict pesticide use in their own operations. For example, a city council may pass an ordinance that restricts pesticide use in

municipal buildings and in public parks, and a school district board can decree that certain pesticides cannot be used in schools (DPR 2001). However, these restrictions do not apply to state operations and would not be applicable to treatments proposed under the Program alternatives.

10.2 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The impact evaluations for terrestrial biological resources, as well as mitigation measures to address those impacts, are provided below.

10.2.1 Evaluation Concerns and Criteria

This section presents the significance criteria used to evaluate the likely impacts of the various Program alternatives under CEQA and identifies the environmental issues. The significance criteria establish thresholds for determining whether an impact rises to a level that is biologically significant. The environmental issues describe the mechanisms by which such impacts might occur.

- Project evaluation criteria and the mandatory findings of significance as explained in CEQA, Public Resources Code Section 21083; Guidelines Section 15065, indicate that a project will have a significant effect on biological resources if it will:
- Substantially degrade environmental quality;
- Substantially reduce fish or wildlife habitat;
- Cause a fish or wildlife habitat to drop below self-sustaining levels;
- Threaten to eliminate a plant or animal community; or
- Substantially reduce the numbers or range of a rare, threatened, or endangered species.

Additional thresholds of significance for biological resources under CEQA have been used in the following evaluation. Impacts were considered significant if they would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFG, USFWS, or USFS.
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the CDFG, USFWS, or USFS.
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

Concerns raised during public scoping are:

- Discuss Program impacts on other insects, endangered species, and riparian wildlife.
- Discuss the impacts of Program-related pheromones on the behavior of other animals.

- Discuss the impacts of No Program and Program alternatives on conifers, ecosystem, and forest health.
- Discuss the impacts of the No Program Alternative on other species and habitats.
- Discuss the impacts on moth predator populations of increased moth population from releasing sterile moths and decreased moth populations after treatment.
- Discuss the impacts of the use of a parasitic wasp.
- Establish biological monitoring.

Proposed monitoring actions are described in Section 10.3.2 (Mitigation and Monitoring).

10.2.2 Evaluation Methods and Assumptions

Existing resource information was used to develop the description of the environmental setting. Representative special-status wildlife and plant species (also described in the environmental setting), as well as representative common species, were selected for evaluation in Appendix F, Ecological Risk Assessment. These resources were evaluated in conjunction with the activities associated with the No Program and Program alternatives to determine potential impacts and develop mitigation measures.

The impacts were estimated based on the following assumptions:

- Impacts to botanical resources could result from spread of the LBAM.
- Impacts to botanical resources could result from impacts to plant pollinators from pesticide use.
- Botanical resources would not be directly impacted by application procedures, because none of the procedures would result in significant ground or vegetation disturbance.
- Botanical resources would not be directly impacted by the evaluated pesticides, based on the data provided in Chapter 12, Ecological Health.
- Botanical resources will not be directly impacted by the LBAM pheromones based on the data provided in Chapter 12, Ecological Health.
- No impacts to terrestrial wildlife would occur from bioaccumulation of any of the chemicals used in the No Program or Program alternatives. Based on the physical and chemical properties of these chemicals, potential does not appear to be significant, for bioaccumulation or biomagnification, and none of the No Program active ingredient chemicals or their inert ingredients are recognized as persistent bioaccumulative toxicants by the USEPA, as described in Chapter 12, Ecological Health.
- Impacts to terrestrial invertebrate resources, including plant pollinators, could result from pesticide application.
- Impacts to terrestrial vertebrate wildlife resources could result from pesticide application.
- Impacts to terrestrial wildlife resources could result from an increase in parasitic wasps in the environment.
- Terrestrial wildlife resources other than LBAM would not be impacted by an increase in LBAM pheromones in the environment, because the action of these pheromones is specific to LBAM.
- Terrestrial wildlife resources other than LBAM would not be impacted by the release of sterile LBAM in the environment.
- No noise impacts would occur to terrestrial wildlife from handheld or backpack application methods.

- No impacts would result from conflicts with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. California state law (California Food and Agricultural Code, Section 11501.1) preempts local regulation and restriction of pesticide use. Local governing bodies may pass ordinances that regulate or restrict pesticide use in their own operations. For example, a city council may pass an ordinance that restricts pesticide use in municipal buildings and in public parks, and a school district board can decree that certain pesticides cannot be used in schools (DPR 2001). However, these restrictions do not apply to state operations and would not be applicable to the No Program or Program alternatives.
- No impacts would occur from conflicts with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. Habitat Conservation Plans generally apply to the identification, acquisition, and management of conservation areas related to specific actions, usually development or resource harvesting. The Proposed Program is not that type of action. Natural Community Conservation Plans, and other local, regional, or state habitat conservation plans generally apply to the management of specific areas. The state law cited in the preceding Section 10.1.3.3 (Local) preempts local regulation and restriction of pesticide use, except that local governing bodies may pass ordinances that regulate or restrict pesticide use in their own operations.

Combinations of biological resources and actions that would result in no impacts as described above are not discussed further, with the exception of Alternative SIT.

10.2.3 No Program Alternative

The No Program Alternative would continue and expand quarantine and detection and inspection activities but without the application of the pheromone or any other insecticides or sterile moths or parasitic wasps on an areawide basis by the USDA or CDFG. Without a regional coordinated governmental treatment program, LBAM would flourish in existing areas and spread to surrounding areas, with associated environmental effects. The No Program Alternative relies on the use of registered chemicals by private individuals and continuation of government-operated regulatory programs involving quarantines and other procedures to lessen LBAM's potential to spread.

Impacts to Special-Status Plant Species from LBAM's Spread

In California, 283 state- or federally-listed plant species are rare, threatened, or endangered (CDFG 2008a). Forty-eight of these (17 percent) are in genera that are recorded as LBAM hosts (USDA 2008a). These genera are *Arctostaphylos*, *Baccharis*, *Berberis*, *Ceanothus*, *Cirsium*, *Cupressus*, *Helianthus*, *Lilium*, *Lotus*, *Lupinus*, *Opuntia*, *Phlox*, *Polygonum*, *Rosa*, *Trifolium*, and *Verbena*. While many, and perhaps all, of these species of concern have neither been encountered by nor tested against LBAM as of yet, these plants are designated as potential hosts by the USDA due to their relatedness to known hosts in their respective genera and due to LBAM's ability to adapt to feeding on plants that it has not previously encountered. LBAM's persistence and spread would result in impacts to any of these species that are susceptible to attack by LBAM. **Impacts would be potentially significant.**

Impacts to Host Plants for Special-Status Invertebrate Species from LBAM's Spread

Nine insects in California that are federally listed threatened or endangered insects feed on plants in genera that are recorded as LBAM hosts (CDFG 2008c; Caterino 2008; USDA 2008a). These nine and their potentially affected host plants are the Bay checkerspot butterfly (host = *Plantago erecta*), Behren's silverspot butterfly (host = *Viola adunca*), callippe silverspot butterfly (host = *Viola pedunculata*), lotis blue butterfly (host = *Lotus formosissimus*), Mission blue butterfly (host = *Lupinus* spp.), Myrtle's silverspot butterfly (host = *Viola* spp., possibly only *V. adunca*), Oregon silverspot butterfly (*Speyeria zerene hippolyta*, host = *Viola*

adunca), Quino checkerspot butterfly (host = *Plantago erecta*), and valley elderberry longhorn beetle (host = *Sambucus* spp.). While many, and perhaps all, of these host species have neither been encountered by nor tested against LBAM as of yet, these plants are designated as potential hosts by the USDA due to their relatedness to known hosts in their respective genera and due to LBAM's ability to adapt to feeding on plants that it has not previously encountered. LBAM's persistence and spread could result in impacts to invertebrate species that are dependent on these plants. **Impacts would be potentially significant.**

