CHAPTER 12

Ecological Health

Chapter 12 evaluates potential ecological risks from the LBAM Program implementation using the screening level ecological risk analysis contained in Appendix F. Results of the evaluation are provided at the programmatic level. Section 12.1, Environmental Setting, presents an overview of hazards, toxicity and exposure concepts, and contains federal, state, and local ordinances and regulations that are applicable to the Program. Section 12.2, Environmental Impacts and Consequences, presents the following:

- Environmental concerns and evaluation criteria: A determination of whether the program alternatives would cause significant impacts to the environment
- Evaluation methods and assumptions
- Discussion of the ecological risks from the No Program and Program alternatives, and recommendations for mitigation, if required, for environmental impacts
- Cumulative impacts
- A summary of environmental impacts due to use of hazardous materials and potential generation of hazardous wastes
- Monitoring of recommended mitigation measures

In this context, hazardous materials and wastes are considered those substances with properties of toxicity, ignitability, corrosivity, and/or reactivity.

12.1 ENVIRONMENTAL SETTING

The LBAM Program Area is defined broadly as all areas of the State of California that could become infested with LBAM (see PEIR Chapter 2, Figure 2-1), and where treatments could feasibly occur. As discussed in Section 2.1, Program Area and Vicinity, the principal infestation identified is within 13 primarily coastal counties, but the Program Area encompasses portions of nearly all 58 counties in the State of California, and excludes alpine and desert areas and Imperial County. The Program Area is intended to include all portions of the state with climatic conditions suitable to the LBAM (USDA 2008a), which includes areas below 5,000 feet mean sea level and where temperatures are below 90°F for most of the year.

The Program alternatives proposed for the eradication of LBAM are summarized in Table 12-1. This table represents an abbreviated description of the application scenarios that are described in greater detail in PEIR Chapter 2. To evaluate the potential ecological impacts from hazardous materials under CEQA, only the alternatives where chemical control is anticipated are addressed. Therefore, Inundative Parasitic Wasp Releases (Alternative Bio-P) and Sterile Insect Technique (Alternative SIT) are not evaluated for ecological impacts in this chapter, but are evaluated in Chapter 9, Aquatic Resources, and Chapter 10, Terrestrial Resources. Furthermore, although two additional pheromone formulations are considered in the risk assessment technical appendices on ecological (Appendix F) and human health (Appendix G) risks, these two formulations (i.e., Checkmate and No-Mate) are not being considered for use based on guidance from the CDFA and, therefore, they are not evaluated for impacts under CEQA in this chapter.

Table 12-1 Condensed Summary of LBAM Control Alternatives Evaluated in the PEIR

Alternative	Application Method	Chemical (s)
No Program	As per label directions	Chlorpyrifos, Permethrin, Lambda-cyhalothrin
Mating Disruption: (Alternative MD-1)	Twist Ties	IsoMate
Mating Disruption (Alternative MD-2)	Ground Applications	Hercon Disrupt Bio-Flake® LBAM SPLAT® LBAM
Mating Disruption (Alternative MD–3)	Aerial Release	Hercon Disrupt Bio-Flake® LBAM SPLAT® LBAM
Male Moth Attractant (Alternative MMA)	Ground Application	Pheromone (1%) + Permethrin (6%)
Organically Approved Insecticides (Alternative Bt)	Ground Treatments*	*Bacillus thuringiensis kurstaki* (Btk)
Organically Approved Insecticides (Alternative S)	Ground Treatments*	Spinosad
Inundative Parasite Wasp Releases (Alternative Bio-P)		None – not considered further in this Risk Assessment
Sterile Insect Technique (Alternative SIT)		None – not considered further in this Risk Assessment
*Aerial treatments with these organic insecticides are not anticipated and were not modeled.		

12.1.1 Hazards, Toxicity and Exposure in the Environmental Setting

A “hazardous material” is defined in Title 22, CCR, Section 66084, as “a substance or combination of substances which, because of its quantity, concentration or physical, chemical, or infectious characteristics, may either (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating irreversible illness, or (2) pose a substantial present or potential hazard to human health or environment *when improperly treated, stored, transported or disposed of or otherwise managed*” [emphasis added]. Any liquid, solid, gas, sludge, synthetic product, or commodity that exhibits characteristics of toxicity, ignitability, corrosivity, or reactivity has the potential to be considered a “hazardous material.” In contrast, a “hazardous waste” is defined as “any hazardous material that is abandoned, discarded, or recycled” (CCR 66084).

12.1.1.1 Hazards and Hazardous Materials in Formulations Identified for the No Program and Program Alternatives

The No Program and some Program alternatives could involve the use of hazardous materials, as defined in CCR 66084. Formulation constituents include the active ingredients and may include inert ingredients generally classified as “volatile organic compounds” (VOCs) and “semivolatile organic compounds” (SVOCs). Inert ingredients do not contribute to the toxicity by the same mechanism of action, but rather are added to the formulations to improve solubility, distribution and emulsification of the active ingredient during application to improve efficacy (generally reducing the amount of active ingredient required). However, several of the VOCs and SVOCs ingredients in the LBAM treatment formulations under No Program and Program alternatives could be classified as hazardous materials under CCR 66084.

Whether or not these or any hazardous substances are associated with adverse health effects depends upon the amount that is contacted and assimilated by an ecological “receptor” (an animal or plant in this context), and for what period of time that contact may occur (see toxicity discussion below). This PEIR evaluation, and the information in Appendix F regarding potential risks for ecological species, was prepared to evaluate if the No Program or Program alternatives present unacceptable risks for unintended and incidentally occurring ecological receptors if they are exposed to the formulation containing the active ingredient.

12.1.1.2 Toxicity Concepts

Toxicology is the study of a chemical's potential to elicit an adverse effect in an organism (ATSDR 2005). The toxicity of a pesticide or chemical is related to the specific amount of the compound taken into an organism's tissues (i.e., the dose received by the ecological 'receptor'), the duration of time over which a dose is received, the potency of the chemical for eliciting a toxic effect (i.e., the 'response'), and the sensitivity of the receptor receiving the dose of the chemical. Receptor responses are measured in controlled laboratory tests to establish the toxicity of chemical(s). Toxicity effects are measured on a dose/response scale, whereby the probability of a toxic response (e.g., increased heart rate, respiratory complications, death, etc.) increases with the dose received (ATSDR 2005). Exposure is required for potential toxic effects to occur from chemicals. However, exposure does not, in itself, imply that toxicity will result (as toxicity is a function of exposure, dose, potency, and sensitivity, as discussed); but, exposure is a necessary first step for potential for an adverse health effect to exist. Thus, toxic hazards can be mitigated by limiting potential exposure to ensure that doses received from intentional applications of chemicals are less than the amount that may result in adverse health effects.

In ecological risk assessment, an exposure dose level is assumed above which noncarcinogenic effects may occur (potential carcinogenicity is not evaluated in ecological risk assessment), and below which no effects are anticipated to be measurable. Toxicity responses in ecologically relevant populations are usually evaluated based on a comparison of an estimated dose received by an ecological receptor (or exposure point concentration [EPC] to which a receptor could be exposed), and a toxicity reference value (TRV) relevant to the exposure pathway. The TRV is generally expressed as a dose per unit body weight of receptor, or media-specific EPC at or above which a toxicologically based endpoint has been reported or promulgated into law (ATSDR 2005). In simple terms, it is a comparison of the exposure dose to a toxicity threshold established in the scientific literature or in law—like water quality criteria. As described further in Section 12.2.2, the TRVs used in the risk assessment to support this chapter were primarily based on No Observable Adverse Effects Levels or Concentrations (NOAEL/NOAEC) that were reported in a study or group of studies on specific ecological receptors. If no NOAEL/NOAECs were reported, then the next higher level of tested concentration was used (i.e., the lowest observable adverse effect level 'LOAEL', or the LD_{50}—the dose that elicits mortality or some other adverse effect in 50 percent of the population of the species tested in a standard laboratory test, or otherwise identified in the field). To develop a NOAEL/NOAEC TRV, if none were identified in the literature for the guild species modeled, safety factors were applied to higher test concentrations.

In conducting ecological risk assessments, the first step is to evaluate exposure routes, or 'pathways.' If this evaluation indicates that a significant exposure could occur, then an evaluation is made of the potential dose that could be received by an ecological receptor. Three principal exposure pathways are related to ecological risk assessment: breathing (i.e., inhalation), eating or drinking (i.e., ingestion), and getting something on the skin (i.e., dermal or surface contact).

As part of the risk assessment process for the control of LBAM, CSMs were developed to identify the principal chemical exposure pathways possible from the No Program and Program alternatives. Exposure pathways qualify how animals and other ecological receptors might be exposed to the LBAM treatment chemicals. The ATSDR (2005) defines a complete exposure pathway as having five parts: (1) source of contamination, (2) a transport mechanism via environmental media (e.g., air, water, soils, etc.), (3) an exposure point where the receptor(s) would encounter the contamination, (4) the receptor population(s) at the exposure point, and (5) the route of exposure at the exposure point by which the chemical would enter the tissues of the receptor population. The CSM considers how ecological receptors could be exposed to formulation constituents during and following treatments. For graphical simplicity, only the primary exposure pathways were charted on Figures 12-1 and 12-2; secondary and tertiary exposure pathways are acknowledged in Table 12-5, by receptor. Figure 12-1 illustrates the CSM for the primary exposure pathways to terrestrial ecological receptors, and Figure 12-2 illustrates the CSM for the primary exposure pathways to aquatic ecological receptors, as similarly presented in Appendix F, Section F2.5.

12.1.2 Pesticides and the Environment

12.1.2.1 Environmental Chemistry and Fate

Addressing the full spectrum of the behavior of a chemical released into the environment requires an analysis of the chemical(s) *fate and transport*. Fate and transport analysis allows for an interpretation of the potential persistence of chemicals in the environment, and the means by which they may be transported from one environmental 'compartment' (e.g., soils) into another (e.g., biological tissues), or otherwise transformed through degradation. A variety of biological, chemical and physical mechanisms affect the persistence of a chemical in the environment, and certain physical and chemical parameters allow for a reasonable prediction of such environmental fate. Typical measures by which the fate and transport of chemicals are evaluated include:

- Half-life in soils, sediments, water, air
- Relative solubility in water versus lipid (fat)
- Adsorption onto soils, sediments, biological tissues (e.g., plant matter)
- Volatilization rate across the air-water interface
- Photolytic half-lives (i.e., degradation/oxidation by sunlight)

Of course, the environmental fate and transport of chemical(s) is also regulated by physical conditions in the environment where the chemical was initially released. Factors of particular relevance that affect fate and transport processes include:

- Temperature
- Wind convection
- Sunlight penetration
- Turbidity (i.e., in water applications)
- pH

The rate and manner in which these natural physical processes affect the breakdown or persistence of a chemical in the environment is chemical specific. The persistence of the chemicals considered for use in the LBAM Program varies, with the majority breaking down readily from photolytic, biological and hydrolytic processes in minutes to days, and some exhibiting more moderate decay rates (up to several weeks or a few months), based on laboratory and field studies. All of these chemicals have characteristics that will lead to their eventual degradation in the environment, and they are not expected to be present in environmental media for extended periods of time. Physical and chemical properties of the active ingredient and principal inert ingredient chemicals that are associated with the No Program and Program alternatives are detailed in Appendix F, Section F3.

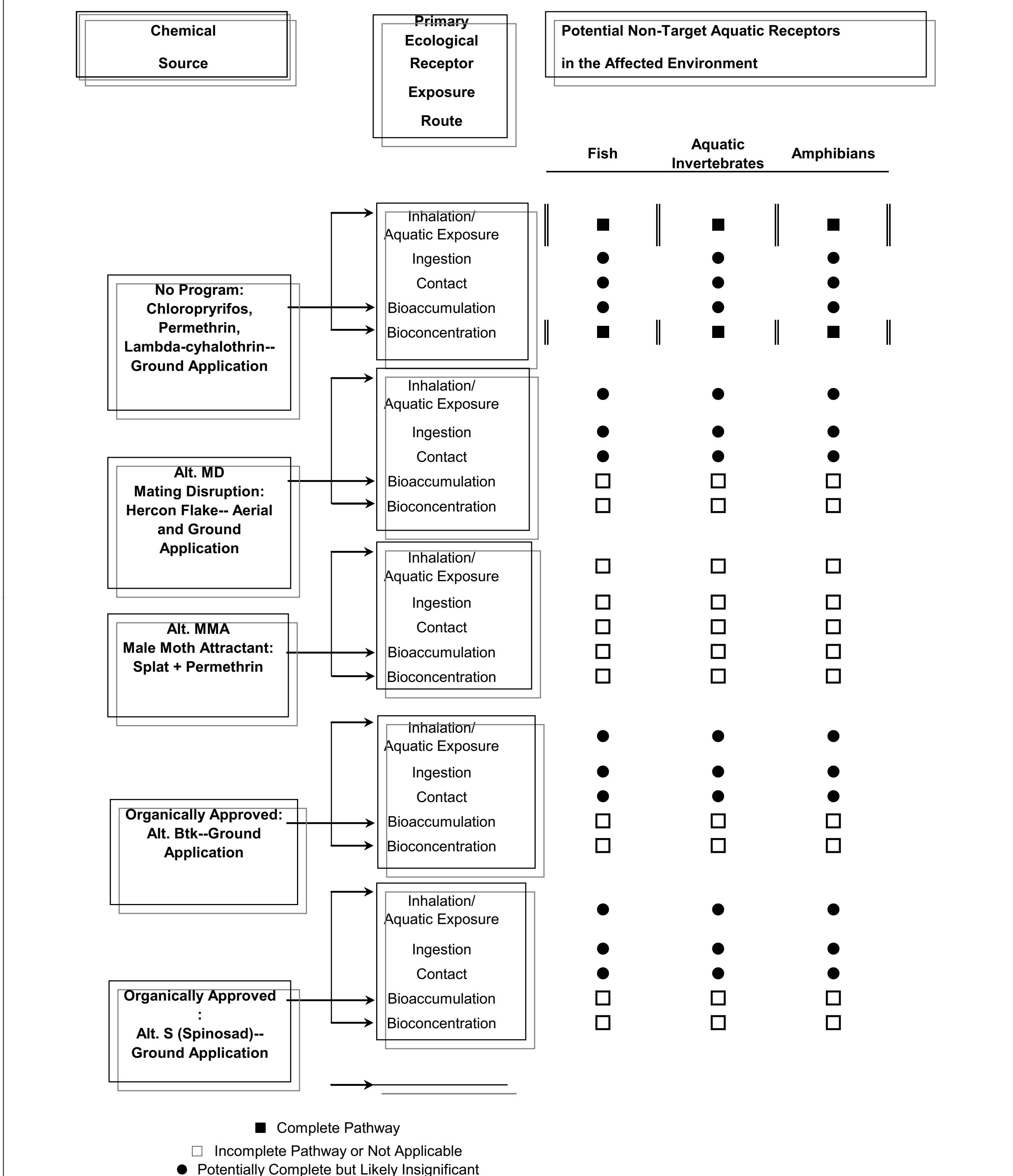
Chemical Source → Ecological Receptor Primary Exposure Route → Potential Non-Target Terrestrial Receptors in the Affected Environment