Impacts to Botanical Resources in Riparian Areas

Many riparian tree and shrub species have been identified as LBAM hosts (USDA 2008a). Tree species that are occasional hosts include cottonwoods (*Populus* spp.) and willows (*Salix* spp.). Shrub species that are primary or common hosts include wild roses (*Rosa* spp.) and blackberries (*Rubus* spp.). LBAM's persistence and spread could result in impacts to vegetation in which these species are dominant or subdominant. **Impacts would be potentially significant.**

Impacts to Botanical Resources in Federally Protected Wetlands

A few genera wetland plant species, such as arrowweed (*Triglochin* spp.), have been identified as LBAM hosts (USDA 2008a). However, most of the dominant genera found in herbaceous wetlands are not currently identified as potential LBAM hosts. **Impacts would be less than significant.**

Impacts to Other Botanical Resources, Including Conifers and Forest Ecosystems, from LBAM's Spread

Coniferous forests and other forest ecosystems, as well as a variety of other native habitats occur within the immediate Program Area, as well as elsewhere in the Program Area. A variety of tree species have been identified as a LBAM host species, including ponderosa pine and other pines, Douglas fir, and redwood. Many native shrubs and herbaceous species are also LBAM host species. LBAM's persistence and spread could result in impacts to habitats in which these species are dominant or subdominant. Impacts to nontarget invertebrate species, including plant pollinators, could occur due to increased use of pesticides to control LBAM infestations. If large areas of trees are adversely affected, the frequency of forest fires could also increase. **Impacts would be potentially significant.**

Impacts Associated with Exposure of Nontarget Invertebrates and Pollinators, Including Special-Status Species, to the Chemical Constituents, or from Production, Use, or Disposal of These Materials

The No Program Alternative would use hydraulic spraying, defined as a medium to coarse spray continuously applied by either truck-based equipment or backpack-based equipment, of the No Program insecticides by farm and nursery operators (and their registered pesticide applicators). The target vegetation would be trees, shrubs, or crops on private land. Use of insecticides by individual homeowners would occur as well.

Impacts to nontarget insects and pollinators (e.g., bees) are considered likely for all No Program formulations except for Btk and spinosad, based on the data provided in Section 12.2.3.7. These chemicals are not highly specific. Therefore, impacts to nontarget invertebrates and pollinators would be **potentially significant.**

Nontarget invertebrates and pollinators could be exposed to Btk and spinosad when they are distributed to control LBAM. The data provided in Chapter 12, Ecological Health, indicate that impacts could occur to nontarget butterflies and moths (lepidopterans) and to honeybees from exposure to Btk and spinosad. However, the honeybee is considered to be less sensitive to Btk, because of Btk's high selectivity to

lepidopterans. Although populations would recover in the short term, the long-term use of these pesticides could result in impacts that are **potentially significant**.

Impacts Associated with Exposure of Terrestrial Vertebrate Wildlife, Including Special-Status Species, to the Chemical Constituents, or from Production, Use, or Disposal of These Materials

The data provided in Chapter 12, Ecological Health, indicate that the increased application of chlorpyrifos, under the No Program Alternative could result in impacts to several mammalian species. Chronic exposure to lambda-cyhalothrin and to permethrin could result in impacts for a few mammalian species. Mammals that are highly mobile will avoid areas of high activity that would be associated with treatments and, thus, reduce the probability that they would experience the maximum exposure doses that were considered. However, based on the criteria, it was concluded that ingestion exposure to several mammalian species under the No Program Alternative could be an adverse effect.

In birds, only chronic exposure data for chlorpyrifos indicated that an impact could occur (Section 12.2.3.3), although the potential impact is likely to be lower than for sensitive mammalian species.

For reptiles and terrestrial amphibians, only chronic ingestion of chlorpyrifos resulted in exposure data that indicated that an impact could occur, but these animals are generally less likely to move away from potential exposure than other mobile vertebrates. Although no exposure data for lambda-cyhalothrin and permethrin exceeded the screening levels for herptiles (Section 12.2.3.5), limited potential still exists for adverse effects, due to the lack of amphibian testing data.

Exposure data indicate that impacts to several mammalian species (Section 12.2.3.3), birds (Section 12.2.3.3), reptiles (Section 12.2.3.5), and terrestrial amphibians (Section 12.2.3.5) resulting from increased exposure to chlorpyrifos would be **potentially significant**.

Exposure data indicate that impacts to several mammalian species (Section 12.2.3.3) resulting from increased exposure to lambda-cyhalothrin or permethrin would be **less than significant**.

The data provided in Section 12.2.3.3 indicate no risk of impacts to birds from the increased application of lambda-cyhalothrin or permethrin under the No Program Alternative. Therefore, increased application of lambda-cyhalothrin or permethrin would result in **no impacts** to birds.

Impacts to reptiles and terrestrial amphibians would have increased exposure from lambda-cyhalothrin or permethrin under the No Program alternative. The potential impacts to these species are low, based on the data provided in Chapter 12, Ecological Health. However, due to the lack of amphibian testing data limited impacts are considered possible (Section 12.2.3.5). Therefore, increased application of lambda-cyhalothrin or permethrin could result in impacts to reptiles or terrestrial amphibians, but the impacts would be **less than significant**.

Terrestrial vertebrate wildlife could be exposed to Btk and spinosad when they are released, through ingestion or inhalation, or from production, use, or disposal of these materials. Reptiles, birds, and terrestrial amphibians could be exposed to Btk and spinosad. However, based on the data provided in Chapter 12, Ecological Health, this exposure would result in **no impacts**.

Mammals could be exposed to Btk and spinosad through ingestion or inhalation, or from production, use, or disposal of these materials. Based on the data provided in Chapter 12, Ecological Health, this exposure would result in no impacts from spinosad and no impacts to many species from Btk. For those species that could be impacted by exposure to Btk, behavioral avoidance would reduce the potential impacts to **less than significant**.

Impacts Associated with Exposure of Terrestrial Wildlife, Including Special-Status Species, to the Chemical Constituents through an Accidental Spill

Distribution of the treatment materials involves transport to treatment sites and filling of the application equipment. Terrestrial wildlife could be exposed to chlorpyrifos, lambda-cyhalothrin, permethrin, Btk, or spinosad from accidental spills (Section 12.2.3.11). However, handling and spill prevention procedures required of all licensed pesticide applicators would be implemented, which will minimize the potential impacts from spills. Due to the implementation of required safe handling and spill prevention procedures, these impacts would be **less than significant**.

Impacts to Terrestrial Wildlife Species from an Increase in Ambient Noise

The No Program Alternative is expected to involve hydraulic spraying by individual growers in agricultural areas and at nurseries (as described in Chapter 5, Noise). While backpack spraying would not produce noise, truck-mounted spraying would be a source of noise and could increase ambient noise levels during operation. Due to the limited time and frequency of the applications, during which the ambient noise levels would be elevated, and the limited increase in projected levels, this impact on terrestrial wildlife would be **less than significant**.

10.2.4 Mating Disruption (Alternative MD)

Mating disruption involves the use of insect pheromones to disrupt the moth's mating activities. Three mating disruption methods evaluated have different methods of delivering the pheromone, including twist ties, ground application of pheromones, and aerial application of pheromones, as described in Chapter 2, Program Description.

10.2.4.1 Twist Ties (Alternative MD-1)

Plastic ties infused with LBAM pheromone are to be used in small isolated infestations (at least 5 miles from a regulated area or separated from a regulated area by a physical barrier, such as a largely uninhabited area or mountain range). Twist ties would be used as a stand-alone treatment or in conjunction with larval treatments of Btk or spinosad. No mechanical equipment is required for this application method. Because the expected environmental concentration of the pheromone would be significantly less than Alternatives MD-2 and MD-3, no formal dosage modeling was conducted, and significance conclusions of the other MD alternatives were considered applicable to Alternative MD-1.

Impacts to Botanical Resources in Riparian Areas or Federally Protected Wetlands

Based on the data provided in Chapter 12, Ecological Health, plants exhibit no sensitivity to the pheromone, and no impacts would occur to botanical resources associated with riparian communities or federally protected wetlands related to Alternative MD-1.

Impact TR-1: Application of pheromones by twist ties would not impact botanical resources in riparian or federally protected wetland areas (Section 12.2.4.6). Therefore, mitigation is not required.

Impacts Associated with Exposure of Nontarget Invertebrates and Pollinators, Including Special-Status Species, to the Chemical Constituents, or from Production, Use, or Disposal of These Materials

Nontarget invertebrates and pollinators could be exposed to pheromones or inert ingredients when they are distributed. However, the data provided in Chapter 12, Ecological Health, indicate that no risk of impacts would occur to nontarget invertebrates, including insects, from exposure to the pheromones or inert ingredients. A limited potential exists for attracting closely related nontarget lepidopterans, but this potential impact is small and would not be harmful to the entire population in an area.

Impact TR-2: Exposure through the use, production, or disposal of pheromones or inert ingredients would not cause direct impacts to nontarget invertebrates and pollinators including special-status species (Section 12.2.4.7). However, a limited potential exists for attracting closely related nontarget lepidopterans. Because the potential impact is limited, Alternative MD-1 is concluded to be less than significant for this criterion. Therefore, mitigation is not required.

Impacts Associated with Exposure of Terrestrial Vertebrate Wildlife, Including Special-Status Species, to the Chemical Constituents or from Production, Use, or Disposal of These Materials

Terrestrial vertebrate wildlife could be exposed to LBAM pheromones by inhaling material released to the atmosphere or by eating the inert ingredients. However, based on the data provided in Chapter 12, Ecological Health, no impacts would occur to terrestrial amphibians, reptiles, birds, or mammals related to exposure through Alternative MD-1. Although it is unlikely, physical obstruction from ingesting twist ties could occur with birds.

Impact TR-3: Exposure through ingestion or inhalation or by the use, production, or disposal of pheromones or inert ingredients would not cause impacts to terrestrial mammals, reptiles, or amphibians, including special-status species (Sections 12.2.4.3, 12.2.4.4, and 12.2.4.5). Therefore, no mitigation is required.

Impact TR-4: Exposure through ingestion or inhalation or by the use, production, or disposal of pheromones or inert ingredients would not cause impacts to birds, including special-status species (Section 12.2.4.3). However, physical adverse effects to birds could occur from ingestion of the twist ties (Section 12.2.4.9). Because ingestion is unlikely to occur, the impact would be less than significant. Therefore, mitigation is not required.

Impacts Associated with Exposure of Terrestrial Wildlife, Including Special-Status Species, to the Chemical Constituents through an Accidental Spill

The twist ties are a solid matrix that, if spilled, can be simply picked up without creating an impact.

Impact TR-5: An accidental spill of twist ties would not result in an increased exposure of terrestrial wildlife to the pheromones or the inert ingredients (Section 12.2.4.11). No impact would occur. Therefore, mitigation is not required.

Impacts to Terrestrial Wildlife from an Increase in Ambient Noise

Twist ties used for mating disruption would be placed by hand by workers on foot, and would not require any mechanical equipment for treatment activities.

Impact TR-6: Hand placement of twist ties by workers on foot would not result in an increase in ambient noise. Therefore, no impact would occur, and no mitigation is required.

10.2.4.2 Ground Application (Alternative MD-2)

The pheromone treatments may be applied to the ground most commonly for two scenarios: (1) trees and shrubs in residential yards and (2) telephone poles and trees on public property alongside the roadways. Several different methods of applying treatment compounds using ground-based equipment are in use. The methods identified by the CDFA include:

- Caulk Gun (for trees and shrubs or telephone poles on private or public land)
- Pod Gun (for trees and shrubs on either public or private land)
- Backpack Dose Spray Gun (for public and private lands and target trees, shrubs, and structures like telephone poles)
- Truck Dose Spray Gun (for use by personnel driving along public streets and stopping to apply the treatment compound to trees and poles that border the street)

Impacts to Botanical Resources in Riparian Areas or Federally Protected Wetlands

Based on the data provided in Chapter 12, Ecological Health, no impacts would occur to botanical resources associated with riparian communities or federally protected wetlands related to Alternative MD-2.

Impact TR-7: Ground application of pheromones would not impact botanical resources in riparian or federally protected wetland areas (Section 12.2.5.6). Therefore, mitigation is not required.

Impacts Associated with Exposure of Nontarget Invertebrates and Pollinators, Including Special-Status Species, to the Chemical Constituents, or from Production, Use, or Disposal of These Materials

Nontarget invertebrates and pollinators could be exposed to pheromones or inert ingredients when they are distributed. The data provided in Chapter 12, Ecological Health, indicate that no direct risk of impacts would occur to nontarget invertebrates, including insects, from exposure to the pheromones or inert ingredients. A limited potential exists for attracting closely related nontarget lepidopterans, but this potential impact is small and would not be harmful to the entire population in an area.

Impact TR-8: Exposure through the use, production, or disposal of pheromones or inert ingredients would not cause direct impacts to nontarget invertebrates and pollinators including special-status species (Section 12.2.5.7). However, a limited potential exists for attracting closely related nontarget lepidopterans. Because the potential impact is limited, Alternative MD-2 is concluded to be less than significant for this criterion. Therefore, mitigation is not required.

Impacts Associated with Exposure of Terrestrial Vertebrate Wildlife, Including Special-Status Species, to the Chemical Constituents, or from Production, Use, or Disposal of These Materials

Terrestrial vertebrate wildlife could be exposed to LBAM pheromones by inhaling material released to the atmosphere or by eating the inert ingredients. However, based on the data provided in Chapter 12, Ecological

Health, no impacts would occur to terrestrial amphibians, reptiles, birds, or mammals related to exposure through Alternative MD-2.

Impact TR-9: Exposure through ingestion or inhalation or by the use, production, or disposal of pheromones or inert ingredients would not cause impacts to terrestrial vertebrate wildlife including special-status species (Sections 12.2.5.4 and 12.2.5.5). Therefore, no mitigation is required.

Impacts Associated with Exposure of Terrestrial Wildlife, Including Special-Status Species, to the Chemical Constituents through an Accidental Spill

Distribution of the treatment materials involves transport to treatment sites and filling of the application equipment. Terrestrial wildlife could be exposed to LBAM pheromones or the inert ingredients from accidental spills. However, it is unlikely that a spill of these formulations would lead to an adverse effect, regardless of the increased potential for a spill to occur (Section 12.2.5.11).

Impact TR-10: Terrestrial wildlife could be exposed to the pheromones or the inert ingredients through an accidental spill. However, based on the data provided in Chapter 12, Ecological Health, impacts from such an exposure would be less than significant. Therefore, no mitigation is required.

Impacts to Terrestrial Wildlife from an Increase in Ambient Noise

While no noise sources would be associated with the use of caulk/pod guns or manual backpack spraying of trees and shrubs, the truck-mounted spraying would be a source of noise and would result in a temporary increase in ambient noise levels.

Impact TR-11 Truck-mounted sprayers could increase ambient noise levels during implementation of Alternative MD-2. Due to the limited time and frequency of the applications, during which the ambient noise levels would be elevated, and the limited increase in projected levels (Section 5.2.4.2), this impact on terrestrial wildlife would be less than significant. Therefore, no mitigation is required.

10.2.4.3 Aerial Application for Mating Disruption (Alternative MD-3)

Aerial application of pheromone for mating disruption would be used to treat denser LBAM populations. The area for aerial applications is a 1.5-mile radius around each location where LBAM is detected in an undeveloped area. Flight operations for pheromone release would be during daytime hours (between 8:00 am and 6:00 pm) over essentially unpopulated areas at a height of 300 to 500 feet above ground level. Aerial application of the pheromone in agricultural or undeveloped areas may be considered where ground applications of the pheromone are not feasible.