Chemical Source	Primary Exposure Route	Plants	Non-target Insects: Bee/Butterfly	Mammals: Herbivore	Mammals: Omnivore	Mammals: Carnivore	Birds: Insectivores/ Carnivore	Birds: Waterfowl	Birds: Seed Eaters	Reptiles and Amphibians: Snakes	Reptiles and Amphibians: Frogs
No Program: Chloropryrifos, Permethrin, Lambda-cyhalothrin--Ground Application	Inhalation	□	□	■	■	■	■	●	■	■	■
	Ingestion	□	□	■	■	■	■	■	■	■	■
	Dermal/ External Contact	■	■	■	■	■	■	■	■	■	■
	Bioaccumulation	□	■	■	■	■	■	■	■	■	■
	Bioconcentration	●	●	●	●	●	●	●	●	●	●
Alt. MD Mating Disruption: Hercon Flake--Aerial and Ground Application	Inhalation	□	□	■	■	■	■	●	■	■	■
	Ingestion	□	□	■	■	●	■	■	■	■	■
	Dermal/External Contact	■	■	■	■	■	■	■	■	■	■
	Bioaccumulation	□	□	□	□	□	□	□	□	□	□
	Bioconcentration	□	□	□	□	□	□	□	□	□	□
Alt. MMA Male Moth Attractant: Splat + Permethrin	Inhalation	□	□	●	●	●	●	●	●	●	●
	Ingestion	□	□	●	●	●	●	●	●	●	●
	Dermal/External Contact	■	■	□	□	□	□	□	□	□	□
	Bioaccumulation	□	□	□	□	□	□	□	□	□	□
	Bioconcentration	□	□	□	□	□	□	□	□	□	□
Organically Approved: Alt. Btk--Ground Application	Inhalation	□	●	●	●	●	●	●	●	●	●
	Ingestion	□	□	■	■	●	●	■	■	■	■
	Dermal/External Contact	■	■	●	●	●	●	●	●	●	●
	Bioaccumulation	□	□	■	■	■	■	■	■	■	■
	Bioconcentration	□	●	●	●	●	●	●	●	●	●
Organically Approved : Alt. S (Spinosad)--Ground Application	Inhalation	□	●	●	●	●	●	●	●	●	●
	Ingestion	□	□	●	●	●	●	●	●	●	●
	Dermal/External Contact	■	■	●	●	●	●	●	●	●	●
	Bioaccumulation	□	□	□	□	□	□	□	□	□	□
	Bioconcentration	□	□	□	□	□	□	□	□	□	□

■ Complete Pathway
□ Incomplete Pathway or Not Applicable
● Potentially Complete but Likely Insignificant

Source: ENVIRON International Corp., 2009

Figure 12-1: Conceptual Ecological Exposure Model for Terrestrial Receptors



Source: ENVIRON Inernation Corp., 2009

Figure 12-2: Conceptual Ecological Exposure Model for Aquatic Receptors

12.1.2.2 Bioconcentration, Bioaccumulation and Biomagnification

Once released into the environment chemicals may also be transformed through biological and/or chemical processes into other chemicals as part of their degradation, or preferentially distributed into specific environmental media or compartments based on their propensity to degrade or bioaccumulate. For organic chemicals, full degradation is considered that point at which a chemical has fully degraded down to its elemental forms and carbon dioxide.

Bioconcentration and *bioaccumulation*, in contrast, reflect transformation processes whereby chemicals are taken up from contaminated media into biological tissues. *Bioconcentration* is the process whereby a chemical enters an organism from the water, either across the gills or epithelial (skin) tissue, and is concentrated in the tissues to a level greater than that dissolved in water. *Bioaccumulation* represents a similar process, in that the concentration ultimately taken up by an organism is greater than that found in the media; however, the term encompasses uptake from both water and food exposure pathways. *Biomagnification* represents the case wherein a contaminant becomes progressively more concentrated in the food web, as the trophic level increases (e.g., an eagle containing more contaminant than the fish it eats, which in turn contains more than found in the invertebrates it eats); it in essence represents the total process of both bioconcentration and bioaccumulation (Rand et al. 1995)

As discussed in detail in Appendix F (Sections F3.1.1, F3.1.2, and F3.1.3), some potential exists for the active ingredient chemicals under the No Program Alternative to bioconcentrate, in the event that they were dispersed into or deposited onto water. Based on the physical and chemical properties of these chemicals, significant potential does not appear to exist, however, for biomagnification, and none of the No Program active ingredient chemicals or their inerts are recognized as persistent bioaccumulative toxicants by the USEPA (2008b). Similarly, while some of the Program alternative ingredients (e.g., spores from Btk) are known to persist in the environment for up to a year, none of the ingredients of either the pheromone-based or organic alternatives are recognized as bioaccumulative.

12.1.2.3 Transport, Use, and Disposal

CCR, Title 3, specifies requirements for proper storage, transportation, and disposal of pesticides and containers. The DPR and the county agricultural commissioners are responsible for enforcement. Pesticide labels provide instructions for proper handling, storage, and disposal of pesticides, as required by the USEPA. The CDFA will follow label instructions for all handling, storage, and disposal of unused treatment chemicals utilized for Program eradication activities.

12.1.3 Regulatory Setting

Formulations considered under the No Program and Program alternatives would be used according to regulatory requirements for the transportation, treatment, and control activities involving their use. Federal and state regulations impose requirements on the registration and use of pesticides. The regulatory framework pertaining to the use of pesticides and the management of hazardous materials is discussed below.

12.1.3.1 Federal

The USEPA regulates pesticides under two major statutes: the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Federal Food, Drug, and Cosmetic Act (FFDCA). Pesticides are defined under FIFRA as, “any substance intended for preventing, destroying, repelling, or mitigating any pest.” FIFRA requires that pesticides be registered (licensed) by the USEPA before they may be sold or distributed for use in the U.S., and that they perform their intended functions without causing unreasonable adverse effects on people and the environment when used according to USEPA-approved label directions.

Current FIFRA regulations under Section 12(a)D do not require manufacturers to reveal the manufacturing processes or the inert ingredients in pesticide formulations, as FIFRA regulates the active ingredients only. Toxicity studies conducted under FIFRA are required to evaluate the product formulations only, and not the toxicity of the individual inert ingredients that may be used to facilitate absorption and uptake of the pesticide. However, because the formulations are tested, the potential additive or synergistic effect of inert ingredients on toxicity is addressed through the testing protocols adopted. Special uses of pesticides, outside their original label specifications, can be considered on a case-by-case basis through FIFRA Section 24C (USEPA 1996). However, the use of the LBAM pheromone formulations considered for use in this PEIR are already authorized in the State of California under FIFRA by the DPR, and uses will conform to the approved label restrictions.

The FFDCA authorizes the USEPA to set tolerances, or maximum legal limits, for pesticide residues in food. Thus, the FFDCA does not expressly regulate pesticide use, but residue limits established by this agency may result in a change in the use pattern regulated under FIFRA. No residue limits have been established for the protection of ecological receptors for either the No Program chemicals, or the pheromones considered under the Program alternatives.

The USEPA also requires extensive scientific research and supporting test data as part of its pesticide review and approval process before granting a registration for most pesticides. These studies allow the USEPA to assess risks to human health, domestic animals, wildlife, plants, groundwater, and beneficial insects, and to assess the potential for other environmental effects. When new evidence raises questions about the safety of a registered pesticide, the USEPA may take action to suspend or cancel its registration and revoke the associated residue tolerance. The USEPA may also undertake extensive special review of a pesticide's risks and benefits or work with manufacturers and users to implement changes in a pesticide's use (e.g., reducing application rates, or cancellation of a pesticide's use). To this end, reregistration eligibility decision (RED) documents have been produced by the USEPA for each of the No Program pesticides except lambda-cyhalothrin, and Program pheromones and organic alternatives considered in this PEIR (USEPA 1998a, 2006a, 2006b, 2007e).

Toxic Substances Control Act

The Toxic Substances Control Act (Public Law 94-469) requires regulation of commercial chemicals, *other than* [emphasis added] pesticide products, that present a hazard to human health or to the environment. Thus, this act specifies the registration requirements for the No Program and Program formulation constituents, other than the active pesticide ingredient.

Clean Water Act and National Pollutant Discharge Elimination System

The discharge of toxic pollutants into the nation's waters is prohibited under the CWA. The CWA provides an integrated approach to protecting aquatic ecosystems and human health by regulating potentially toxic discharges through the NPDES, and by regulating ambient water quality through numeric and narrative water quality standards. The release of aquatic pesticides into waters of any state may require an NPDES permit, depending on the pesticide considered, and the conditions proposed for application. The Ninth Circuit Court recently held that an NPDES permit is not required where a pesticide is applied intentionally, in accordance with label instructions, and no residue *or unintended effect* [emphasis added] occurs (SWRCB 2005). The CDFA does not propose any treatment of water bodies for LBAM eradication.

12.1.3.2 State

California's programs addressing product registration of pesticides and commercial chemicals, licensing and certification, data review and evaluation, and pesticide residue monitoring closely parallel federal programs. However, California data requirements are stricter than federal requirements and are California-specific (e.g., manufacturers must prove their products are effective and can be used safely under California conditions). The registration of pesticides and commercial chemicals in California is under the purview of the California Environmental Protection Agency.

The DPR, a department overseen by the California Environmental Protection Agency, coordinates a number of programs to regulate pesticides, to include product evaluation and registration through use enforcement, environmental monitoring, residue testing, and reevaluation, if deemed appropriate. The DPR works with county agricultural commissioners who act as local pesticide enforcement authorities and evaluate, condition, approve, or deny permits for restricted-use pesticides; certify private applicators; conduct compliance inspections; and take formal compliance or enforcement actions. California's pesticide regulatory program has been certified by the Secretary of Resources as meeting the requirements of CEQA (DPR 2006a).

The State of California also requires commercial growers and pesticide applicators to report commercial pesticide applications to local county agricultural commissioners. The DPR compiles this information in annual pesticide use reports. Agricultural use comprises a vast majority of the total reported annual pesticide use while nonagricultural uses, like that associated with some of the project alternatives, comprise approximately 4 percent of the annual use. In addition to pesticide applications for fisheries management, other nonagricultural uses of pesticides include pest control of right-of-ways, fumigation of nonfood and nonfeed materials, pesticide research, and regulatory pest control in the ongoing control and /or eradication of pest infestations (DPR 2003).

The DPR evaluates pesticides for potential effects on human and ecological health prior to registration and require appropriate use restrictions to be present on the pesticide label to ensure a reasonable certainty of no harm to human health and the environment. The DPR's pesticide registration process has been certified as meeting the requirements of CEQA (DPR 2006a). Application in compliance with pesticide labels ensures that pesticides used in the project would not be detrimental to the public health and safety. The DPR enforces state and federal regulations that govern the safe and proper use of pesticides including licensing of dealers and applicators, investigating pesticide incidents, ensuring product quality, and monitoring pesticide residues on commercial produce. The county agricultural commissioners and their staff carry out enforcement activities with training, coordination, oversight, and technical and legal support provided by state staff.

The Environmental Hazards Assessment Program has the lead role in implementing the DPR's environmental protection program. This program collects data and analyzes the results from studies that are conducted to measure pesticide residues in the environment, characterize drift and other off-site pesticide movement, and evaluate the effect of application methods on movement of pesticides in air. If a pesticide is determined to be a toxic air contaminant, appropriate control measures are developed to reduce emissions to levels that adequately protect public health and the environment. This development is done in consultation with the CARB. Control measures may include product label amendments, applicator training, restrictions on use patterns or locations, and product cancellations.

State and local agency regulatory responsibilities related to the protection of human and ecological health from potentially contaminated environmental media (air, water, sediments) include:

- **State Water Quality Control Board/Regional Water Quality Control Boards**: are responsible for protecting the quality of the waters of the state for present and future beneficial uses. Risk-based numeric criteria specify the concentrations of some constituents that are protective of aquatic life and other narrative beneficial uses such as 'drinking water supply.' Under the nondegradation policy adopted by the SWRCB policy (Resolution 68-16), whenever the existing quality of water exceeds the quality necessary to maintain present and potential beneficial uses of the water, existing water quality must be maintained. This policy pertains to both surface waters and groundwater of the state.

- **California Department of Health Services**: Health and Safety Code Section 116751 prevents any agency from introducing a pesticide into surface or groundwater drinking supplies unless the DHS determines the activity will not have an adverse impact. The DHS is responsible for evaluating the short- and long-term effect(s) of pesticide use on water quality, and for ensuring alternative water supplies are available during pesticide applications that may contaminate drinking waters. The DHS defaults to the MCLs discussed above when monitoring and evaluating water quality. If no MCL is identified in the CFR, then Health and Safety Code 11675 requires a standard of 'nondetect' for other constituents for their approval of safety. The DHS also has the authority to set nonregulatory advisory levels, such as the "notification levels" for some of inert ingredients. The DHS is also responsible for implementing Proposition 65.

  The Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) was enacted as a ballot initiative in November 1986. The proposition was intended by its authors to protect California citizens and the state's drinking water sources from chemicals known to cause cancer, birth defects, or other reproductive harm, and to inform citizens about exposures to such chemicals. Proposition 65 requires the governor to publish, at least annually, a list of chemicals known to the state to cause cancer or reproductive toxicity. Of the chemicals identified in the formulations proposed for use for LBAM eradication, only ethylbenzene is listed as a Proposition 65 chemical.

12.2 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

This section evaluates the ecological concerns and potential impacts specific to the use of hazardous materials under the No Program and Program alternatives in the eradication of the LBAM throughout the state where the pest could colonize.

12.2.1 Evaluation Concerns and Criteria

CEQA Guidelines outlines evaluation 'criteria' for considering ecological health concerns related to the use and/or production of hazardous materials and/or wastes (CEQA 2009). These criteria are provided in Table 12-2.

Table 12-2 Hazards and Hazardous Materials

Would the project:
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school?
d. Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the Program Area?
f. For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the Program Area?
g. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?
h. Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

The criteria most relevant for this PEIR chapter are (a) and (b). The other criteria deal with potential land use conflicts and wildfires and are covered in Chapter 4 (Urban and Rural Land Uses), Chapter 5 (Noise), and Chapter 7 (Public Services and Hazard Response) as appropriate.

Public scoping for the PEIR also requested specific discussion and analysis on the following concerns:

- Discuss impacts on bees from all chemicals in spray and from sticky traps. (Microcapsules are about the same size as pollen grains, and bees may carry them back to hives or birds may mistake them for food.)[1]
- Discuss impacts of drift from aerial spray, especially into sensitive habitat areas.
- Discuss persistence of all proposed treatment substances in the environment, as well as potential for bioaccumulation.
- Discuss impacts of chemicals on microbial life in the soil.
- Analyze No Program Alternative as it relates to impacts on other insect species of increased home pesticide use.

With respect to these scoping comments, impacts to bees are addressed through evaluations of potential impacts on nontarget insects in Appendix F, Section F1 and summarized in this chapter. Air dispersion and deposition modeling was fundamental to the analyses summarized in this chapter to identify exposure point concentrations for estimating exposure doses to ecological receptors (Appendix F, Section F4) and risks (Appendix F, Section F5) were characterized. Environmental fate and persistence of constituents and effects on microbial life (biodegradation) is considered for the No Program and Program alternatives in Appendix F, Section F3, and was briefly summarized above (Sections 12.1.2.1 and 12.1.2.2).

12.2.1.1 Significance Criteria and Thresholds of Significance for Impacts

The criteria in Table 12-2 do not adequately address the potential effects of toxics on ecological receptors or the principal areas of concern identified in public scoping, and are focused on potential hazards to human populations. Thus, the significance criteria for ecological hazards addressed in this chapter were expanded to consider whether the No Program or Program alternatives would:

- Result in an exceedance of federal or state agency surface or groundwater quality standard or water quality objective (particularly waters that may drain to wetlands or streams) for a chemical found in the formulation.
- Result in an exceedance of a literature-based TRV (i.e., threshold) for aquatic toxicity in aquatic animals.
- Result in an exceedance of a literature-based TRV for ingestion uptake in relevant terrestrial or avian wildlife.
- Result in an exceedance of a literature-based TRV for acute or chronic inhalation uptake in terrestrial wildlife.
- Result in an exceedance of a literature-based TRV for acute or chronic ingestion uptake in relevant amphibians or reptiles
- Cause a spill or leak that would contaminate the soil or waters to the extent of eradicating the existing vegetation, inhibiting revegetation, or migrating to other areas and affecting soil and/or aquatic ecosystems via erosion and/or sedimentation.

[1] The eradication alternatives evaluated in this PEIR do not include microcapsule formulations or sticky traps. Rather, the potential impacts to bees from all of the chemical treatment methods proposed for use are evaluated.

- Create a potential health hazard or involve the use, production, or disposal of materials in a manner that would be expected to pose a hazard to wildlife or aquatic life in the Program Area (i.e., where hazard would be considered likely if the estimated dose received by wildlife receptors exceeds pertinent TRVs).
- Create a potential health hazard or involve the use, production, or disposal of materials that pose a hazard to a special-status species population in the Program Area.
- Increase the likelihood of impact to fish, wildlife or human health in the event of an accidental spill of hazardous materials.

12.2.2 Evaluation Methods and Assumptions

A screening level ecological risk assessment was the principal method used to evaluate ecological health concerns associated with the hazardous materials use considered under the No Program or Program alternatives.

12.2.2.1 Methods

The approach used in the Ecological Risk Assessment (Appendix F) that supports the conclusions brought forward in this chapter borrows from federal guidance for conducting ecological risk assessments (USEPA 1998b), and state guidance (California Environmental Protection Agency 1996). Briefly, the approach involves:

- Identification of constituents of potential concern (COPCs) in exposure media
- Selection of TRVs for the COPCs
- Identification of habitats, biological communities, and biological receptors of potential concern where exposure to COPCs could occur
- Identification of exposure parameters and appropriate uptake equations
- Prediction of estimated exposure to COPCs in exposure media (i.e., air, food, water, soil)
- Comparison of estimated exposure to recognized toxicological hazards associated with the COPCs to characterize risks

Identification of the COPCs and TRVs are summarized in the Toxicity Assessment (Appendix F, Section F3), following the review of the literature on the active ingredient and some of the inert ingredients that could be released from the different treatments under consideration. The COPCs include the active ingredients of the pesticide formulations, as well as some of the inert ingredients that may be used in the treatments. Enforceable criteria established by federal or state agencies to be protective of ecological health were used as the default thresholds for interpreting whether a potentially adverse impact was significant to ecological health (i.e., if exceeded in the exposure media of concern). In the absence of such criteria, estimated exposure doses were modeled and compared against TRVs derived from the literature (Appendix F, Section F3.6).

In the selection of TRVs, the results were used from animal toxicity testing from the closest related species, by exposure pathway and duration of exposure. The range of species for which toxicity testing has been conducted is limited, as demonstrated in the previous discussion, thus, safety (uncertainty) factors were applied to the TRVs by exposure pathway if same-species toxicity data were not found in the literature for the ecological receptors modeled. The general rules for applying safety factors to existing toxicity data to species for which no toxicity information was identified are summarized in Table 12-3. These factors are consistent with guidance developed for ecological screening levels (USEPA 1998b), and are described in greater detail in Appendix F, Section F3.6).

Table 12-3 Logic For Defining Toxicity Reference Values in the Absence of Species-Specific Exposure Data

Situation	IF	THEN	Safety Factor	Example
General	No NOAEC/NOAEL data for target species	Use the LOAEC/LOAEL*0.5 for target species	0.5	TRV (rat, inhalation) = LOAEC*0.5
General	No LOAEC/LOAEL data for target species	Use the LC50/LD50*0.1 for target species	0.1	TRV (rat, inhalation) = LC50*0.1
Within Feeding Guild	No LC_{50}/LD_{50} data for target species	Use the TRV*0.5 for related species within same feeding guild	0.5	TRV (raccoon, inhalation) = TRV (rat, inhalation)*0.5
Across Feeding Guild	No TRV for related species within same guild	Use the TRV*0.1 for closest-related species across feeding guild	0.1	TRV (mallard duck, oral) = TRV (rat, oral)*0.1
Chronic Exposure	No chronic exposure data for target species	Use the acute exposure data*0.1 for target species	0.1	TRV (rat, chronic) = TRV (rat, acute)*0.1
Acute Exposure	No acute exposure data for target species	Use the chronic exposure data*10 for target species	10	TRV (rat, acute) = TRV (rat, chronic)*10

Exposure was calculated from the general **Equation 12-1** below**:**

Equation 12-1	**Daily intake = CM * CR * FI * AF/BW**

Where

BW = Body Weight

CM = Concentrations of constituents of concern in exposure media(s)—effectively, the exposure point concentration (EPC)

CR = Contact Rate—The estimate of the quantity of the medium consumed (or otherwise taken in) per day

FI = Fractional Intake—The fraction of time (site use factor) spent in contact with the contaminated media (e.g., the proportion of the total diet obtained from the site, as extrapolated from information such as home range data on the species, or empirical findings)

AF = Absorption Fraction—The amount of contaminant contacted (e.g., consumed) that is actually assimilated into tissue to assert a potentially toxic effect

The CMs were derived from the EPCs in air, water, soil or vegetation (Table 12-4); these EPCs, in turn, were developed from air dispersion and deposition modeling based on a series of assumptions, as outlined below in Section 12.2.2.2, and explained in detail in Chapter 6, Air Quality. Additional equations were required to estimate surface contact exposure for nontarget terrestrial insects and pollinators, and to consider how bioconcentration and root translocation could lead to increased doses in aquatic receptors, and terrestrial animals, respectively **(**Appendix F, Section F4**)**.

The *Hazard Quotient (HQ)* was then calculated to characterize risks from the estimated exposure doses by dividing the estimated dose received, by the chronic and/or acute TRVs (Equation 12-2). The exposure duration from the application scenarios envisioned determined whether an acute or chronic TRV was used in the calculation. Acute exposure TRVs were selected to represent the potential effect from the immediate spray aftermath within the first 24 hours. Chronic exposure TRVs were selected to model the potential effects over the duration of the three spraying events assumed under the Program Description (Chapter 2, Table 2-2), by using the maximum period average concentration from air dispersion modeling. TRVs were taken from data specific to the No Program or Program active ingredients under evaluation where available and applicable, and from tests that evaluated commercial formulations. In the case of Btk, data specifically related to Btk were selected even if a lower dose was tested in other Bt species, as sensitivity to Bt varies by Bt species, and only Btk is proposed for use under the LBAM Program. The highest exposure dose tested that yielded a NOAEL was selected as the TRV value for modeling.

Equation 12-2	**HQ1 = EPC/TRV**

Where

EPC = Exposure Point Concentration (i.e., the concentration of contaminant in the exposure media) (Table 12-2)

TRV = Toxicity Reference Value by exposure pathway, as summarized by species in Appendix F, Section F3.6

The calculation of HQs are developed in Appendix F, Section F5, by species, and represent the culmination of information developed from the toxicity (Appendix F, Section F3) and exposure (Appendix F, Section F4) assessments.

12.2.2.2 Assumptions

Numerous exposure assumptions were necessary to screen risks for this nearly state-wide program. These assumptions are listed below:

- **Maximum modeled air dispersion and deposition rates**. These rates were used as the input parameters to define estimated exposure point concentrations in soil, water, and vegetation. For the air dispersion modeling that provided the source data for all ecological risk modeling additional assumptions were inherent, including:
  - **Model Selection.** Either very conservative screening-level models were used (e.g., box models) or more refined models were used in a screening-mode (e.g., industrial source complex using screening level meteorology). The models were run in this manner so the results would be applicable statewide. As a result, the estimated concentrations and depositions are likely higher than what a more refined model would predict for a specific location using site-specific information.
  - **Assumed the Maximum Concentrations and Depositions Could Occur at the Same Time.** The maximum concentration and maximum deposition were estimated in separate model runs because the environmental conditions and application characteristics that result in maximum airborne concentrations tend to minimize the amount of material that deposits and vice versa. It is therefore unlikely that the maximum concentration and maximum deposition would occur at the same time, and assuming exposure to both would overpredict the impacts.
  - **Utilized Maximum Application Rates.** The emission rates for each treatment formulation were calculated based on the maximum application rate and the fraction of the active ingredients obtained from the product labels. Often application rates range for each treatment formulation for different pests and application settings. In those situations, the most conservative of the potentially applicable application rates was used. It is anticipated that the emissions used in the analyses likely overestimate the true emissions.

Table 12-4 Exposure Point Concentrations of No Program and Program Alternative Active Ingredients

Estimated Chronic Concentration in Treatment[1]	Acute						Chronic								
		Water						Water							
Chemical Name	Air (mg/m³)	(max. sol. mg/L)	(10 cm, mg/L)	(1 meter, mg/L)[n]	Soil (mg/kg)	Veg (mg/kg)	Air (mg/m³)	(max. sol. mg/L)	(10 cm, mg/L)	(1 meter, mg/L)[n]	Soil (mg/kg)	Veg (mg/kg)	CAS #	EPA Registration #	DPR Chemical Code
No Program															
Warrior/ Lambda-cyhalothrin	3.08×10^{-4}[a] 1.32×10^{-4}[b]	$4 – 5 \times 10^{-3}$[h] @ pH 5.0 – 9.2	1.59×10^{-2}[a] 1.66×10^{-2}[b]	1.59×10^{-3}[a] 1.66×10^{-3}[b]	2.38×10^{-2}[a] 2.48×10^{-2}[b]	0.16[a] 0.17[b]	9.16×10^{-7}[a] 3.94×10^{-7}[b]	$4 – 5 \times 10^{-3}$[h] @ pH 5.0 – 9.2	2.58×10^{-2}[a] 2.69×10^{-2}[b]	2.58×10^{-3}[a] 2.69×10^{-3}[b]	3.87×10^{-2}[a] 4.04×10^{-2}[b]	0.464[a] 0.468[b]	91465-08-6	100-1112	2297
Duraguard ME/ Chlorpyrifos	1.43×10^{-2}[a] 1.01×10^{-2}[b]	0.941 – 0.588[i] @ 20°C	0.376[a] 0.392[b]	3.76×10^{-2}[a] 3.92×10^{-2}[b]	0.563[a] 0.588[b]	3.75[a] 3.92[b]	7.20×10^{-4}[a] 7.07×10^{-4}[b]	0.941 – 0.588[i] @ 20°C	0.188[a] 0.196[b]	1.88×10^{-2}[a] 1.96×10^{-2}[b]	0.282[a] 0.294[b]	2.81[a] 2.86[b]	2921-88-2	499-367-ZA	253
Dursban 4E/ Chlorpyrifos	6.68×10^{-3}[a] 4.73×10^{-3}[b]	0.941 – 0.588[i] @ 20°C	0.176[a] 0.183[b]	1.76×10^{-2}[a] 1.83×10^{-2}[b]	0.264[a] 0.275[b]	1.76[a] 1.83[b]	3.37×10^{-4}[a] 3.31×10^{-4}[b]	0.941 – 0.588[i] @ 20°C	8.79×10^{-2}[a] 9.17×10^{-2}[b]	8.79×10^{-3}[a] 9.17×10^{-3}[b]	0.132[a] 0.138[b]	1.31[a] 1.34[b]	2921-88-2	62719-11-AA	253
Permethrin E-Pro/ Permethrin	1.51×10^{-3}[a] 6.49×10^{-4}[b]	5.5×10^{-3}[j] @25°C	7.77×10^{-2}[a] 8.11×10^{-2}[b]	7.77×10^{-3}[a] 8.11×10^{-3}[b]	0.116[a] 0.122[b]	0.78[a] 0.81[b]	4.49×10^{-6}[a] 1.93×10^{-6}[b]	5.5×10^{-3}[j] @25°C	0.184[a] 0.192[b]	1.84×10^{-2}[a] 1.92×10^{-2}[b]	0.276[a] 0.288[b]	1.84[a] 1.92[b]	52645-53-1	79676-2	2008
Mating Disruption (MD-1)															
Isomate Twist Ties	3.22×10^{-7}	Insoluble	Not determined	Not determined	Not determined	Not determined	1.65×10^{-8}	Insoluble	Not estimated	Not estimated	Not estimated	Not estimated	33189-72-9; 30562-09-5	CA REG 53575-07008-EU	5022
Mating Disruption (MD-2)															
SPLAT® LBAM / Pheromone	6.65×10^{-4}[a] 4.26×10^{-4}[c] 1.50×10^{-3}[d]	Limited	0.332[a,c] 0.415[d]	3.32×10^{-2}[a,c] 4.15×10^{-2}[d]	0.498[a,c] 0.623^{-1}[d]	3.32[a,c] 4.15[d]	2.62×10^{-6}[a] 1.69×10^{-6}[c] 5.85×10^{-6}[d]	Limited	0.166[a,c] 0.208[d]	1.66×10^{-2}[a,c] 2.08×10^{-2}[d]	0.249[a,c] 0.311[d]	1.66[a,c] 2.08[d]	-	80386-6*	
Hercon Disrupt Bio-Flake® LBAM	$3.54 \text{ X } 10^{-4}$[e]	Insoluble	0.277[e]	2.77×10^{-2}[e]	0.415[e]	2.76[e]	$2.81 \text{ X } 10^{-6}$[e]	Limited	0.138[e]	$1.38 \text{ X } 10^{-2}$[e]	0.207[e]	1.38[e]	-	8730-61	
Mating Disruption (MD-3)															
SPLAT® LBAM / Pheromone	2.63×10^{-5}[f]	Limited	9.89×10^{-2}[f]	9.89×10^{-3}[f]	0.148[f]	0.99[f]	9.95×10^{-8}[f]	Limited	4.95×10^{-2}[f]	4.95×10^{-3}[f]	7.42×10^{-2}[f]	0.49[f]	-	80386-6*	
Hercon Disrupt Bio-Flake® LBAM	7.14×10^{-6}[f]	Insoluble	0.117[f]	1.17×10^{-2}[f]	0.175[f]	1.17[f]	6.23×10^{-8}[f]	Insoluble	5.85×10^{-2}[f]	5.85×10^{-3}[f]	8.77×10^{-2}[f]	0.58[f]	-	8730-61	
Male Moth Attractant (MMA)															
SPLAT® LBAM /Pheromone	1.04×10^{-3}[a]	Limited	1.30×10^{-4}[a]	1.30×10^{-5}[a]	1.95×10^{-4}[a]	1.30×10^{-3}[a]	4.14×10^{-6}[a]	Limited	6.49×10^{-5}[a]	6.49×10^{-6}[a]	9.73×10^{-5}[a]	6.50×10^{-4}[a]		80386-6*	
Permethrin E-Pro/ Permethrin	1.25×10^{-3}[a]	5.5×10^{-3}[j] @25°C	7.79×10^{-4}[a]	7.79×10^{-5}[a]	1.17×10^{-3}[a]	7.80×10^{-3}[a]	4.85×10^{-6}[a]	5.5×10^{-3}[j] @25°C	9.02×10^{-4}[a]	9.02×10^{-5}[a]	1.35×10^{-3}[a]	1.14×10^{-2}[a]	52645-53-1	79676-2	2008
Permethrin E-Pro/ 1,2,4-trimethylbenzene	1.35×10^{-3}[a]	57 @ 25ºC[k]	8.46×10^{-5}[a]	8.46×10^{-6}[a]	1.27×10^{-04}[a]	8.46×10^{-4}[a]	5.33×10^{-6}[a]	57 @ 25ºC[k]	4.23×10^{-5}[a]	4.23×10^{-6}[a]	6.35×10^{-5}[a]	4.23×10^{-4}[a]	95-63-6		-
Permethrin E-Pro/ ethylbenzene	1.02×10^{-5}[a]	0.014 – 169[l] @ 15 – 25 ºC	6.35×10^{-7}[a]	6.35×10^{-8}[a]	9.52×10^{-7}[a]	6.30×10^{-6}	4.00×10^{-8}[a]	0.014 – 169[l] @ 15 – 25 ºC	3.17×10^{-7}[a]	3.17×10^{-8}[a]	4.76×10^{-7}[a]	3.17×10^{-6}[a]	100-41-4		-
Other Alternatives															
Entrust/Spinosad A, D	3.24×10^{-4}[a] 1.39×10^{-4}[b]	89.4-235[m] 0.329-0.495	9.34×10^{-2}[a] 9.75×10^{-2}[b]	9.34×10^{-3}[a] 9.75×10^{-3}[b]	0.140[a] 0.146[b]	0.93[a] 0.97[b]	5.40×10^{-6}[a] 2.32×10^{-6}[b]	89.4-235[m] @ 0.329-0.495	0.115[a] 0.120[b]	1.15×10^{-2}[a] 1.20×10^{-2}[b]	0.172[a] 0.179[b]	1.15[a] 1.20[b]	131929-60-7, 131929-63-0	62719-282	3983
DiPel DF/ Btk	8.17×10^{-3}[a] 3.15×10^{-3}[b]	Suspends	2.36[a] 2.46[b]	0.236[a] 0.246[b]	3.53[a] 3.69[b]	23.55[a] 24.57[b]	1.36×10^{-4}[a] 5.85×10^{-5}[b]	Suspends	1.36[a] 1.42[b]	0.136[a] 0.142[b]	2.04[a] 2.13[b]	13.58[a] 14.18[b]	68038-71-1	73049-39	86
DiPel, DF PRO DF/ Btk	8.17×10^{-3}[a] 3.15×10^{-3}[b]	Suspends	2.36[a] 2.46[b]	0.236[a] 0.246[b]	3.53[a] 3.69[b]	23.55[a] 24.57[b]	1.36×10^{-4}[a] 5.85×10^{-5}[b]	Suspends	1.36[a] 1.42[b]	0.136[a] 0.142[b]	2.04[a] 2.13[b]	13.58[a] 14.18[b]	68038-71-1	73049-39	86

[a]Truck-based application; [b]Backpack-based application; [c]Metered spraygun application; [d]Caulkgun application; [e]Podgun application;
[f]Aerial application; [g]based on the stationary encapsulated method of this pheromone application, dispersion modeling was not projected, nor were EPCs in other media considered; [h]Values from Table F3-14; [i]Values from Table F3-3; [j]Value from Table F3-10; [k]Value from Table F3-6; [l]Values from Table F3-7; [m]Top value is for Spinosad A, and bottom value for Spinosad D, values from Table F3-49; [n]Acute Water Exposure Concentrations for Green Sturgeon assumes a depth of 5 meters and is 5 times less than concentrations presented here.