Impacts to Botanical Resources in Riparian Areas or Federally Protected Wetlands

Based on the data provided in Chapter 12, Ecological Health, the chemicals in the MD-3 formulations are not toxic to plants. Therefore, no impacts would occur to botanical resources associated with riparian communities or federally protected wetlands related to Alternative MD-3.

Impact TR-12: Application of pheromones by aerial application would not impact botanical resources in riparian or federally protected wetland areas (Section 12.2.6.6). Therefore, mitigation is not required.

Impacts Associated with Exposure of Nontarget Invertebrates and Pollinators, Including Special-Status Species, to the Chemical Constituents, or from Production, Use, or Disposal of These Materials

Nontarget invertebrates and pollinators could be exposed to pheromones or inert ingredients when they are distributed. The data provided in Chapter 12, Ecological Health, indicate that no direct risk of impacts would occur to nontarget invertebrates, including insects, from exposure to the pheromones or inert ingredients. However, a limited potential exists for attracting closely related nontarget lepidopterans, but is small and not harmful to the entire population in an area.

Impact TR-13: Exposure through the use, production, or disposal of pheromones or inert ingredients would not cause direct impacts to nontarget invertebrates and pollinators including special-status species (Section 12.2.6.7). However, a limited potential exists for attracting closely related nontarget lepidopterans. Because the potential impact is limited, Alternative MD-3 is concluded to be less than significant for this criterion. Therefore, mitigation is not required.

Impacts Associated with Exposure of Terrestrial Vertebrate Wildlife, Including Special-Status Species, to the Chemical Constituents, or from Production, Use, or Disposal of These Materials

Terrestrial vertebrate wildlife could be exposed to LBAM pheromones by inhaling material released to the atmosphere or by eating the inert ingredients. However, based on the data provided in Chapter 12, Ecological Health, no impacts would occur to terrestrial amphibians, reptiles, birds, or mammals related to exposure through Alternative MD-3.

Impact TR-14: Exposure through ingestion or inhalation or by the use, production, or disposal of pheromones or inert ingredients would not cause impacts to terrestrial vertebrate wildlife including special-status species (Sections 12.2.6.3, 12.2.6.4, and 12.2.6.5). No impacts would occur. Therefore, no mitigation is required.

Impacts Associated with Exposure of Terrestrial Wildlife, Including Special-Status Species, to the Chemical Constituents through an Accidental Spill

Distribution of the treatment materials involves transport to treatment sites and filling of the application equipment. Terrestrial wildlife could be exposed to LBAM pheromones or the inert ingredients from accidental spills. However, it is unlikely that a spill of these formulations would lead to an adverse effect, regardless of the increased potential for a spill to occur. However, due to uncertainty related to the data for special-status lepidopteran species, a limited potential for effects, particularly to lepidopteran mating behavior, exists.

Impact TR-15: Terrestrial wildlife could be exposed to the pheromones or the inert ingredients through an accidental spill (Section 12.2.6.11). However, based on the data provided in Chapter 12, Ecological Health, impacts from such an exposure would be less than significant. Therefore, no mitigation is required.

Impacts to Terrestrial Wildlife from an Increase in Ambient Noise

The potential for impacts from noise by Alternative MD-3 is associated with the aircraft operations. Aircraft operation for the dispersal of sterile insects would result in noise in the vicinity of the dispersal activity. Impacts would occur only during flights, which are limited to 15 to 30 minutes. However, noise levels from the activity could be perceptible over ambient noise levels, depending on existing noise sources in the vicinity.

Impact TR-16: Aircraft operation could result in an increase in ambient noise level. Due to the limited time during which the ambient noise levels would be elevated, this impact for most species would be less than significant.

Impact TR-17: If LBAM infestations occurred near sensitive receptors, such as nesting eagles or other special-status raptors, then they could experience short-term and temporary noise-level increases from aerial application. Noise disturbance could result in disruption to nesting, interrupted feeding of nestlings, or nest abandonment. Impacts would be potentially significant but mitigable.

Mitigation Measure TR-17a: Avoid operating aircraft close to known active nests of federally or state-listed raptors. Aerial treatment will not be conducted close to known active nests of federally or state-listed raptors during the breeding season. The buffer area may vary by species, ranging up to 0.25 mile.

Mitigation Measure TR-17b: Avoid operating aircraft close to known active nests of bald eagles. Aerial treatments will not be conducted within 1,000 feet of a known active bald eagle nest during the breeding season, except where eagles have demonstrated tolerance for the activity (USFWS 2007b).

Mitigation Measure TR-17c: Avoid operating aircraft close to known active nests of other special-status raptors. Aerial treatment will not be conducted within 300 feet of a known active nest for any other special-status raptor during the breeding season, except where the raptors have demonstrated tolerance for the activity.

Significance after Mitigation: Less than significant

10.2.5 Male Moth Attractant (Alternative MMA)

Alternative MMA involves a combination of the LBAM-specific pheromone plus permethrin, applied as a ground treatment that is conducted in advance of the aerial mating disruption or the release of sterile moths or parasitic wasps (if needed) to enhance the efficacy of the aerial methods. The treatment area consists of a 1.5-mile radius around any detection site. Treatments may occur on street trees and utility poles, 8 feet aboveground, applied using a truck-based spray system as described for the use of SPLAT in Section 10.2.3, No Program Alternative. Male attractant treatment sites would be out of reach of ground-based wildlife. Applying the permethrin in Alternative MMA via a waxy material reduces the potential for exposure of nontarget wildlife.

Impacts to Botanical Resources in Riparian Areas or Federally Protected Wetlands

Based on the data provided in Chapter 12, Ecological Health, no impacts would occur to botanical resources associated with riparian communities or federally protected wetlands related to Alternative MMA (Section 12.2.7.6).

Impact TR-18: Application of male moth attractant would not impact botanical resources in riparian or federally protected wetland areas. Therefore, mitigation is not required.

Impacts Associated with Exposure of Nontarget Invertebrates and Pollinators, Including Special-Status Species, to the Chemical Constituents, or from Production, Use, or Disposal of These Materials

Nontarget invertebrates and pollinators could be exposed to pheromones or inert ingredients when these materials are distributed. However, areas at the height of the applications and the substrate upon which

applications will occur (utility poles) are not habitats that would normally attract pollinators or many nontarget invertebrates. Therefore, even though the concentration of the only active insect toxicant (permethrin) would be adequate to kill insects if they contact the deposits, the likelihood of quantitative significance under this alternative is low. The data provided in Chapter 12, Ecological Health, indicate that little potential exists for impacts to nontarget invertebrates, including insects, from exposure to the pheromones, inert ingredients, or permethrin through this application method.

Impact TR-19: Impacts from exposure of nontarget invertebrates and pollinators, including special-status species, through the use, production, or disposal of pheromones or inert ingredients (Section 12.2.7.7), would be less than significant. Therefore, mitigation is not required.

Nontarget invertebrates and pollinators could be exposed to permethrin when this material is distributed. However, areas at the height of the applications, and the substrate upon which applications will occur (utility poles) are not habitats that would normally attract pollinators or many nontarget invertebrates. Therefore, even though the concentration of the only active insect toxicant (permethrin) would be adequate to kill insects if they contact the deposits, the likelihood of quantitative significance under this alternative is low. The data provided in Chapter 12, Ecological Health, indicate that little potential exists for impacts to nontarget invertebrates, including insects, from exposure to permethrin through this application method. No toxicity information applicable to insects was identified for 1,2,4-trimethylbenzene or ethylbenzene. Because the compounds are highly volatile, exposure to these chemicals would be extremely limited if Alternative MMA is implemented.

Impact TR-20: Nontarget invertebrates and pollinators, including special-status species, could be exposed to permethrin and inert ingredients, and could have limited exposure to 1,2,4-trimethylbenzene or ethylbenzene. However, impacts from this exposure would be less than significant. Therefore, mitigation is not required.