*EPA Est. #

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- **Overestimated the Quantity of Material that Would Likely Volatilize.** For volatile compounds and for certain methods of application (e.g., pod guns and metered jet guns) estimates of the amount of material that would volatilize or be present as drift were required. With different environmental conditions likely to be encountered across the state and different application methods, conservative assumptions regarding volatilization were made. These assumptions include, but are not limited to, assuming 100 percent of the volatile materials volatilize between applications and that 10 percent of the permethrin applied would either volatilize or be present in drift for Alternative MMA, even though it is likely nonvolatile. Thus, the resulting concentration estimates likely overpredict the actual concentrations.
- **Assumed Three Applications Per Treatment Option.** To determine the number of applications for each treatment alternative, the Program calls for up to two life cycles without LBAM being detected before treatment is halted. However, it was necessary to quantify this value in more precise terms to perform the modeling and post-processing calculations, and it was assumed that each treatment alternative would be applied 3 times. If the number of applications increases or decreases, then the resulting concentrations and depositions would also increase or decrease.
- **Hydraulic Spraying Only During Daylight Hours.** It was assumed that the hydraulic spraying for both the No Program Alternative and Organically Approved Insecticides (Alternatives Btk and S) would only occur during daylight hours. As such, a limited set of meteorological data was used, representing conditions that occur during daylight hours. In particular, the most stable atmospheric conditions that only occur at night were excluded from the analyses. This assumption would underestimate concentrations if spraying were to occur at night.
- **Limited Exposure from No Program Application**. Most of the Program alternatives are assumed to impact the maximum receptors for up to 8 hours per day. However, for the No Program alternatives, a more reasonable assumption was used when converting the 1-hour maximums to longer-term averages. The No Program alternatives were assumed to impact the maximum receptors for 1 hour per day. If this assumption was modified, the resulting ambient air concentrations and deposition rates would likely increase for the No Program options.
- For Alternative MMA, the nontarget deposition rate (i.e., the deposition estimated for constituents that did not land on the targeted utility poles) was used as the exposure point concentration from which estimated dosages to nontarget receptors were derived.

- **Water Ingestion of the Formulations to Terrestrial Mammals and Avian Species.** It was assumed that full mixing of the active ingredients deposited indirectly onto water bodies would occur, and that the volume of water onto which chemicals would deposit was 10 centimeters (puddle depth).[2] The estimated deposition under this scenario greatly exceeds the solubility of all the chemicals applied, but it was assumed that under this scenario, that animals would drink through any surface sheen, even if full dilution was not achieved. For screening, all drinking water bodies were assumed to be uniformly contaminated in the species' home range. For chronic exposure, the period average deposition concentrations, were assumed to be diluted into the same volume of water, as specified above, but no additional half-life degradation was factored into the assumptions to account for hydrolytic or biological degradation (half-lives were incorporated into air dispersion modeling).
- **Soil Depth Concentration.** A 5-centimeter (~ 2-inch) soil depth concentration was used for the estimation of dose from chronic soil ingestion—it was thereby assumed that the applied dose would be entirely distributed within the top 5 centimeters for chronic doses. This soil horizon is significantly less than that suggested in ecological guidance for burrowing animals and burrow-dwelling birds (California

[2] Program alternatives are land-based and include aerial applications over land areas; there is no direct application to water. However, applied material may drift onto water bodies or end up in water bodies through physical processes described in Section 11.2.1, which is an indirect impact. The water body assumption described is for a conservative "worst-case" analysis appropriate for a CEQA document where understatement of impacts is to be avoided.

Environmental Protection Agency 1996). However, mobility of No Program and Program alternative chemicals will be most concentrated in the surficial soil horizon; thus, this assumption allows for some limited chemical mobility within the surficial soil horizon over the treatment period (three applications) and screens at a conservative concentration relevant at the screening level.

- **Concentration Accumulated from Soil to Invertebrates.** To estimate the concentration accumulated from soil to invertebrates, bioaccumulation factors were used for chemicals where bioaccumulation could be predicted from environmental fate data. This use was relevant for only the No Program chemicals and for permethrin when used with the LBAM pheromone under Alternative MMA.
- **Acute Inhalation Exposure.** The maximum 1-hour aerial concentration modeled for each chemical and treatment alternative was used. The 1-hour maximum concentrations were the highest aerosol concentrations projected from air dispersion modeling. For chronic exposure, the period average air concentration for each treatment chemical, with depletion, was used; this metric provides for both air concentrations during subsequent treatments and volatilized concentrations from past treatments. (HQs by inhalation were calculated for only those species where the inhalation rates were identified and inhalation TRVs could be supported from the literature).
- **Aquatic Animal Exposure.** Freshwater fish drink very little, so exposure by this pathway was not considered significant. Thus, exposure for fish and aquatic invertebrates was assumed to occur principally through bioconcentration across the gills (fish and inverts) and skin (fish) for acute and chronic waterborne exposure, and the depth of water in which aquatic receptors were assumed to reside and treatment chemicals were to uniformly drift was assumed to be 1 meter, based on a past method applied by the U.S. Forest Service in their assessment of Btk ecological risks (USDA 2008b). All water bodies in aquatic receptors home range were assumed to be uniformly contaminated at these conservative concentrations. Uniform application over the water body from aerial deposition was conservatively assumed. For green sturgeon, this assumption was deviated from by assuming a 5-meter mixing depth, as this species is typically found in deeper waters. In the event that the concentration of chemical was higher than the maximum solubility in water, the exposure concentration default was the maximum solubility value. Pheromone TRV values for aquatic receptors were developed from a range of tests, conducted by the CDFG for all of the Program pheromone-based alternatives (MD-1, MD-2, and MD-3), for which results are thoroughly summarized in Appendix F, Section F3.2.
- **Bioconcentration Factors.** Bioconcentration factors (BCFs) were used to identify potential tissue concentrations in fish to assess potential dietary risks to piscivorous wildlife, and to further consider potential risks to fish themselves (i.e., beyond the principal aquatic exposure route considered), if relevant tissue-residue based effects concentrations were identified in the literature. For all Program alternatives using pheromones or the organically approved insecticides Btk or spinosad, the BCF was assumed to be '1' (i.e., essentially no bioaccumulation). For No Program chemicals chlorpyrifos, lambda-cyhalothrin, and permethrin (under Alternative MMA and No Program), the BCF was calculated, and the meat portion of carnivore and omnivore diets (C_{tissue}) was based on the modeled chronic concentration from average. BCF values are summarized in Appendix F, Table F4-5. The BCF values for No Program chemicals in fish tissue were taken from literature compendia (Jarvinen and Ankley 1999; USEPA 1988).
- **Btk Exposure.** To support quantitative risk assessment for Btk exposure under Alternative Btk, it was necessary for some receptors to derive TRVs from effects literature where exposure was reported as colony forming units in exposure media (Appendix F, Section F3). For this conversion, the reference of Capalbo et al. (2001) was used, where it was determined that approximately 10^9 colony forming units (viable spores) exist per gram of *Bacillus thuringiensis* ssp. *tolworthi*. In the absence of other information, it was assumed that Btk spores have approximately the same mass as Bt *tolworthi*, and that all of the spores released would be viable over the treatment interval periods. The TRVs, however, were based exclusively on toxicity data derived from Btk studies, as summarized in Appendix F, as Bt species are relatively selective to specific orders of insects (e.g., diptera and lepidoptera).

- **Mammalian and Avian Wildlife Exposure.** Mammalian and avian wildlife can be exposed to the formulation constituents through dermal (contact), oral (ingestion of food, soil and/or water) or through inhalation. For this assessment, only the ingestion routes (diet, water, and soils/sediment) and inhalation were considered complete and potentially significant and, therefore, modeled. Dermal (contact) exposure was considered potentially complete, but likely insignificant due to fur and feather barriers. Further, transdermal assimilation factors for the ecological receptors modeled were not readily identifiable, reducing the reliability of quantifying uptake through this pathway. Uptake by this pathway was considered to represent an insignificant increase in total dose, and safety factors applied to dosage estimations by other more direct pathways for exposure were considered sufficient to account for additional uptake that might occur through surface contact.
- **Nontarget Terrestrial Invertebrates and Pollinators.** Surface contact through aerial deposition was used to consider exposure to nontarget terrestrial invertebrates and pollinators. It was assumed that 75 percent of the available surface area could be contacted through deposition from ground-based spraying techniques employed under the No Program Alternative. Surface area and body weight were estimated based on analyses provided in Appendix F, Section F4.2.1.5. Nontarget insect effects from organically approved insecticides (Alternatives Btk and S) and pheromone-based treatments were based on the presumption of sensitivity to dietary exposure, through contact with exposure media. If no dose-response toxicity information was developed from which to ascertain nontarget insect effects, or other testing data were not identified wherein the development of dose-response curves were even attempted, then it was not possible

12.2.2.3 Ecological Receptors

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 as estimation of potential effect by ‘guild.’ Species grouped by guilds were assumed to exhibit similar life-history and exposure characteristics to allow for interpretation of potential effects of nonmodeled species in the same feeding guild. For example, the species for which ingestion doses were considered reflected herbivore, carnivore and omnivore guilds, of both small and large species within these broad guilds. Relevant life-history characteristics of the species evaluated are summarized briefly in Table 12-5 through Table 12-8 below. In brief:

- Exposure to nine mammalian species was modeled, including sea otter, cottontail rabbit, Norway rat, deer mouse, Buena Vista lake shrew, red fox, black bear, mule deer, and cow/calf as representative mammalian species that have been documented in the Program Area, or that have been the foundation for much of the toxicological effects literature (e.g., rat).
- Nine avian species were modeled for ingestion exposure, including the American robin, bobwhite quail, marsh wren, Cooper’s hawk, least Bell’s vireo, southwestern willow flycatcher, mallard duck, bald eagle, and great blue heron. Inhalation rates for birds could not be verified and no estimate of inhalation doses was attempted.
- Six herptile species were evaluated for ingestion exposure, including the Santa Cruz long-toed salamander, the California red legged frog, the Pacific treefrog, the western toad, pond turtle, and the Common garter snake.
- To evaluate the potential effects on nontarget insects and pollinators, the honeybee, bay checkerspot butterfly, Kern primrose sphinx moth, and monarch butterfly were evaluated as surrogate species for potential effects. Exposure was estimated by surface contact, as described in Appendix F, Section F4.2.1.5.
- Plant exposure was qualitatively evaluated in that deposition on plants was assumed, as the vector for direct herbivore exposure, but phytoxicity from any of the treatment alternatives, including No Program,

is not anticipated provided label application rates are followed, as was the assumption for all modeling conducted. Potential indirect effects to plants, through effects on pollinators, are recognized.

As discussed above, HQ estimations were used as the principal means to evaluate the potential significance of ecological health hazards from the No Program and Program alternatives. HQ calculations are provided in Table 12-9. Exposure concentrations and HQ calculations for each Program alternative are further clarified in Appendix F, Sections F4 and F5.

Table 12-5 Terrestrial Vertebrates Considered for Ecological Health Effects from the No Program and Program Alternatives

Species & Status	Relevant Life-History Characteristics & Dietary Preference Relevant to Exposure	Potential Exposure Pathways
Amphibians		
Santa Cruz Long-Toed Salamander *Ambystoma macrodactylum croceum*	Location: Santa Cruz and Monterey counties. Diet: Adults - arthropods, esp spiders, insects and isopods & aquatic dipterans. Larvae - aquatic crustaceans, dipterans & tadpoles. Breeding: mid-January to mid-February. Habitat: Aquatic larvae prefer shallow (<12 inches) water, using clumps of vegetation or debris for cover no fish or bullfrogs. Adults use mammal burrows.	Primary: Ingestion Secondary: Inhalation of drift Tertiary: Surface contact
California Red-Legged Frog *Rana aurora draytonii* Size 1.5 to 5 inches – largest native western frog	Diet: Adults - invertebrates or Pacific tree frog and California mice. Larvae are algal grazers. Breeding: Nov- April. Habitat: close to spawning ponds or along deep, quiet pools in creeks with vegetative, undercut banks, or rootwads, as well as in burrows in or above the banks.	Primary: Ingestion Secondary: Inhalation of drift Tertiary: Surface contact
Pacific Treefrog *Pseudacris regilla*	Diet: Plant material as juveniles; insects as adults.	Primary: Ingestion Secondary: Inhalation of drift. Tertiary: Surface contact
Western Toad *Bufo boreas*	Aquatic habitat. Diet: Plant material as juveniles; insects & beetles as adults.	Primary: Ingestion Secondary: Inhalation of drift Tertiary: Surface contact
Pond Turtle *Clemmys marmorata*	Aquatic. Diet: Aquatic macroinvertebrates.	Primary: Ingestion Secondary: Inhalation of drift Tertiary: Surface contact
Common Garter snake *Thamnophis sirtalis*	Aquatic. Diet: Amphibians, earthworms & fish.	Primary: Ingestion Secondary: Inhalation of drift
Birds		
Least Bell's Vireo *Vireo bellii pusillus*	Migratory resident breeds in riparian habitats from mid March to mid April; hatching April and May; migrate south between July and September. Diet: Gleans bugs, beetles, caterpillars, moths, grasshoppers from foliage.	Primary: Ingestion (food & water) Secondary: Inhalation of drift Tertiary: Surface Contact
American robin *Turdus migratorius*	Nesting April-July. Omnivorous: Earthworms, insects, berries.	Primary: Ingestion (food & water) Secondary: Inhalation of drift Tertiary: Surface Contact
Bobwhite Quail *Colinus virginianus*	Breeding in April-July; hatching May to August; Nonmigratory; annual mortality rate of approx. 80% Diet: Plants and insects. Max insects 20% in summer	Primary: Ingestion (food & water) Secondary: Inhalation of drift Tertiary: Surface Contact

Table 12-5 Terrestrial Vertebrates Considered for Ecological Health Effects from the No Program and Program Alternatives

Species & Status	Relevant Life-History Characteristics & Dietary Preference Relevant to Exposure	Potential Exposure Pathways
Southwestern Willow Flycatcher *Empidonax traillii extimus*	Neotropical migrant nests in dense riparian habitats within low gradient streams and floodplains with native and nonnative trees and shrubs ranging in height from 6 to 98 feet from sea level to over 8,000 feet between May and June. Riparian habitats also used for rearing, foraging, and dispersing. Migrate to wintering areas by end of September Diet: Many different insects, including flying ants, wasps, and bees; dragonflies; flies; beetles; butterflies, moths, and caterpillars; and spittlebugs.	Primary: Ingestion (food & water) Secondary: Inhalation of drift Tertiary: Surface Contact
Marsh Wren *Cistothorus palustris*	Breed in April; hatch in May; Migration in fall and spring; likely to be found within coastal marsh habitat where Spartina is abundant Diet: Insects, spiders, mollusks, and crustaceans.	Primary: Ingestion (food & water) Secondary: Inhalation of drift Tertiary: Surface Contact
Mallard Duck *Anas platyrhynchos*	A surface feeding “puddle” duck, feeds on an omnivorous diet. Dietary patterns vary with season. In winter, mallards feed mostly on seeds mast, and to a lesser extent invertebrates. In the migratory and breeding seasons, high protein and fat diets are consumed, with more invertebrate biomass.	Primary: Ingestion (food & water) Secondary: Inhalation of drift Tertiary: Surface Contact
Cooper’s Hawk *Accipiter cooperii*	Year-round resident breeds March – June; young mostly May – June Diet: Mostly birds but some small mammals, such as ground squirrels, chipmunks, and deer mice	Primary: Dietary Secondary: Inhalation of drift Tertiary: Water Intake
Great blue heron *Ardea Herodias*	Diet: Fish, amphibians, snakes & lizards, large insects and small mammals.	Primary: Ingestion (food & water) Secondary: Inhalation of drift Tertiary: Surface Contact
Bald Eagle *Haliaeetus leucocephalus*	Usually associated near large bodies of water. Diet: Fishes, waterfowl, small mammals and carrion.	Primary: Ingestion (food & water) Secondary: Inhalation of drift Tertiary: Surface Contact
Mammals		
Buena Vista Lake Shrew *Sorex ornatus relictus*	Location: Kern County Diet: primarily feed on invertebrates Breeding: Autumn to May/June Habitat: Permanent marshlands & riparian areas with dense vegetation in Tulare Basin. Prefers moist soil. Uses stumps, logs and litter for cover.	Primary: Ingestion (food & water) Secondary: Surface Contact Tertiary: Inhalation of drift
Sea Otter *Enhydra lutris*	Location: Coastal Diet: abalone, sea urchin, crabs, clams, kelp-associated fish, mollusks, barnacles, octopus, starfish Breeding: Births from late February to early April Habitat: Rocky shorelines with kelp beds	Primary: Ingestion (food & water) Secondary: Inhalation of drift Tertiary: Surface Contact
Deer mouse *Peromyscus maniculatus*	Breed several times during the year. Diet: Mixture of nuts, seeds, and insects	Primary: Ingestion (food & water) Secondary: Inhalation of drift Tertiary: Surface Contact
Cottontail rabbit *Sylvilagus* spp.	Breed several times during the year Diet: Grasses, shrubs, woody plants	Primary: Ingestion (food & water) Secondary: Inhalation of drift Tertiary: Surface Contact
Norway rat *Rattus norvegicus*	Breed several times during the year. Diet: Omnivorous	Primary: Ingestion (food & water) Secondary: Inhalation of drift Tertiary: Surface Contact

Table 12-5 Terrestrial Vertebrates Considered for Ecological Health Effects from the No Program and Program Alternatives

Species & Status	Relevant Life-History Characteristics & Dietary Preference Relevant to Exposure	Potential Exposure Pathways
Red Fox *Vulpes vulpes*	Breeding in December–February Diet: Omnivorous: mostly small mammals, birds, insects, and fruit. Plant material is common in summer and fall diet.	Primary: Ingestion (food & water) Secondary: Inhalation of drift Tertiary: Surface Contact
Mule deer *Odocoileus hemionus*	Breeding in June. Diet: Herbivorous: leaves & twigs of trees & shrubs. Acorns, legumes & fleshy fruits	Primary: Ingestion (food & water) Secondary: Inhalation of drift Tertiary: Surface Contact
Black bear *Ursus americanus*	Hibernation period: 3-4 months during winter (January-April) Diet: Omnivorous: Grasses & Forbes in spring, fruits in summer, nuts & acorns in fall, insects & beetles. Carrion.	Primary: Ingestion (food & water) Secondary: Inhalation of drift Tertiary: Surface Contact
Cow & calf *Bos primigenius taurus*	Drink vast quantities of water. Diet: Grasses.	Primary: Ingestion (food & water) Secondary: Inhalation of drift Tertiary: Surface Contact

[1]Fellers, G. and G. Guscio. 2004.
[2]USEPA 1993 –for bullfrogs (28-77g)
[3]Brown et al. 2006
[4]USEPA 1993 - for short tailed shrews – a larger species so these values likely overestimates
[5]Gunderson 2002 - Sea otters eat 20-25% of body weight/ day
[6] USEPA 1993 - river otter data, SA is 3x River Otter Surface area – sea otters are ~ 3x the weight

Table 12-6 Nontarget Invertebrate Exposure Factor Information

Species	Adult Body Weight/ Wing Span	Surface Area (cm^2)	Relevant Life-History Characteristics & Dietary Preference Relevant to Exposure & Ecological Subregion(s) Where Found	Potential Exposure Pathways
Honeybee[a] *Apis mellifera*	Mean body weight 0.093 gram Wing span 7.63 millimeters	2.45	Cosmopolitan in treatment area; standard invertebrate test species	Contact, Ingestion
Bay Checkerspot Butterfly[b] *Euphydryas editha bayensis*	Wing span 51 millimeters	5.202	Location: San Francisco, San Mateo, Alameda, Contra Costa, Santa Clara Diet: larval host plant is the annual rock plantain (*Plantago erecta*). Also utilizes owl's clover. Breeding: Late February to early May Habitat: Native grasslands on serpentine outcrops	Contact, Ingestion
Kern Primrose Sphinx Moth[c] *Euproserpinus euterpe*	Mean body weight 0.3–3.5 grams Wing span 44.45-53.98 millimeters	3.95-5.83	Location: Kern County in Walker Basin (outside LBAM area) & Carrizo Plain (SE San Luis Obispo Co), Cuyama Valley (Santa Barbara Co) in LBAM area. Diet: nectar of filaree or *Erodium cicutarium* and baby blue eyes (*Nemophila menziesii*). Larvae deposited on evening primrose (*Camissonia* sp.), to hatch and feed. Breeding: Flight season Carrizo Plain (late Jan to late Feb), Walker Basin (mid-March to early April). Habitat: sandy washes with open soil for basking that support the food plant field primrose or sun cup (*Camissonia campestris*) with loose soil for larvae to burrow & construct shallow pupal chambers.	Contact, Ingestion
Monarch Butterfly[d] *Danaus plexippus*	Mean body weight (adult) 0.27-0.75 gram Mean weight (larvae) 0.38 -0.02 gram Wing span 94-105 millimeters	17.67-22.05	Location: Fremont, Santa Cruz, Pacific Grove, Big Sur, Morro Bay, Pismo Beach, Ventura, Malibu, Long Beach, Encinitas, San Diego; likely cosmopolitan in treatment area Diet: Larval host plants are milkweeds (*Asclepisa* spp.). Adults feed on floral nectar. Breeding: Spring and summer. Habitat: Need host plant, milkweed (*Asclepias* spp.). Eucalyptus, pines, and cypress used for roosting.	Contact, Ingestion

[a] S. Sheppard, pers. comm., 2009 (weight); Landacre 1901 (wing span); Coelho and Taylor 2005 (calculating surface area)
[b] USFWS 2008b
[c] Heinrich and Casey (1973)
[d] Brower et al. (2006); Losey et al. (1999)

Table 12-7 Exposure Factor Information for Aquatic Receptors

Species	Relevant Life-History Characteristics & Dietary Preference Relevant to Exposure	Principal Exposure Pathways
San Diego Fairy Shrimp *Branchinecta sandiegonensis*	Location: San Diego and Orange counties Diet: algae, zooplankton Breeding: After winter rains Habitat: Small, shallow vernal pools. Occasionally occurs in ditches and road ruts that can support suitable conditions	Aquatic exposure
Water flea *Ceriodaphnia dubia*	Standard aquatic test species, broadly distributed in lakes and ponds of Program Area	Aquatic exposure
Rainbow trout *Oncorhynchus mykiss*	Standard aquatic test species, broadly distributed in freshwaters of treatment area; anadromous life cycle possible (steelhead)	Aquatic exposure
Fathead minnow *Pimephales promelas*	Standard aquatic test species, broadly distributed in freshwaters of treatment area.	Aquatic exposure
Green algae *Selenastrum capricornum*	Standard aquatic test species, common in freshwaters.	Aquatic exposure

Table 12-8 Exposure Factor Information for Plant Receptors Considered for Ecological Health Impacts

Category	Common Name	Scientific Name	Status	Habitat	Plant Habit	Plant pollinator	Flower Period	CA County Occurrences
Plant	Ione buckwheat (including Irish Hill variety)	*Eriogonum apricum* (including var. *prostratum*)	FE, CE, CNPS 1B	Ione chaparral, in gravelly openings on Ione Formation soil. 80-150m.	Perennial herb	No specialized pollinator. Pollen attracts bees, flies, ants, and other insects	Jun-Jul	Amador and possibly Sacramento
Plant	Yadon's rein orchid	*Piperia yadonii*	FE, CNPS 1B	*Piperia yadonii* populations occur in northern coastal Monterey County. Habitats include both Monterey pine forest where the understory is sparse and herbaceous and in along ridges in maritime chaparral where the shrubs are dwarfed and the soils shallow. This species grows in filtered sun on soils (sandy, podzolic, or decomposed granite when associated with Monterey pine and manzanitas) with a shallow clay hard pan that becomes very dry during the flowering season. However, these soils include cracks and tubes derived from root penetration that fill with clay and remain moist for long periods of time. In maritime chaparral habitat in northern Monterey County, plants grow on sandstone ridges where soils are shallow (10 to 415 meters).	Perennial herb	Pollinators include Pyralidae (snout moths), Geometridae (geometer moths), Noctuidae (noctuid moths), and Pterophoridae (plume moths) and bumble bees (*Bombus* sp.). Reproduction includes both outcrossing and self-pollination. Both of these modes require insect pollinators; virtually no fruit and seed production occurs in plants that are not visited by pollinators.	May-Aug.	Monterey

Table 12-9 Toxicity Reference Values and Hazard Quotients for Nontarget Wildlife and Aquatic Organisms

MAMMALS – HAZARD QUOTIENTS FOR INGESTION

Alternative	Treatment	TRV & Application Method	Feeding Guild									
			Herbivores				Omnivores			Carnivores		
			Deer Mouse	Cottontail	Deer/Sheep	Cow/Calf	Rat	Lake Shrew	Black Bear	Raccoon	Sea Otter	Red Fox
ACUTE TOXICITY												
No Program	Lambda-cyhalothrin	TRV (mg/kg)	2	2	1	1	5.6	5.6	2.8	2.8	0.56	0.28
		Truck-based	0.01062	0.00608	0.00615	0.00569	0.00114	9.3 X10^{-04}	0.00249	0.00813	0.005	0.01454
		Backpack-based	0.01122	0.00645	0.00651	0.006	0.0012	9.8 X10^{-04}	0.00261	0.00851	0.00522	0.01533
	Chlorpyrifos (ME)	TRV (mg/kg)	6	100	80	80	8.2	8.2	4.1	4.1	0.82	0.41
		Truck-based	0.0832	0.00286	0.0018	0.00167	0.01826	0.01493	0.02158	0.03884	0.0076	0.23377
		Backpack-based	0.08693	0.00298	0.00189	0.00175	0.01907	0.01559	0.02254	0.04058	0.00794	0.24419
	Chloropyrifos (4E)	TRV (mg/kg)	6	100	80	80	8.2	8.2	4.1	4.1	0.82	0.41
		Truck-based	0.03902	0.00134	8.5 X10^{-04}	7.8 X10^{-04}	0.00856	0.007	0.01012	0.01821	0.00356	0.10959
		Backpack-based	0.04061	0.00139	8.8 X10^{-04}	8.2 X10^{-04}	0.00891	0.00729	0.01053	0.01896	0.00371	0.11413
	Permethrin	TRV (mg/kg)	25	25	12.5	12.5	43	43	21.5	21.5	4.3	2.15
		Truck-based	0.00415	0.00237	0.0024	0.00222	7.2 X10^{-04}	5.9 X10^{-04}	8.3 X10^{-04}	0.00141	2.0 X10^{-04}	0.00925
		Backpack-based	0.00431	0.00247	0.00249	0.00231	7.5 X10^{-04}	6.1 X10^{-04}	8.6 X10^{-04}	0.00146	2.0 X10^{-04}	0.00963
Mating Disruption	SPLAT® LBAM	TRV (mg/kg)	50	50	25	25	500	500	250	250	50	25
		Truck/Metered	0.0088	0.0051	0.0051	0.0047	3.0 X10^{-04}	2.0 X10^{-04}	3.0 X10^{-04}	5.0 X10^{-04}	3.0 X10^{-05}	0.0034
		Caulk Gun	0.011	0.0063	0.0064	0.0059	3.0 X10^{-04}	3.0 X10^{-04}	4.0 X10^{-04}	6.0 X10^{-04}	4.0 X10^{-05}	0.0042
	Hercon Disrupt Bio-Flake® LBAM	TRV (mg/kg)	176	176	88	88	1760	1760	880	880	176	88
		Pod Gun	0.002	0.001	0.001	0.001	1.0 X10^{-04}	1.0 X10^{-04}	1.0 X10^{-04}	1.0 X10^{-04}	1.0 X10^{-05}	0.001
	SPLAT® LBAM	TRV (mg/kg)	50	50	25	25	500	500	250	250	50	25
		Aerial	0.0026	0.0015	0.0015	0.0014	8.0 X10^{-05}	6.0 X10^{-05}	9.0 X10^{-05}	1.0 X10^{-04}	0.00001	0.001f
	Hercon Disrupt Bio-Flake® LBAM	TRV (mg/kg)	176	176	88	88	1760	1760	880	880	176	88
		Aerial	9.0 X10^{-04}	5.0 X10^{-04}	5.0 X10^{-04}	5.0 X10^{-04}	3.0 X10^{-05}	2.0 X10^{-05}	3.0 X10^{-05}	5.0 X10^{-05}	3.0 X10^{-06}	3.0 X10^{-04}f

Table 12-9 Toxicity Reference Values and Hazard Quotients for Nontarget Wildlife and Aquatic Organisms