Impacts Associated with Exposure of Terrestrial Vertebrate Wildlife, Including Special-Status Species, to the Chemical Constituents, or from Production, Use, or Disposal of These Materials

Terrestrial vertebrate wildlife could be exposed to LBAM pheromones by inhaling material released to the atmosphere or by eating the inert ingredients. Based on the data provided in Chapter 12, Ecological Health, no impacts would occur to terrestrial amphibians or reptiles, mammals, or birds from exposure to the inert ingredients for SPLAT and Permethrin E-Pro (1,2,4-tri-methylbenzene).

Impact TR-21: Application of male moth attractant treatments would not impact reptiles, terrestrial amphibians, mammals, or birds (Sections 12.2.7.3, 12.2.7.4, 12.2.7.5, and 12.2.7.10). Therefore, mitigation is not required.

Impacts Associated with Exposure of Terrestrial Wildlife, Including Special-Status Species, to the Chemical Constituents through an Accidental Spill

Distribution of the treatment materials involves transport to treatment sites and filling of the application equipment. Terrestrial wildlife could be exposed to pheromones or the inert ingredients from accidental spills. Because Alternative MMA formulations do not elicit toxicity in the tests that have been conducted to date on standard test species, it is unlikely that a spill of these formulations would lead to an adverse effect, regardless of the increased potential for a spill to occur

Impact TR-22: Terrestrial wildlife could be exposed to the pheromones, the inert ingredients, or permethrin through an accidental spill. However, based on the data provided in

Chapter 12, Ecological Health, no impacts would occur (Section 12.2.7.11). Therefore, mitigation is not required.

Impacts to Terrestrial Wildlife from an Increase in Ambient Noise

Application of male moth attractant would be similar to the truck-mounted spraying described in Section 10.2.4.2, Ground Application for Mating Disruption (Alternative MD-2). This application method would be a source of noise and would result in a temporary increase in ambient noise levels.

Impact TR-23: Truck-mounted sprayers could increase ambient noise levels during application of male moth attractant materials. Due to the limited time and frequency of the applications, during which the ambient noise levels would be elevated, and the limited increase in projected levels (Section 5.2.5), this impact on terrestrial wildlife would be less than significant. Therefore, no mitigation is required.

10.2.6 Organically Approved Insecticides (Alternatives Btk and S)

Control alternatives with pesticides include the use of *Bacillus thuringiensis kurstaki* (Alternative Btk) and spinosad (Alternative S). These alternatives may be used in targeted areas. Both of these treatments would be applied by hydraulic spraying using either truck-based or backpack-based equipment.

Impacts to Botanical Resources in Riparian Areas or Federally Protected Wetlands

Based on the data provided in Chapter 12, Ecological Health, no impacts would occur to botanical resources associated with riparian communities or federally protected wetlands related to Alternatives Btk and S, because none of these materials present phytotoxic risks.

Impact TR-24: Application of Organically Approved Insecticides would not impact botanical resources in riparian or federally protected wetland areas (Section 12.2.8.6). Therefore, mitigation is not required.

Impacts Associated with Exposure of Nontarget Invertebrates and Pollinators, Including Special-Status Species, to the Chemical Constituents, or from Production, Use, or Disposal of These Materials

Nontarget invertebrates and pollinators could be exposed to Btk and spinosad when they are distributed to control LBAM. The data provided in Chapter 12, Ecological Health, indicate that impacts could occur to nontarget butterflies and moths (lepidopterans) and to honeybees from exposure to Btk and spinosad. However, the honeybee is considered to be less sensitive to Btk, because of Btk's high selectivity to lepidopterans.

Impact TR-25: Application of Btk or spinosad could result in impacts to nontarget (nonspecial-status) moths and butterflies and to other insect pollinators (Section 12.2.8.7). Because populations would recover in the short term, these impacts would be less than significant. Therefore, mitigation is not required.

Impact TR-26: Application of Btk or spinosad could result in impacts to special-status moths and butterflies (Section 12.2.8.10). These impacts are potentially significant but mitigable.

Mitigation Measure TR-26: Avoid application of Btk and spinosad in occupied habitat for federally listed butterflies and moths. The CDFA or its contractors will check the locations of known populations of federally

listed moths and butterflies prior to scheduling the application of Btk or spinosad. No Btk or spinosad treatments will be conducted within 1-mile buffer zones around known populations of federally listed moths or butterflies, or as determined in consultation with the USFWS.

Significance after Mitigation: Less than significant

Impacts Associated with Exposure of Terrestrial Vertebrate Wildlife, Including Special-Status Species, to the Chemical Constituents, or from Production, Use, or Disposal of These Materials

Terrestrial vertebrate wildlife could be exposed to Btk and spinosad when they are released, through ingestion or inhalation, or from production, use, or disposal of these materials. However, based on the data provided in Chapter 12, Ecological Health, this exposure would not result in adverse effects, because these materials have no or minimal toxicity to vertebrate wildlife.

Impact TR-27: Reptiles, terrestrial amphibians, mammals, and birds could be exposed to Btk and spinosad. However, due to the limited or absence of toxicity, this exposure would result in no impacts (Section 12.2.8.3, 12.2.8.4, and 12.2.8.5). Therefore, no mitigation is required.

Impacts Associated with Exposure of Terrestrial Wildlife, Including Special-Status Species, to the Chemical Constituents through an Accidental Spill

Distribution of the treatment materials involves transport to treatment sites and filling of the application equipment. Terrestrial wildlife could be exposed to Btk or spinosad from accidental spills. However, handling and spill prevention procedures required of all licensed pesticide applicators would be implemented, which will minimize the potential impacts from spills.

Impact TR-28: Terrestrial wildlife could be exposed to Btk or spinosad through an accidental spill. Due to the implementation of required safe-handling and spill prevention procedures, these impacts would be less than significant (Section 12.2.8.11). Therefore, no mitigation is required.

Impacts to Terrestrial Wildlife from an Increase in Ambient Noise

Treatments for both Alternatives Btk and S would be applied by hydraulic spraying using either truck-based or backpack-based equipment. While no noise sources would be associated with manual backpack spraying of trees and shrubs, the truck-mounted spraying would be a source of noise and would result in a temporary increase in ambient noise levels.

Impact TR-29: Truck-mounted sprayers could increase ambient noise levels during application of Btk or spinosad. Due to the limited time and frequency of the applications, during which the ambient noise levels would be elevated, and the limited increase in projected levels (Section 5.2.6), this impact on terrestrial wildlife would be less than significant. Therefore, no mitigation is required.

10.2.7 Inundative Parasite Wasp Releases (Alternative Bio-P)

The environmental concerns for this alternative are limited to the impacts to terrestrial wildlife from the aerial release of parasitic wasps, including a short-term, localized increase in prey for wasp predators and a potential short-term, localized increase in parasitism on nontarget insect species. Inundative parasite wasp releases would be made only in areas with moderate to heavy LBAM detections, using native, commercially available

parasitic wasps. The estimated number of the native wasp species (*Trichogramma platerni* and *T. pretiosum*) to be released is 1,000,000 per square mile. Wasp pupae in host eggs are glued to index cards and then attached to foliage where LBAM has been detected.

Impacts on Nontarget Insect Species Associated with the Release of Parasitic Wasps

Because native *Trichogramma* wasps also feed on the eggs of nontarget insect species, releasing parasitic wasps could impact some nontarget insects. However, these wasps are native to California and are relatively site-specific in their impact. The range is considered to be approximately 200 feet. Native insect populations in areas that incur population reductions from the increase in parasitic wasps generally are expected to recover rapidly as insects from outside the treatment area move into the depleted populations. Populations of special-status insects may not be able to recover as rapidly as commoner species.

Impact TR-30: Special-status insect species could be slow to recover from a temporary increase in parasitic wasp numbers at treatment sites. Impacts would be potentially significant but mitigable.