MAMMALS – HAZARD QUOTIENTS FOR INGESTION

Alternative	Treatment	TRV & Application Method	Feeding Guild									
			Herbivores				Omnivores			Carnivores		
			Deer Mouse	Cottontail	Deer/Sheep	Cow/Calf	Rat	Lake Shrew	Black Bear	Raccoon	Sea Otter	Red Fox
Male Moth Attractant	SPLAT® LBAM	TRV (mg/kg)	50	50	25	25	500	500	250	250	50	25
		Truck-based	3.458x10^{-06}	1.979 x10^{-06}	2.001 x10^{-06}	1.855 x10^{-06}	1.83 x10^{-07}	8.5 x10^{-08}	1.15 x10^{-07}	1.83 x10^{-07}	1.4 x10^{-08}	1.327 x10^{-06}
	Permethrin	TRV (mg/kg)	25	25	12.5	12.5	43	43	21.5	21.5	4.3	2.15
		Truck-based	2.2 x10^{-05}	1.5 x10^{-05}	6.0 x10^{-06}	8.0 x10^{-06}	1.5 x10^{-05}	2.0 x10^{-06}	9.3 x10^{-05}	2.2x10^{-05}	1.5 x10^{-05}	6.0 x10^{-06}
	1,2,4-trimethylbenzene	TRV (mg/kg)	0.044	0.044	0.022	0.022	0.44	0.44	0.22	0.22	0.044	0.022
		Truck-based	0.00133a	1.3 x10^{-04}	6.0 x10^{-05}	8.0 x10^{-05}	1.3 x10^{-04}	9.0 x10^{-06}	9.5 x10^{-04}	0.00133a	1.3 x10^{-04}	6.0 x10^{-04}
	ethylbenzene	TRV (mg/kg)	35	35	17.5	17.5	350	350	175	175	35	17.5
		Truck-based	1.71 x10^{-08}	1.8 x10^{-09}	8.0 x10^{-10}	1.1 x10^{-09}	1.8 x10^{-09}	1.0 x10^{-10}	1.23 x10^{-08}	1.71 x10^{-08}	1.8 x10^{-09}	8.0 x10^{-10}
Organically Approved Insecticides	Spinosad	TRV (mg/kg)	200	200	100	100	2000	2000	1000	1000	200	100
		Truck-based	6.2 X10^{-04}	3.5 X10^{-04}	3.6 X10^{-04}	3.3 X10^{-04}	2.0 X10^{-05}	2.0 X10^{-05}	2.0 X10^{-05}	3.0 X10^{-05}	2.0 X10^{-06}	2.4 X10^{-04}a
		Backpack-based	6.5 X10^{-04}	3.7 X10^{-04}	3.7 X10^{-04}	3.5 X10^{-04}	2.0 X10^{-05}	2.0 X10^{-05}	2.0 X10^{-05}	3.0 X10^{-05}	3.0 X10^{-06}	2.5 X10^{-04}b
	Bacillus thuringiensis	TRV (mg/kg)	944	944	944	944	1888	1888	944	188.8	188.8	188.8
		Truck-based	0.0033	0.0019	0.001	9.0 X10^{-04}	5.0 X10^{-04}	4.0 X10^{-04}	6.0 X10^{-04}	0.0044	6.5 X10^{-05}	0.0032a
		Backpack-based	0.0035	0.002	0.001	9.0 X10^{-04}	5.0 X10^{-04}	4.0 X10^{-04}	6.0 X10^{-04}	0.0046	6.8 X10^{-05}	0.0033b
CHRONIC TOXICITY												
No Program	Lambda-cyhalothrin	TRV (mg/kg)	0.25	0.25	0.125	0.125	2.5	2.5	1.25	1.25	0.5	0.25
		Truck-based	0.228	0.133	0.132	0.106	0.007	0.007	0.008	0.028	0.009	0.028
		Backpack-based	0.232	0.134	0.133	0.108	0.007	0.007	0.008	0.029	0.009	0.029
	Chlorpyrifos (ME)	TRV (mg/kg)	0.6	10	8	8	0.025	0.025	0.0125	0.0125	0.0025	0.00125
		Truck-based	0.599	0.02	0.013	0.011	4.498	4.673	5.868	10.264	1.621	59.86
		Backpack-based	0.614	0.021	0.013	0.011	4.623	4.828	6.128	10.718	1.693	62.304
	Chlorpyrifos (4E)	TRV (mg/kg)	0.6	10	8	8	0.025	0.025	0.0125	0.0125	0.0025	0.00125
		Truck-based	0.28	0.01	0.006	0.005	2.105	2.188	2.752	4.814	0.76	28.059
		Backpack-based	0.288	0.01	0.006	0.005	2.167	2.262	2.863	5.007	0.792	29.131
	Permethrin	TRV (mg/kg)	2.5	2.5	1.25	1.25	25	25	12.5	12.5	0.025	0.005
		Truck-based	0.106	0.056	0.057	0.053	0.003	0.004	0.002	0.004	0.079	7.81
		Backpack-based	0.111	0.059	0.059	0.055	0.004	0.004	0.002	0.004	0.082	8.142

Table 12-9 Toxicity Reference Values and Hazard Quotients for Nontarget Wildlife and Aquatic Organisms

MAMMALS – HAZARD QUOTIENTS FOR INGESTION

Alternative	Treatment	TRV & Application Method	Feeding Guild									
			Herbivores				Omnivores			Carnivores		
			Deer Mouse	Cottontail	Deer/Sheep	Cow/Calf	Rat	Lake Shrew	Black Bear	Raccoon	Sea Otter	Red Fox
Mating Disruption	SPLAT® LBAM	TRV (mg/kg)	5	5	2.5	2.5	50	50	25	25	5	2.5
		Truck/Metered	0.0442	0.0253	0.0256	0.0237	0.0013	0.0011	0.0025	0.004	3.4 X10^{-04}	0.0239
		Caulk Gun	0.0553	0.0317	0.032	0.0297	0.0017	0.0014	0.0031	0.005	4.2 X10^{-04}	0.0299
	Hercon Disrupt Bio-Flake® LBAM	TRV (mg/kg)	17.6	17.6	8.8	8.8	176	176	88	88	17.6	8.8
		Pod Gun	0.0104	0.006	0.006	0.0056	3.0 X10^{-04}	3.0 X10^{-04}	6.0 X10^{-04}	9.0 X10^{-04}	1.0 X10^{-04}	0.0057
	SPLAT® LBAM	TRV (mg/kg)	5	5	2.5	2.5	50	50	25	25	5	2.5
		Aerial	0.0131	0.0075	0.0076	0.007	3.9 X10^{-04}	3.2 X10^{-04}	7.4 X10^{-04}	0.0012	1.01 X10^{-04}	0.0071
	Hercon Disrupt Bio-Flake® LBAM	TRV (mg/kg)	17.6	17.6	8.8	8.8	176	176	88	88	17.6	8.8
		Aerial	0.0044	0.0025	0.0025	0.0024	1.0 X10^{-04}	1.0 X10^{-04}	2.0 X10^{-04}	4.0 X10^{-04}	3.0 X10^{-05}	0.0024
Male Moth Attractant	SPLAT® LBAM	TRV (mg/kg)	5	5	2.5	2.5	50	50	25	25	5	2.5
		Truck-based	1.7x10^{-05}	9.9 x10^{-06}	1.0 x10^{-05}	9.0 x10^{-06}	2.0 x10^{-06}	4.0 x10^{-07}	1.0 x10^{-06}	2.0 x10^{-06}	1.3 x10^{-07}	9.0 x10^{-06}
	Permethrin	TRV (mg/kg)	2.5	2.5	1.25	1.25	25	25	12.5	12.5	0.025	0.005
		Truck-based	6.07 x10^{-04}	3.37 x10^{-04}	3.38 x10^{-04}	2.95 x10^{-04}	2.7 x10^{-04}	2.0 x10^{-05}	1.5 x10^{-05}	2.7 x10^{-05}	4.66 x10^{-04}	0.048481
	1,2,4-trimethylbenzene	TRV (mg/kg)	0.02	0.02	0.01	0.01	0.2	0.2	0.1	0.1	0.02	0.01
		Truck-based	0.002801	0.0016	0.001619	0.001504	2.44 x10^{-04}	6.9 x10^{-05}	1.51 x10^{-04}	2.44 x10^{-04}	2.0 x10^{-05}	0.001474
	ethylbenzene	TRV (mg/kg)	1.36	1.36	0.68	0.68	13.6	13.6	6.8	6.8	1.36	0.68
		Truck-based	3.0x10^{-07}	2.0 x10^{-07}	2.0 x10^{-07}	2.0 x10^{-07}	4.0 x10^{-08}	7.0 x10^{-09}	3.0 x10^{-08}	4.0 x10^{-08}	3.7 x10^{-09}	2.0 x10^{-07}
Organically Approved Insecticides	Spinosad	TRV (mg/kg)	48	48	24	24	480	480	240	240	48	24
		Truck-based	0.0032	0.0018	0.0018	0.0017	1.0 X10^{-04}	8.0 X10^{-05}	9.0 X10^{-05}	1.5 X10^{-04}	1.02 X10^{-05}	0.0011
		Backpack-based	0.0033	0.0019	0.0019	0.0018	9.97 X10^{-05}	8.0 X10^{-05}	9.6 X10^{-05}	2.0 X10^{-04}	1.1 X10^{-05}	0.0012
	Bacillus thuringiensis	TRV (mg/kg)	420	400	400	400	840	840	420	84	84	84
		Truck-based	0.0043	0.0026	0.0013	0.0012	6.0 X10^{-04}	5.0 X10^{-04}	0.0011	0.0087	1.43 X10^{-04}	0.0054
		Backpack-based	0.0045	0.0027	0.0014	0.0013	7.0 X10^{-04}	6.0 X10^{-04}	0.0011	0.0091	1.5 X10^{-04}	0.0056

Table 12-9 Toxicity Reference Values and Hazard Quotients for Nontarget Wildlife and Aquatic Organisms

MAMMALS - – HAZARD QUOTIENTS [TRVS] FOR INHALATION

			Feeding Guild								
			Herbivores				Omnivores		Carnivores		
Alternative	Treatment	Application	Deer Mouse	Cottontail	Deer/Sheep	Cow/Calf	Lake Shrew	Black Bear	Raccoon	Sea Otter	Red Fox
ACUTE TOXICITY											
No Program	Lambda-cyhalothrin	TRV (mg/L)	6.0 X10^{-04}	6.0 X10^{-04}	3.0 X10^{-04}	3.0 X10^{-04}	0.006	0.003	0.003	6.0 X10^{-04}	3.0 X10^{-04}
		Truck-based	0.61099	0.26945	0.23475	0.15592	0.23534	0.0344	0.03915	0.04697	0.38521
		Backpack-based	0.26272	0.11586	0.10094	0.06705	0.1012	0.01479	0.01683	0.0202	0.16564
	Chlorpyrifos (ME)	TRV (mg/L)	9.4	9.4	4.7	4.7	0.522	0.261	0.261	0.052	0.026
		Truck-based	0.00181	8.0 X10^{-04}	6.9 X10^{-04}	4.6 X10^{-04}	0.12537	0.01833	0.02085	0.02512	0.20599
		Backpack-based	0.00128	5.6 X10^{-04}	4.9 X10^{-04}	3.3 X10^{-04}	0.08886	0.01299	0.01478	0.0178	0.146
	Chlorpyrifos (4E)	TRV (mg/L)	9.4	9.4	4.7	4.7	0.522	0.261	0.261	0.052	0.026
		Truck-based	8.5 X10^{-04}	3.7 X10^{-04}	3.3 X10^{-04}	2.2 X10^{-04}	0.05868	0.00858	0.00976	0.01176	0.09642
		Backpack-based	6.0 X10^{-04}	2.6 X10^{-04}	2.3 X10^{-04}	1.5 X10^{-04}	0.04159	0.00608	0.00692	0.00833	0.06834
	Permethrin	TRV (mg/L)	0.235	0.235	0.118	0.118	2.35	1.175	1.175	0.235	0.118
		Truck-based	0.00164	7.2 X10^{-04}	6.3 X10^{-04}	4.2 X10^{-04}	6.3 X10^{-04}	0.00009	1.1 X10^{-04}	1.3 X10^{-04}	0.00103
		Backpack-based	0.00329	0.00145	0.00126	8.3 X10^{-04}	0.00127	1.8 X10^{-04}	2.1 X10^{-04}	2.5 X10^{-04}	0.00206
Mating Disruption	Isomate Twist Ties	TRV (mg/L)	0.0526	0.0526	0.0263	0.263	0.526	0.263	0.263	0.0526	0.0263
		Twist Ties	7.0 X10^{-06}	3.0 X10^{-06}	3.0 X10^{-06}	2.0 X10^{-06}	3.0 X10^{-06}	4.0 X10^{-07}	5.0 X10^{-07}	1.0 X10^{-06}	5.0 X10^{-06}
	SPLAT® LBAM	TRV (mg/L)	0.0207	0.0207	0.0104	0.0104	0.207	0.1035	0.1035	0.0207	0.0104
		Truck-based	0.038	0.017	0.015	0.01	0.015	0.002	0.002	0.003	0.024
		Metered Spray	0.024	0.011	0.009	0.006	0.009	0.001	0.002	0.002	0.015
		Caulk Gun	0.086	0.038	0.033	0.022	0.033	0.005	0.006	0.007	0.054
	Hercon Disrupt Bio-Flake® LBAM	TRV (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA
	SPLAT® LBAM	TRV (mg/L)	0.0207	0.0207	0.0104	0.0104	0.207	0.1035	0.1035	0.0207	0.0104
		Aerial	0.0015	7.0 X10^{-04}	6.0 X10^{-04}	4.0 X10^{-04}	6.0 X10^{-04}	9.0 X10^{-05}	1.0 X10^{-04}	1.0 X10^{-04}	9.0 X10^{-04}
	Hercon Disrupt Bio-Flake® LBAM	TRV (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 12-9 Toxicity Reference Values and Hazard Quotients for Nontarget Wildlife and Aquatic Organisms

MAMMALS - – HAZARD QUOTIENTS [TRVS] FOR INHALATION

			Feeding Guild								
			Herbivores				Omnivores		Carnivores		
Alternative	Treatment	Application	Deer Mouse	Cottontail	Deer/Sheep	Cow/Calf	Lake Shrew	Black Bear	Raccoon	Sea Otter	Red Fox
Male Moth Attractant	SPLAT® LBAM	TRV (mg/L)	0.0207	0.0207	0.0104	0.0104	0.207	0.1035	0.1035	0.0207	0.0104
		Truck-based	0.06	0.026	0.023	0.015	0.023	0.003	0.004	0.005	0.038
	Permethrin	TRV (mg/L)	0.235	0.235	0.118	0.118	2.35	1.175	1.175	0.235	0.118
		Truck-based	0.00631	0.00278	0.00241	0.0016	0.00243	3.6 x10^{-04}	4.0x10^{-04}	4.9 x10^{-04}	0.00396
	1,2,4-trimethylbenzene	TRV (mg/L)	2000	2000	1000	1000	2000	1000	1000	200	100
		Truck-based	8.1 x10^{-07}	3.6 x10^{-07}	3.1 x10^{-07}	2.1 x10^{-07}	3.11 x10^{-06}	4.5 x10^{-07}	5.2 x10^{-07}	6.2 x10^{-07}	5.08 x10^{-06}
	ethylbenzene	TRV (mg/L)	125	125	62.5	62.5	1250	625	625	125	62.5
		Truck-based	9.7 x10^{-08}	4.3 x10^{-08}	3.7 x10^{-08}	2.5 x10^{-08}	3.7 x10^{-08}	5.0 x10^{-09}	6.0 x10^{-09}	7.0 x10^{-09}	6.1 x10^{-08}
Organically Approved Insecticides	Spinosad	TRV (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Bacillus thuringiensis	TRV (mg/L)	1.04	1.04	0.52	0.52	0.104	0.052	0.052	0.104	0.052
		Truck-based	0.009	0.004	0.004	0.002	0.36	0.053	0.06	0.007	0.059
		Backpack-based	0.004	0.002	0.002	0.001	0.155	0.023	0.026	0.003	0.025
CHRONIC TOXICITY											
No Program	Lambda-cyhalothrin	TRV (mg/L)	6.0 X10^{-05}	6.0 X10^{-05}	3.0 X10^{-05}	3.0 X10^{-05}	6.0 X10^{-04}	3.0 X10^{-04}	3.0 X10^{-04}	6.0 X10^{-05}	3.0 X10^{-05}
		Truck-based	0.018	0.008	0.007	0.005	0.007	0.00102	0.0012	0.0014	0.011
		Backpack-based	0.008	0.003	0.003	0.002	0.003	4.0 X10^{-04}	5.0 X10^{-04}	6.0 X10^{-04}	0.005
	Chloropyrifos (ME)	TRV (mg/L)	0.0295	0.0295	0.01475	0.01475	0.295	0.1475	0.1475	0.0295	0.01475
		Truck-based	0.029	0.013	0.011	0.007	0.011	0.002	0.002	0.002	0.018
		Backpack-based	0.029	0.013	0.011	0.007	0.011	0.002	0.002	0.002	0.018
	Chlorpyrifos (4E)	TRV (mg/L)	0.0295	0.0295	0.01475	0.01475	0.295	0.1475	0.1475	0.0295	0.01475
		Truck-based	0.014	0.006	0.005	0.003	0.005	8.0 X10^{-04}	9.0 X10^{-04}	0.001	0.009
		Backpack-based	0.013	0.006	0.005	0.003	0.005	8.0 X10^{-04}	9.0 X10^{-04}	0.001	0.008
	Permethrin	TRV (mg/L)	0.0235	0.0235	0.0118	0.0118	0.235	0.1175	0.1175	0.0235	0.0118
		Truck-based	5.0 X10^{-05}	2.0 X10^{-05}	2.0 X10^{-05}	1.2 X10^{-05}	2.0 X10^{-05}	3.0 X10^{-06}	3.0 X10^{-06}	4.0 X10^{-06}	3.0 X10^{-05}
		Backpack-based	9.8 X10^{-05}	4.0 X10^{-05}	4.0 X10^{-05}	2.0 X10^{-05}	4.0 X10^{-05}	6.0 X10^{-06}	6.0 X10^{-06}	8.0 X10^{-06}	6.0 X10^{-05}