Mitigation Measure TR-30: Avoid parasitic wasp releases near known populations of federally listed insects. The CDFA or its contractors will check the locations of known populations of federally listed insects prior to scheduling the release of parasitic wasps. No parasitic wasp treatments will be conducted within 0.5 mile of known populations of federally listed insects.

Significance after Mitigation: Less than significant

Impact TR-31: Release of native parasitic wasps would result in a temporary increase in parasitic wasp numbers at treatment sites, which could impact nonlisted, nontarget insect species. Nonlisted, nontarget insect species with adjacent populations could be temporarily impacted, but would rapidly recover. Impacts are less than significant based on the recruitment potential. Therefore, no mitigation is required.

Impacts on Wasp Predator Species Associated with the Release of Parasitic Wasps

Release of parasitic wasps would result in a temporary, localized increase in prey for predators of these wasps. However, most predators have opportunistic feeding habits. Release of parasitic wasps is unlikely to result in impacts on predator populations.

Impact TR-32: Release of parasitic wasps would result in a temporary, localized increase in prey for predators of *Trichogramma* wasps, followed by a return to normal prey levels. Impacts are less than significant based on the availability of other prey. Therefore, no mitigation is required.

10.2.8 Sterile Insect Technique (Alternative SIT)

The environmental concerns for this alternative are limited to the impacts to terrestrial wildlife from the aerial release of sterile male LBAMs, including aircraft noise and a short-term increase in prey. The releases would occur on a schedule of 7 to 14 days over a time period of at least 2 LBAM life cycles past the last wild LBAM detected in each treatment area. The length of a life cycle is temperature dependent so the time for 2 life cycles can range from 45 days to 6 months, depending upon local weather conditions.

Impacts to Terrestrial Wildlife from an Increase in Ambient Noise

The potential for impacts from noise by Alternative SIT is associated with the aircraft operations. Aircraft operation for the dispersal of sterile insects would result in noise in the vicinity of the dispersal activity. Impacts would occur only during flights, which are limited to 15 to 30 minutes. However, noise levels from the activity could be perceptible over ambient noise levels, depending on existing noise sources in the vicinity.

Impact TR-33 Aircraft operation could result in an increase in ambient noise level. Due to the limited time during which the ambient noise levels would be elevated, this impact for most species would be less than significant. Therefore, no mitigation is required.

Impact TR-34: If LBAM infestations occurred near sensitive receptors, such as nesting eagles or other special-status raptors, then they could experience short-term and temporary noise-level increases from aerial release of sterile male moths. Noise disturbance could result in disruption to nesting, interrupted feeding of nestlings, or nest abandonment. Impacts would be potentially significant but mitigable.

Mitigation Measure TR-34: Implement Mitigation Measure TR-17a (Avoid operating aircraft close to active nests of federally or state-listed raptors), Mitigation Measure TR-17b (Avoid operating aircraft close to active nests of bald eagles), and Mitigation Measure TR-17c (Avoid operating aircraft close to active nests of other special-status raptors).

Significance after Mitigation: Less than significant

Impacts on Moth Predator Species Associated with the Release of Sterile Male LBAMs.

Release of sterile male LBAMs would result in a temporary, localized increase in prey for predators of moths. However, according to Nagel and Peveling (2005), apparently no obligate predators of insects are targeted by SIT. Most predators have opportunistic feeding habits. Release of sterile moths is unlikely to result in impacts on predator populations.

Impact TR-35: Fluctuation in the prey base for moth predator species would be associated with the release of sterile male LBAMs. Impacts are considered less than significant based on the availability of other prey. Therefore, no mitigation is required.

10.2.9 Cumulative Impacts

Cumulative impacts are those based on two or more individual effects that in the aggregate are considerable or that enlarge or intensify other environmental impacts. For this PEIR, cumulative impacts relate to the effects of Program alternatives together with the effects of past, present, and reasonably foreseeable actions on the terrestrial biological resources considered herein: botanical resources, nontarget invertebrates and pollinators, and terrestrial vertebrate wildlife.

As discussed in Chapter 2, Program Description, LBAM eradication will be based on releases of sterile insects, ground and aerial applications of pheromone for mating disruption, ground treatment with a male moth attractant, insecticides, and biological control agents. It is expected that LBAM eradication would require 3 to 5 years using these and, possibly, other treatment tools not yet available. During that time, LBAM infestations may continue to spread until full-scale eradication and treatment activities are implemented.

Less-than-significant impacts to nontarget wildlife from the LBAM mating disruption treatments are expected because the pheromone is selective to LBAM and other leafroller moths. If any native leafroller species are

impacted, they would recover quickly through immigration from adjacent populations. These small incremental impacts are not cumulatively considerable, as they do not contribute to a combined significant cumulative impact from other general pest control activities by residential, commercial, and agricultural activities occurring within the treatment areas.

The use of male moth attractant treatments containing permethrin is expected to have less-than-significant impacts to other biological resources, because the treatments are specially formulated to attract LBAM and then kill them, i.e., targeted to LBAM. Only those nontarget insects that incidentally come into contact with the treatment would be affected by the permethrin. Similarly, terrestrial vertebrate wildlife exposure to permethrin and inert ingredients would be incidental. Based on the rate of permethrin use for the proposed treatments in the immediate Program Area, the additional permethrin use (less than 3,000 pounds per year) would amount to less than 1 percent of current use (354,800 pounds in 2007). See Sections 8.3 and 12.3 for further discussion of pesticide use. Cumulative impacts to nontarget species would not be significant, and the Program is not expected to result in cumulatively considerable impacts to pollinators and honeybees.

Applications of organically approved pesticides (Btk and spinosad) would be used in relatively small areas. Populations of nontarget insects that may be reduced by these applications are expected to quickly return to pre-treatment levels through immigration from adjacent populations. Cumulative impacts to nontarget species would not occur.

The Program alternative that includes the release of parasitic wasps could result in increased predation on special-status insects if the wasps are released near these resources. Because parasitic wasps would be used only in relatively small areas, they would not be released near areas of known threatened or endangered insects, and *Trichogramma* populations would not remain high indefinitely, cumulative impacts to nontarget species would not occur.

Program alternatives that include truck or aerial spraying could result in an increase in ambient noise near sensitive biological receptors, such as nesting raptors. However, the increase in noise levels would be short term and would only occur during the eradication period. It is also assumed under the Program alternatives that individual farmers and nursery operators would not contribute to ambient noise levels by applying pesticide materials to control LBAM independently. Because neither other pest control programs nor farmer and nursery operator pesticide usage for LBAM would occur under the Program, cumulative impacts would not occur.

Program alternatives that include aerial spraying or sterile moth release could result in short-term and temporary noise-level increases near sensitive receptors, such as nesting eagles or other special-status raptors, if LBAM infestations occur nearby. Potential impacts from aerial applications would be mitigated by adoption of Mitigation Measures TR-17a through c, and cumulative impacts would not occur.

10.2.10 Environmental Impacts Summary

Table 10-1 is a summary comparison of all of the potential terrestrial impacts, including no impacts, associated with No Program and Program alternatives in comparison to existing conditions. The number of each statement correlates to its number in the text.

Table 10-1 Summary Comparison of Impacts of Alternatives

Impact Statement	No Program	MD-1	MD-2	MD-3	MMA	Btk and S	Bio-P	SIT
Terrestrial Resources								
Impacts to Special-Status Plant Species from LBAM's Spread	PS	na	na	na	na	na	na	na
Impacts to Host Plants for Special-Status Invertebrate Species from LBAM's Spread	PS	na	na	na	na	na	na	na
Impacts to Other Botanical Resources, Including Conifers and Forest Ecosystems, from LBAM's Spread	PS	na	na	na	na	na	na	na
Impacts to Botanical Resources in Riparian Areas	PS	N	N	N	N	N	N	N
Impact TR-1: Application of pheromones by twist ties would not impact botanical resources in riparian or federally protected wetland areas (Section 12.2.4.6).	na	N	na	na	na	na	na	na
Impact TR-7: Ground application of pheromones would not impact botanical resources in riparian or federally protected wetland areas (Section 12.2.5.6).	na	na	N	na	na	na	na	na
Impact TR-12: Application of pheromones by aerial application would not impact botanical resources in riparian or federally protected wetland areas (Section 12.2.6.6).	na	na	na	N	na	na	na	na
Impact TR-18: Application of male moth attractant would not impact botanical resources in riparian or federally protected wetland areas.	na	na	na	na	N	na	na	na
Impact TR-24: Application of Organically Approved Insecticides would not impact botanical resources in riparian or federally protected wetland areas (Section 12.2.8.6).	na	na	na	na	na	N	na	na
Impacts to Botanical Resources in Federally Protected Wetlands	LS	N	N	N	N	N	N	N
Impact TR-1: Application of pheromones by twist ties would not impact botanical resources in riparian or federally protected wetland areas (Section 12.2.4.6).	na	N	na	na	na	na	na	na
Impact TR-7: Ground application of pheromones would not impact botanical resources in riparian or federally protected wetland areas (Section 12.2.5.6).	na	na	N	na	na	na	na	na
Impact TR-12: Application of pheromones by aerial application would not impact botanical resources in riparian or federally protected wetland areas (Section 12.2.6.6).	na	na	na	N	na	na	na	na
Impact TR-18: Application of male moth attractant would not impact botanical resources in riparian or federally protected wetland areas.	na	na	na	na	N	na	na	na
Impact TR-24: Application of Organically Approved Insecticides would not impact botanical resources in riparian or federally protected wetland areas (Section 12.2.8.6).	na	na	na	na	na	N	na	na

**LIGHT BROWN APPLE MOTH ERADICATION PROGRAM
DRAFT PEIR**

Table 10-1 Summary Comparison of Impacts of Alternatives

Impact Statement	No Program	MD-1	MD-2	MD-3	MMA	Btk and S	Bio-P	SIT
Terrestrial Resources								
Impacts Associated with Exposure of Nontarget Invertebrates and Pollinators, Including Special-Status Species, to the Chemical Constituents, or from Production, Use, or Disposal of These Materials	PS	LS	LS	LS	LS	LS, SM	na	na
Impact TR-2: Exposure through the use, production, or disposal of pheromones or inert ingredients would not cause direct impacts to nontarget invertebrates and pollinators including special-status species (Section 12.2.4.7). However, a limited potential exists for attracting closely related nontarget lepidopterans. Because the potential impact is limited, Alternative MD-1 is concluded to be less than significant for this criterion.	na	LS	na	na	na	na	na	na
Impact TR-8: Exposure through the use, production, or disposal of pheromones or inert ingredients would not cause direct impacts to nontarget invertebrates and pollinators including special-status species (Section 12.2.5.7). However, a limited potential exists for attracting closely related nontarget lepidopterans.	na	na	LS	na	na	na	na	na
Impact TR-13: Exposure through the use, production, or disposal of pheromones or inert ingredients would not cause direct impacts to nontarget invertebrates and pollinators including special-status species (Section 12.2.6.7). However, a limited potential exists for attracting closely related nontarget lepidopterans.	na	na	na	LS	na	na	na	na
Impact TR-19: Impacts from exposure of nontarget invertebrates and pollinators, including special-status species, through the use, production, or disposal of pheromones or inert ingredients (Section 12.2.7.7), would be less than significant.	na	na	na	na	LS	na	na	na
Impact TR-20: Nontarget invertebrates and pollinators, including special-status species, could be exposed to permethrin and inert ingredients, and could have limited exposure to 1,2,4-trimethylbenzene or ethylbenzene.	na	na	na	na	LS	na	na	na
Impact TR-25: Application of Btk or spinosad could result in impacts to nontarget (nonspecial-status) moths and butterflies and to other insect pollinators (Section 12.2.8.7). Because populations would recover in the short term, these impacts would be less than significant.	na	na	na	na	na	LS	na	na
Impact TR-26: Application of Btk or spinosad could result in impacts to special-status moths and butterflies (Section 12.2.8.10).	na	na	na	na	na	SM	na	na

Table 10-1 Summary Comparison of Impacts of Alternatives

Impact Statement	No Program	MD-1	MD-2	MD-3	MMA	Btk and S	Bio-P	SIT
Terrestrial Resources								
Impacts Associated with Exposure of Terrestrial Vertebrate Wildlife, Including Special-Status Species, to the Chemical Constituents, or from Production, Use, or Disposal of These Materials	N, LS, PS	N,LS	N	N	N	N	na	na
Impact TR-3: Exposure through ingestion or inhalation or by the use, production, or disposal of pheromones or inert ingredients would not cause impacts to terrestrial mammals, reptiles, or amphibians, including special-status species (Sections 12.2.4.3, 12.2.4.4, and 12.2.4.5).	na	N	na	na	na	na	na	na
Impact TR-4: Exposure through ingestion or inhalation or by the use, production, or disposal of pheromones or inert ingredients would not cause impacts to birds, including special-status species (Section 12.2.4.3). However, physical adverse effects to birds could occur from ingestion of the twist ties (Section 12.2.4.9). Because ingestion is unlikely to occur, the impact would be less than significant.	na	LS	na	na	na	na	na	na
Impact TR-9: Exposure through ingestion or inhalation or by the use, production, or disposal of pheromones or inert ingredients would not cause impacts to terrestrial vertebrate wildlife including special-status species (Sections 12.2.5.4 and 12.2.5.5).	na	na	N	na	na	na	na	na
Impact TR-14: Exposure through ingestion or inhalation or by the use, production, or disposal of pheromones or inert ingredients would not cause impacts to terrestrial vertebrate wildlife including special-status species (Sections 12.2.6.3, 12.2.6.4, and 12.2.6.5).	na	na	na	N	na	na	na	na
Impact TR-21: Application of male moth attractant treatments would not impact reptiles, terrestrial amphibians, mammals, or birds (Sections 12.2.7.3, 12.2.7.4, 12.2.7.5, and 12.2.7.10).	na	na	na	na	N	na	na	na
Impact TR-27: Reptiles, terrestrial amphibians, mammals, and birds could be exposed to Btk and spinosad. However, due to the limited or absence of toxicity, this exposure would result in no impacts (Section 12.2.8.3, 12.2.8.4, and 12.2.8.5).	na	na	na	na	na	N	na	na
Impacts Associated with Exposure of Terrestrial Wildlife, Including Special-Status Species, to the Chemical Constituents through an Accidental Spill	LS	N	LS	LS	N	LS	na	na
Impact TR-5: An accidental spill of twist ties would not result in an increased exposure of terrestrial wildlife to the pheromones or the inert ingredients (Section 12.2.4.11).	na	N	na	na	na	na	na	na
Impact TR-10: Terrestrial wildlife could be exposed to the pheromones or the inert ingredients through an accidental spill.	na	na	LS	na	na	na	na	na
Impact TR-15: Terrestrial wildlife could be exposed to the pheromones or the inert ingredients through an accidental spill (Section 12.2.6.11).	na	na	na	LS	na	na	na	na
Impact TR-22: Terrestrial wildlife could be exposed to the pheromones, the inert ingredients, or permethrin through an accidental spill. However, based on the data provided in Chapter 12, Ecological Health, no impacts would occur (Section 12.2.7.11).	na	na	na	na	N	na	na	na