Table 12-9 Toxicity Reference Values and Hazard Quotients for Nontarget Wildlife and Aquatic Organisms

MAMMALS - – HAZARD QUOTIENTS [TRVS] FOR INHALATION

			Feeding Guild								
			Herbivores				Omnivores		Carnivores		
Alternative	Treatment	Application	Deer Mouse	Cottontail	Deer/Sheep	Cow/Calf	Lake Shrew	Black Bear	Raccoon	Sea Otter	Red Fox
Mating Disruption	Isomate Twist Ties	TRV (mg/L)	0.00526	0.00526	0.00263	0.0263	0.0526	0.0263	0.0263	0.00526	0.00263
		Twist Ties	4.4 X10^{-06}	9.0 X10^{-07}	3.0 X10^{-07}	1.0 X10^{-07}	6.6 X10^{-06}	1.0 X10^{-07}	1.0 X10^{-07}	3.0 X10^{-08}	9.0 X10^{-07}
	SPLAT® LBAM	TRV (mg/L)	0.00207	0.00207	0.00104	0.00104	0.0207	0.01035	0.01035	0.00207	0.00104
		Truck-based	0.0015	7.0 X10^{-04}	6.0 X10^{-04}	4.0 X10^{-04}	6.0 X10^{-04}	8.0 X10^{-05}	9.6 X10^{-05}	1.2 X10^{-04}	9.0 X10^{-04}
		Metered Spray	0.001	4.0 X10^{-04}	4.0 X10^{-04}	2.0 X10^{-04}	4.0 X10^{-04}	5.0 X10^{-05}	6.0 X10^{-05}	7.0 X10^{-05}	6.0 X10^{-04}
		Caulk Gun	0.0034	0.0015	0.0013	9.0 X10^{-04}	0.0013	2.0 X10^{-04}	2.0 X10^{-04}	3.0 X10^{-04}	0.0021
	Hercon Disrupt Bio-Flake® LBAM	TRV (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA
	SPLAT® LBAM	TRV (mg/L)	0.00207	0.00207	0.00104	0.00104	0.0207	0.01035	0.01035	0.00207	0.00104
		Aerial	6.0 X10^{-05}	3.0 X10^{-05}	2.0 X10^{-05}	1.5 X10^{-05}	2.0 X10^{-05}	3.0 X10^{-06}	4.0 X10^{-06}	4.0 X10^{-06}	4.0 X10^{-05}
	Hercon Disrupt Bio-Flake® LBAM	TRV (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Male Moth Attractant	SPLAT® LBAM	TRV (mg/L)	0.00207	0.00207	0.00104	0.00104	0.0207	0.01035	0.01035	0.00207	0.00104
		Truck-based	0.00238	0.001049	9.1 x10^{-04}	6.04 x10^{-04}	9.17 x10^{-04}	1.34 x10^{-04}	1.52 x10^{-04}	1.83 x10^{-04}	0.001493
	Permethrin	TRV (mg/L)	0.0235	0.0235	0.0118	0.0118	0.235	0.1175	0.1175	0.0235	0.0118
		Truck-based	2.45 x10^{-04}	1.08 x10^{-04}	9.4 x10^{-05}	6.2 x10^{-05}	9.5 x10^{-05}	1.4 x10^{-05}	1.6 x10^{-05}	1.9 x10^{-05}	1.54 x10^{-04}
	1,2,4-trimethylbenzene	TRV (mg/L)	85	85	42.5	42.5	850	425	425	85	42.5
		Truck-based	7.0 x10^{-08}	3.0 x10^{-08}	3.0 x10^{-08}	1.9 x10^{-08}	3.0 x10^{-08}	4.0 x10^{-09}	5.0 x10^{-09}	6.0 x10^{-09}	5.0 x10^{-08}
	ethylbenzene	TRV (mg/L)	12.5	12.5	6.25	6.25	125	62.5	62.5	12.5	6.25
		Truck-based	4.0 x10^{-09}	2.0x10^{-09}	1.5 x10^{-09}	1.0 x10^{-09}	1.5 x10^{-09}	2.0 x10^{-10}	2.0 x10^{-10}	3.0 x10^{-10}	2.0 x10^{-09}
Organically Approved Insecticides	Spinosad	TRV (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Bacillus thuringiensis	TRV (mg/L)	0.104	0.104	0.052	0.052	0.0104	0.0052	0.0052	0.0104	0.0052
		Truck-based	0.00156	6.9 X10^{-04}	6.0 X10^{-04}	4.0 X10^{-04}	0.06003	0.00877	0.00998	0.0012	0.00983
		Backpack-based	6.7 X10^{-04}	3.0 X10^{-04}	2.6 X10^{-04}	1.7 X10^{-04}	0.02581	0.00377	0.00429	5.2 X10^{-04}	0.00422

Table 12-9 Toxicity Reference Values and Hazard Quotients for Nontarget Wildlife and Aquatic Organisms

AVIAN - – HAZARD QUOTIENTS [TRVS] FOR INGESTION

			Feeding Guild								
			Insectivore				Waterfowl	Gamebird	Carnivores		
Alternative	Treatment	Application	Vireo	Flycatcher	Marsh Wren	Am Robin	Mallard Duck	Bobwhite Quail	Grt Blue Heron	Bald Eagle	Cooper's Hawk
ACUTE TOXICITY											
No Program	Lambda-cyhalothrin	TRV (mg/kg)	197.5	197.5	197.5	197.5	395	530	197.5	197.5	197.5
		Truck-based	1.01 X10^{-04}	1.75 X10^{-04}	1.33 X10^{-04}	2.95 X10^{-04}	9.9 X10^{-05}	2.2 X10^{-05}	0.002015	0.001659	2.1 X10^{-05}
		Backpack-based	1.06 X10^{-04}	1.86 X10^{-04}	1.4 X10^{-04}	3.12 X10^{-04}	1.05 X10^{-04}	2.3 X10^{-05}	0.002103	0.001731	2.2 X10^{-05}
	Chlorpyrifos (ME)	TRV (mg/kg)	3.2	3.2	3.2	2.1	7.56	10.8	3.2	3.2	3.2
		Truck-based	0.148	0.254	0.296	0.428	0.121	0.025	0.208	0.171	0.031
		Backpack-based	0.154	0.265	0.309	0.447	0.127	0.027	0.218	0.178	0.032
	Chlorpyrifos (4E)	TRV (mg/kg)	3.2	3.2	3.2	2.1	7.56	10.8	3.2	3.2	3.2
		Truck-based	0.069	0.119	0.139	0.201	0.057	0.012	0.098	0.08	0.014
		Backpack-based	0.072	0.124	0.145	0.209	0.059	0.012	0.102	0.083	0.015
	Permethrin	TRV (mg/kg)	495	495	495	495	990	1550	495	495	1350
		Truck-based	1.98 X10^{-04}	3.41 X10^{-04}	2.6 X10^{-04}	5.74 X10^{-04}	1.92 X10^{-04}	3.7 X10^{-05}	1.53 X10^{-04}	1.25 X10^{-04}	1.5 X10^{-05}
		Backpack-based	2.06 X10^{-04}	3.55 X10^{-04}	2.71 X10^{-04}	5.97 X10^{-04}	2.0 X10^{-04}	3.8 X10^{-05}	1.53 X10^{-04}	1.25 X10^{-04}	1.6 X10^{-05}
Mating Disruption	SPLAT® LBAM	TRV (mg/kg)	50	50	50	50	50	50	50	50	50
		Truck/Metered	0.0084	0.0144	0.011	0.0242	0.0162	0.0049	8.0 X10^{-04}	6.0 X10^{-04}	0.0018
		Caulk Gun	0.0105	0.018	0.0138	0.0303	0.0203	0.0061	0.001	0.0007	0.0022
	Hercon Disrupt Bio-Flake® LBAM	TRV (mg/kg)	100	100	100	100	200	200	100	100	100
		Pod Gun	0.0035	0.006	0.0046	0.0101	0.0034	0.001	3.0 X10^{-04}	2.0 X10^{-04}	7.0 X10^{-04}
	SPLAT® LBAM	TRV (mg/kg)	50	50	50	50	50	50	50	50	50
		Aerial	0.0025	0.0043	0.0033	0.0072	0.0048	0.0014	2.0 X10^{-04}	2.0 X10^{-04}	5.0 X10^{-04}
	Hercon Disrupt Bio-Flake® LBAM	TRV (mg/kg)	100	100	100	100	200	200	100	100	100
		Aerial	0.0015	0.0025	0.0019	0.0043	0.0014	4.0 X10^{-04}	1.0 X10^{-04}	1.0 X10^{-04}	3.0 X10^{-04}

Table 12-9 Toxicity Reference Values and Hazard Quotients for Nontarget Wildlife and Aquatic Organisms

AVIAN - – HAZARD QUOTIENTS [TRVS] FOR INGESTION

			Feeding Guild								
			Insectivore				Waterfowl	Gamebird	Carnivores		
Alternative	Treatment	Application	Vireo	Flycatcher	Marsh Wren	Am Robin	Mallard Duck	Bobwhite Quail	Grt Blue Heron	Bald Eagle	Cooper's Hawk
Male Moth Attractant	SPLAT® LBAM	TRV (mg/kg)	50	50	50	50	50	50	50	50	50
		Truck-based	3.3 x10^{-06}	5.6 x10^{-06}	4.3 x10^{-06}	9.5 x10^{-06}	6.3 x10^{-06}	1.9 x10^{-06}	3.0 x10^{-07}	2.0 x10^{-07}	7.0 x10^{-07}
	Permethrin	TRV (mg/kg)	495	495	495	495	990	1550	495	495	1350
		Truck-based	2.0 x10^{-06}	3.4 x10^{-06}	2.6 x10^{-06}	5.7 x10^{-06}	1.9 x10^{-06}	4.0 x10^{-07}	2.1 x10^{-06}	1.7 x10^{-06}	2.0 x10^{-07}
	1,2,4-trimethylbenzene	TRV (mg/kg)	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044
		Truck-based	0.0024	0.004	0.0032	0.0067	0.0045	0.0013	2.0 x10^{-04}	2.0 x10^{-04}	5.0 x10^{-04}
	ethylbenzene	TRV (mg/kg)	35	35	35	35	35	35	35	35	35
		Truck-based	2.5 x10^{-08}	5.8 x10^{-08}	3.4 x10^{-08}	9.4 x10^{-08}	6.7 x10^{-08}	1.9 x10^{-08}	2.0 x10^{-09}	2.0 x10^{-09}	6.0 x10^{-09}
Organically Approved Insecticides	Spinosad	TRV (mg/kg)	66.65	66.65	66.65	66.65	133.3	133.3	66.65	66.65	66.65
		Truck-based	0.0018	0.003	0.0023	0.0051	0.0017	5.0 X10^{-04}	2.0 X10^{-04}	1.2 X10^{-04}	4.0 X10^{-04}
		Backpack-based		0.0032	0.0024	0.0053	0.0018	5.0 X10^{-04}	2.0 X10^{-04}	1.3 X10^{-04}	4.0 X10^{-04}
	Bacillus thuringiensis	TRV (mg/kg)	1666.5	1666.5	1666.5	1666.5	3333	3333	1666.5	1666.5	1666.5
		Truck-based	0.0018	0.0031	0.0023	0.0052	0.0017	5.0 X10^{-04}	2.0 X10^{-04}	1.0 X10^{-04}	4.0 X10^{-04}
		Backpack-based	0.0013	0.0032	0.0024	0.0054	0.0018	5.0 X10^{-04}	2.0 X10^{-04}	1.0 X10^{-04}	4.0 X10^{-04}
CHRONIC TOXICITY											
No Program	Lambda-cyhalothrin	TRV (mg/kg)	19.75	19.75	19.75	19.75	39.5	53	19.75	19.75	19.75
		Truck-based	0.004	0.005	0.006	0.0104	0.003	6.0 X10^{-04}	0.033	0.027	5.0 X10^{-04}
		Backpack-based				0.011			0.034	0.028	6.0 X10^{-04}
	Chlorpyrifos (ME)	TRV (mg/kg)	0.32	0.32	0.32	0.21	50	1.08	0.32	0.32	0.32
		Truck-based	1.656	1.954	3.478	4.031	0.015	0.187	1.042	0.854	0.243
		Backpack-based	1.723	2.001	3.618	4.148	0.015	0.192	1.088	0.892	0.251
	Chlorpyrifos (4E)	TRV (mg/kg)	0.32	0.32	0.32	0.21	50	1.08	0.32	0.32	0.32
		Truck-based	0.775	0.915	1.628	1.887	0.007	0.088	0.488	0.3999	0.114
		Backpack-based	0.807	0.938	1.694	1.944	0.007	0.09	0.509	0.417	0.117
	Permethrin	TRV (mg/kg)	49.5	49.5	49.5	49.5	50	155	49.5	49.5	135
		Truck-based	0.009	0.009	0.013	0.02	0.0104	0.0009	0.005	0.004	0.0004
		Backpack-based	0.01	0.009	0.014	0.021	0.011	0.001	0.005	0.004	4.0 X10^{-04}

Table 12-9 Toxicity Reference Values and Hazard Quotients for Nontarget Wildlife and Aquatic Organisms