**LIGHT BROWN APPLE MOTH ERADICATION PROGRAM
DRAFT PEIR**

Table 10-1 Summary Comparison of Impacts of Alternatives

Impact Statement	No Program	MD-1	MD-2	MD-3	MMA	Btk and S	Bio-P	SIT
Terrestrial Resources								
Impact TR-28: Terrestrial wildlife could be exposed to Btk or spinosad through an accidental spill. Due to the implementation of required safe-handling and spill prevention procedures, these impacts would be less than significant (Section 12.2.8.11).	na	na	na	na	na	LS	na	na
Impacts to Terrestrial Wildlife Species from an Increase in Ambient Noise								
Impact TR-6: Hand placement of twist ties by workers on foot would not result in an increase in ambient noise.	na	N	na	na	na	na	na	na
Impact TR-11: Truck-mounted sprayers could increase ambient noise levels during implementation of Alternative MD-2.	na	na	LS	na	na	na	na	na
Impact TR-16: Aircraft operation could result in an increase in ambient noise level. Due to the limited time during which the ambient noise levels would be elevated.	na	na	na	LS	na	na	na	na
Impact TR-17: If LBAM infestations occurred near sensitive receptors, such as nesting eagles or other special-status raptors, then they could experience short-term and temporary noise-level increases from aerial application. Noise disturbance could result in disruption to nesting, interrupted feeding of nestlings, or nest abandonment.	na	na	na	SM	na	na	na	na
Impact TR-23: Truck-mounted sprayers could increase ambient noise levels during application of male moth attractant materials.	na	na	na	na	LS	na	na	na
Impact TR-29: Truck-mounted sprayers could increase ambient noise levels during application of Btk or spinosad.	na	na	na	na	na	LS	na	na
Impact TR-33: Aircraft operation could result in an increase in ambient noise level. Due to the limited time during which the ambient noise levels would be elevated, this impact for most species would be less than significant.	na	na	na	na	na	na	na	LS
Impact TR-34: If LBAM infestations occurred near sensitive receptors, such as nesting eagles or other special-status raptors, then they could experience short-term and temporary noise-level increases from aerial release of sterile male moths. Noise disturbance could result in disruption to nesting, interrupted feeding of nestlings, or nest abandonment.	na	na	na	na	na	na	na	SM
Impacts on Nontarget Insect Species Associated with the Release of Parasitic Wasps								
Impact TR-30: Special-status insect species could be slow to recover from a temporary increase in parasitic wasp numbers at treatment sites.	na	na	na	na	na	na	SM	na
Impact TR-31: Release of native parasitic wasps would result in a temporary increase in parasitic wasp numbers at treatment sites, which could impact nonlisted, nontarget insect species. Nonlisted, nontarget insect species with adjacent populations could be temporarily impacted, but would rapidly recover.	na	na	na	na	na	na	LS	na

Table 10-1 Summary Comparison of Impacts of Alternatives

Impact Statement	No Program	MD-1	MD-2	MD-3	MMA	Btk and S	Bio-P	SIT
Terrestrial Resources								
Impacts on Wasp Predator Species Associated with the Release of Parasitic Wasps	na	na	na	na	na	na	LS	na
Impact TR-32: Release of parasitic wasps would result in a temporary, localized increase in prey for predators of <i>Trichogramma</i> wasps, followed by a return to normal prey levels. Impacts are less than significant based on the availability of other prey.	na	na	na	na	na	na	LS	na
Impacts on Moth Predator Species Associated with the Release of Sterile Male LBAMs	na	na	na	na	na	na	na	LS
Impact TR-35: Fluctuation in the prey base for moth predator species would be associated with the release of sterile male LBAMs. Impacts are considered less than significant based on the availability of other prey.	na	na	na	na	na	na	na	LS
Key: LS = Less-than-significant impact N = No impact na = Not applicable PS = Potentially significant impact (Applies to No Program only. Program alternatives have either feasible mitigations or unavoidable impacts.) SM = Potentially significant but mitigable impact SU = Potentially significant and unavoidable impact								

10.2.11 Mitigation and Monitoring

Mitigation and monitoring for terrestrial biological resources are presented in this section of the document. The primary mitigation measures are minimizing noise disturbance near breeding raptors, and establishing appropriate buffers adjacent to habitats for sensitive, special-status wildlife to minimize drift of pesticides and parasitic wasps into these environments. Monitoring of the measures effectiveness will be conducted by the CDFA.

Impact TR-17: If LBAM infestations occurred near sensitive receptors, such as nesting eagles or other special-status raptors, then they could experience short-term and temporary noise-level increases from aerial application. Noise disturbance could result in disruption to nesting, interrupted feeding of nestlings, or nest abandonment. Impacts would be potentially significant but mitigable.

Mitigation Measure TR-17a: Avoid operating aircraft close to active nests of federally or state-listed raptors. Aerial treatment will not be conducted close to active nests of federally or state-listed raptors during the breeding season. The buffer area might vary by species, ranging up to 0.25 mile.

Mitigation Measure TR-17b: Avoid operating aircraft close to active nests of bald eagles. Aerial treatments will not be conducted within 1,000 feet of an active bald eagle nest during the breeding season, except where eagles have demonstrated tolerance for the activity (USFWS 2007b).

Mitigation Measure TR-17c: Avoid operating aircraft close to active nests of other special-status raptors. Aerial treatment will not be conducted within 300 feet of an active nest for any other special-status raptor during the breeding season, except where the raptors have demonstrated tolerance for the activity.

Location: All aerial application areas near breeding special-status raptors

Monitoring/Reporting Action: Concurrence with CDFG and USFWS.

Effectiveness Criteria: CDFG and USFWS to establish and may include selected site visits during treatment

Responsible Agency: CDFA

Timing: Prior to treatment

Impact TR-26: Application of Btk or spinosad could result in impacts to special-status moths and butterflies. These impacts are potentially significant but mitigable.

Mitigation Measure TR-26: Avoid application of Btk and spinosad in occupied habitat for federally listed butterflies and moths. The CDFA or its contractors will check the locations of known populations of federally listed moths and butterflies prior to scheduling the application of Btk or spinosad. No Btk or spinosad treatments will be conducted within 1-mile buffer zones around known populations of federally listed moths or butterflies, or as determined in consultation with the USFWS.

Location: All Btk and spinosad application areas near known populations of federally listed moths or butterflies

Monitoring/Reporting Action: Concurrence with CDFG and USFWS

Effectiveness Criteria: CDFG and USFWS to establish and may include selected site visits during treatment

Responsible Agency: CDFA

Timing: During treatment

Impact TR-30: Special-status insect species could be slow to recover from a temporary increase in parasitic wasp numbers at treatment sites. Impacts would be potentially significant but mitigable.

Mitigation Measure TR-30: Avoid parasitic wasp releases near known populations of federally listed insects. The CDFA or its contractors will check the locations of known populations of federally listed insects prior to scheduling the release of parasitic wasps. No parasitic wasp treatments will be conducted within 0.5 mile of known populations of federally listed insects.

Location: All parasitic wasp application areas near known populations of federally listed insects

Monitoring/Reporting Action: Concurrence with USFWS

Effectiveness Criteria: USFWS to establish and may include selected site visits during treatment

Responsible Agency: CDFA

Timing: Prior to treatment

Impact TR-34: If LBAM infestations occurred near sensitive receptors, such as nesting eagles or other special-status raptors, then they could experience short-term and temporary noise-level increases from aerial release of sterile male moths. Noise disturbance could result in disruption to nesting, interrupted feeding of nestlings, or nest abandonment. Impacts would be potentially significant but mitigable.

Mitigation Measure TR-34: Implement Mitigation Measure TR-17a (Avoid operating aircraft close to active nests of federally or state-listed raptors), Mitigation Measure TR-17b (Avoid operating aircraft close to active nests of bald eagles), and Mitigation Measure TR-17c (Avoid operating aircraft close to active nests of other special-status raptors).

Location: All aerial application areas near breeding special-status raptors.

Monitoring/Reporting Action: Concurrence with CDFG and USFWS.

Effectiveness Criteria: CDFG and USFWS to establish and may include selected site visits during treatment

Responsible Agency: CDFA

Timing: Prior to treatment

This Page Intentionally Left Blank