AVIAN - – HAZARD QUOTIENTS [TRVS] FOR INGESTION

			Feeding Guild								
			Insectivore				Waterfowl	Gamebird	Carnivores		
Alternative	Treatment	Application	Vireo	Flycatcher	Marsh Wren	Am Robin	Mallard Duck	Bobwhite Quail	Grt Blue Heron	Bald Eagle	Cooper's Hawk
Mating Disruption	SPLAT® LBAM	TRV (mg/kg)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
		Truck-based	0.042	0.072	0.055	0.121	0.081	0.024	0.004	0.003	0.0098
		Metered Spray	0.042	0.072	0.055	0.121	0.081	0.024	0.004	0.003	0.0098
		Caulk Gun	0.052	0.09	0.069	0.152	0.102	0.03	0.005	0.004	0.012
	Hercon Disrupt Bio-Flake® LBAM	TRV (mg/kg)	10	10	10	10	20	20	10	10	10
		Pod Gun	0.017	0.03	0.023	0.05	0.017	0.005	0.002	0.001	0.004
	SPLAT® LBAM	TRV (mg/kg)	5	5	5	5	5	5	5	5	5
		Aerial	0.012	0.021	0.016	0.036	0.024	0.007	0.001	9.0 X10^{-04}	0.003
	Hercon Disrupt Bio-Flake® LBAM	TRV (mg/kg)	10	10	10	10	20	20	10	10	10
		Aerial	0.007	0.013	0.01	0.021[f]	0.007	0.002	0.0007	0.0005	0.002
Male Moth Attractant	SPLAT® LBAM	TRV (mg/kg)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
		Truck-based	2.0 x10^{-05}	3.0 x10^{-05}	2.0 x10^{-05}	5.0 x10^{-05}	3.0 x10^{-05}	9.0 x10^{-06}	1.5 x10^{-06}	1.1 x10^{-06}	3.8 x10^{-06}
	Permethrin	TRV (mg/kg)	49.5	49.5	49.5	49.5	50	155	49.5	49.5	135
		Truck-based	5.0 x10^{-05}	5.0 x10^{-05}	7.0 x10^{-05}	1.1 x10^{-04}	6.0 x10^{-05}	5.0 x10^{-06}	2.0 x10^{-05}	2.0 x10^{-05}	2.0 x10^{-06}
	1,2,4-trimethylbenzene	TRV (mg/kg)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
		Truck-based	0.003	0.005	0.004	0.008	0.005	0.002	2.4 x10^{-04}	1.9 x10^{-04}	6.0 x10^{-04}
	ethylbenzene	TRV (mg/kg)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
		Truck-based	1.1 x10^{-07}	1.9 x10^{-07}	1.5 x10^{-07}	3.0 x10^{-07}	2.0 x10^{-07}	6.0 x10^{-08}	1.04 x10^{-08}	8.0 x10^{-09}	3.0x10^{-08}
Organically Approved Insecticides	Spinosad	TRV (mg/kg)	6.665	6.665	6.665	6.665	13.33	13.33	6.665	6.665	6.665
		Truck-based	0.022	0.037	0.029	0.063	0.021	0.006	0.002	0.002	0.004
		Backpack-based	0.023	0.039	0.03	0.066	0.022	0.007	0.002	0.002	0.005
	Bacillus thuringiensis	TRV (mg/kg)	1428.5	1428.5	1428.5	1428.5	2857	2857	1428.5	1428.5	1428.5
		Truck-based	0.0012	0.0021	0.0016	0.0035	0.0012	3.0 X10^{-04}	1.1 X10^{-04}	8.0 X10^{-05}	3.0 X10^{-04}
		Backpack-based	8.0 X10^{-04}	0.0022	0.0016	0.0036	0.0012	4.0 X10^{-04}	1.1 X10^{-04}	9.0 X10^{-05}	3.0 X10^{-04}

Table 12-9 Toxicity Reference Values and Hazard Quotients for Nontarget Wildlife and Aquatic Organisms

AMPHIBIAN AND REPTILES - – HAZARD QUOTIENTS [TRVS] FOR INGESTION

			Amphibians				Reptiles	
Alternative	Treatment	Application	CA Red-Legged Frog	Pacific Treefrog	Western Toad	Long-Toed Salamander	Pond Turtle	Common Garter Snake
ACUTE TOXICITY								
No Program	Lambda-cyhalothrin	TRV (mg/kg)	3.95	3.95	3.95	3.95	5.3	5.3
		Truck-based	3.2 X10^{-06}	7.8 X10^{-05}	7.2 X10^{-05}	1.4 X10^{-05}	1.1 X10^{-04}	1.15 X10^{-04}
		Backpack-based	3.3 X10^{-06}	8.1 X10^{-05}	7.6 X10^{-05}	1.5 X10^{-05}	1.15 X10^{-04}	1.2 X10^{-04}
	Chlorpyrifos (ME)	TRV (mg/kg)	0.0756	0.0756	0.0756	0.0756	0.108	0.108
		Truck-based	0.003942	0.0965	0.0895	0.0173	0.1282	0.1331
		Backpack-based	0.00411	0.1007	0.0934	0.0180	0.1338	0.1390
	Chlorpyrifos (4E)	TRV (mg/kg)	0.0756	0.0756	0.0756	0.0756	0.108	0.108
		Truck-based	0.001845	0.045	0.042	0.008	0.06	0.062
		Backpack-based	0.00193	0.047	0.044	0.008	0.063	0.065
	Permethrin	TRV (mg/kg)	9.9	9.9	9.9	9.9	13.5	13.5
		Truck-based	6.2 X10^{-06}	1.52 X10^{-04}	1.41 X10^{-04}	2.7 X10^{-05}	2.12 X10^{-04}	2.2 X10^{-04}
		Backpack-based	6.5 X10^{-06}	1.59 X10^{-04}	1.48 X10^{-04}	2.8 X10^{-05}	2.21 X10^{-04}	2.3 X10^{-04}
Mating Disruption	SPLAT® LBAM	TRV (mg/kg)	0.5	0.5	0.5	0.5	0.5	0.5
		Truck/Metered	5.0 X10^{-04}	0.013	0.012	0.002	0.024	0.025
		Caulk Gun	0.0007	0.016	0.015	0.003	0.031	0.032
	Hercon Disrupt Bio-Flake® LBAM	TRV (mg/kg)	2.0	2.0	2.0	2.0	2.0	2.0
		Pod Gun	1.0 X10^{-04}	0.0027	0.0025	5.0 X10^{-04}	0.0051	0.0053
	SPLAT® LBAM	TRV (mg/kg)	0.5	0.5	0.5	0.5	0.5	0.5
		Aerial	2.0 X10^{-04}	0.0038	0.0036	7.0 X10^{-04}	0.0073	0.0076
	Hercon Disrupt Bio-Flake® LBAM	TRV (mg/kg)	2.0	2.0	2.0	2.0	2.0	2.0
		Aerial	5.0 X10^{-05}	0.0011	0.00105	2.0 X10^{-04}	0.0022	0.0022

Table 12-9 Toxicity Reference Values and Hazard Quotients for Nontarget Wildlife and Aquatic Organisms

AMPHIBIAN AND REPTILES - – HAZARD QUOTIENTS [TRVS] FOR INGESTION

Alternative	Treatment	Application	Amphibians				Reptiles	
			CA Red-Legged Frog	Pacific Treefrog	Western Toad	Long-Toed Salamander	Pond Turtle	Common Garter Snake
Male Moth Attractant	SPLAT® LBAM	TRV (mg/kg)	0.5	0.5	0.5	0.5	0.5	0.5
		Truck-based	2.1 $x10^{-07}$	5.04 $x10^{-06}$	4.68 $x10^{-06}$	9.0 $x10^{-07}$	9.57 $x10^{-06}$	9.94 $x10^{-06}$
	Permethrin	TRV (mg/kg)	9.9	9.9	9.9	9.9	13.5	13.5
		Truck-based	6.0 $x10^{-08}$	1.53 $x10^{-06}$	1.42 $x10^{-06}$	2.7 $x10^{-07}$	2.13 $x10^{-06}$	2.21 $x10^{-06}$
	1,2,4-trimethylbenzene	TRV (mg/kg)	4.4 $X10^{-04}$	4.4 $X10^{-04}$	4.4 $X10^{-04}$	4.4 $X10^{-04}$	4.4 $X10^{-04}$	4.4 $X10^{-04}$
		Truck-based	2.0 $x10^{-04}$	0.0037	0.0035	6.0 $x10^{-04}$	0.0071	0.0074
	ethylbenzene	TRV (mg/kg)	0.35	0.35	0.35	0.35	0.35	0.35
		Truck-based	1.0$x10^{-09}$	4.0 $x10^{-08}$	3.0 $x10^{-08}$	9.0$x10^{-09}$	7.0 $x10^{-08}$	7.0 $x10^{-08}$
Organically Approved Insecticides	Spinosad	TRV (mg/kg)	1.333	1.333	1.333	1.333	1.333	1.333
		Truck-based	6.0 $X10^{-05}$	0.0014	0.0013	2.0 $X10^{-04}$	0.0026	0.0027
		Backpack-based	6.0 $X10^{-05}$	0.0014	0.0013	3.0 $X10^{-04}$	0.0027	0.0028
	Bacillus thuringiensis	TRV (mg/kg)	33.33	33.33	33.33	33.33	33.33	33.33
		Truck-based	6.0 $X10^{-05}$	0.0014	0.0013	2.0 $X10^{-04}$	0.0026	0.0027
		Backpack-based	6.0 $X10^{-05}$	0.0014	0.0013	3.0 $X10^{-04}$	0.0027	0.0028
CHRONIC TOXICITY								
No Program	Lambda-cyhalothrin	TRV (mg/kg)	0.395	0.395	0.395	0.395	0.53	0.53
		Truck-based	1.7 $X10^{-04}$	0.0037	0.00334	4.9 $X10^{-04}$	0.00565	0.00586
		Backpack-based	1.8 $X10^{-04}$	0.00386	0.00349	5.0 $X10^{-04}$	0.00589	0.00611
	Chlorpyrifos (ME)	TRV (mg/kg)	0.5	0.5	0.5	0.5	0.0108	0.0108
		Truck-based	9.0 $X10^{-04}$	0.02	0.018	0.002	1.855	1.926
		Backpack-based	9.3 $X10^{-04}$	0.02	0.019	0.003	1.936	2.01
	Chlorpyrifos (4E)	TRV (mg/kg)	0.5	0.5	0.5	0.5	0.0108	0.0108
		Truck-based	4.2 $X10^{-04}$	0.009	0.008	0.0011	0.868	0.901
		Backpack-based	4.4 $X10^{-04}$	0.0096	0.009	0.0012	0.906	0.941
	Permethrin	TRV (mg/kg)	0.5	0.5	0.5	0.5	1.35	1.35
		Truck-based	0.001	0.018	0.016	0.002	0.013	0.014
		Backpack-based	0.001	0.019	0.017	0.002	0.014	0.015

Table 12-9 Toxicity Reference Values and Hazard Quotients for Nontarget Wildlife and Aquatic Organisms

AMPHIBIAN AND REPTILES - – HAZARD QUOTIENTS [TRVS] FOR INGESTION

			Amphibians				Reptiles	
Alternative	Treatment	Application	CA Red-Legged Frog	Pacific Treefrog	Western Toad	Long-Toed Salamander	Pond Turtle	Common Garter Snake
Mating Disruption	SPLAT® LBAM	TRV (mg/kg)	0.05	0.05	0.05	0.05	0.05	0.05
		Truck/Metered	0.003	0.065	0.06	0.012	0.122	0.127
		Caulk Gun	0.003	0.081	0.075	0.014	0.153	0.159
	Hercon Disrupt Bio-Flake® LBAM	TRV (mg/kg)	0.2	0.2	0.2	0.2	0.2	0.2
		Pod Gun	0.0005	0.013	0.012	0.002	0.025	0.026
	SPLAT® LBAM	TRV (mg/kg)	0.05	0.05	0.05	0.05	0.05	0.05
		Aerial	$8.0 X10^{-04}$	0.019	0.018	0.003	0.036	0.038
	Hercon Disrupt Bio-Flake® LBAM	TRV (mg/kg)	0.2	0.2	0.2	0.2	0.2	0.2
		Aerial	$2.3 X10^{-04}$	0.006	0.00527	0.001	0.011	0.011
Male Moth Attractant	SPLAT® LBAM	TRV (mg/kg)	0.05	0.05	0.05	0.05	0.05	0.05
		Truck-based	$1.0 x10^{-06}$	$2.5 x10^{-05}$	$2.3 x10^{-05}$	$5.0x10^{-06}$	$4.8 x10^{-05}$	$5.0 x10^{-05}$
	Permethrin	TRV (mg/kg)	0.5	0.5	0.5	0.5	1.35	1.35
		Truck-based	$4.0 x10^{-06}$	$8.8 x10^{-05}$	$8.0 x10^{-05}$	$1.05 x10^{-05}$	$6.63 x10^{-05}$	$6.88 x10^{-05}$
	1,2,4-trimethylbenzene	TRV (mg/kg)	$2.0 X10^{-04}$	$2.0 X10^{-04}$	$2.0 X10^{-04}$	$2.0X10^{-04}$	$2.0 X10^{-04}$	$2.0 X10^{-04}$
		Truck-based	$2.0 x10^{-04}$	0.004	0.004	$7.0 x10^{-04}$	0.008	0.008
	ethylbenzene	TRV (mg/kg)	0.035	0.035	0.035	0.035	0.035	0.035
		Truck-based	$7.0 x10^{-09}$	$2.0 x10^{-07}$	$2.0 x10^{-07}$	$3.0 x10^{-08}$	$3.3 x10^{-07}$	$3.5 x10^{-07}$
Organically Approved Insecticides	Spinosad	TRV (mg/kg)	0.1333	0.1333	0.1333	0.1333	0.1333	0.1333
		Truck-based	$6.8 X10^{-04}$	0.017	0.016	0.003	0.032	0.033
		Backpack-based	$7.1 X10^{-04}$	0.017	0.016	0.003	0.033	0.034
	Bacillus thuringiensis	TRV (mg/kg)	28.57	28.57	28.57	28.57	28.57	28.57
		Truck-based	$4.0 X10^{-05}$	$9.0 X10^{-04}$	$9.0 X10^{-04}$	$2.0 X10^{-04}$	0.002	0.002
		Backpack-based	$4.0 X10^{-05}$	$9.6 X10^{-04}$	$9.0 X10^{-04}$	$2.0 X10^{-04}$	0.002	0.002

Table 12-9 Toxicity Reference Values and Hazard Quotients for Nontarget Wildlife and Aquatic Organisms

AQUATIC ORGANISMS - – HAZARD QUOTIENTS [TRVS] FOR AQUATIC EXPOSURE

			ACUTE TOXICITY				CHRONIC TOXICITY			
			Aquatic Invertebrates		Fish		Aquatic Invertebrates		Fish	
Alternative	Treatment	Application	SD Fairy Shrimp	CA FW Shrimp	Green Sturgeon	Rainbow Trout	SD Fairy Shrimp	CA FW Shrimp	Green Sturgeon	Rainbow Trout
No Program	Lambda-cyhalothrin	TRV (mg/L)	0.002	0.002	8.07x10^{-05}	8.07x10^{-05}	0.105	0.105	8.07x10^{-05}	8.07x10^{-05}
		Truck-based	7.93 x10^{-01}	7.93 x10^{-01}	3.93	1.97 x10^{+01}	2.46x10^{-02}	2.46 x10^{-02}	6.39	3.20 x10^{+01}
		Backpack-based	8.28 x10^{-01}	8.28 x10^{-01}	4.10	2.05 x10^{+01}	2.56 x10^{-02}	2.56 x10^{-02}	6.67	3.34 x10^{+01}
	Chlorpyrifos (ME)	TRV (mg/L)	8.0x10^{-06}	8.0x10^{-06}	0.0009	0.0009	8.0x10^{-06}	8.0x10^{-06}	0.001	0.001
		Truck-based	4.69 x10^{+03}	4.69 x10^{+03}	8.35	4.17 x10^{+01}	2.35 x10^{+03}	2.35 x10^{+03}	3.76	1.88 x10^{+01}
		Backpack-based	4.90 x10^{+03}	4.90 x10^{+03}	8.71	4.35 x10^{+01}	2.45 x10^{+03}	2.45 x10^{+03}	3.92	1.96 x10^{+01}
	Chlorpyrifos (4E)	TRV (mg/L)	8.0x10^{-06}	8.0x10^{-06}	0.0009	0.0009	8.0x10^{-06}	8.0x10^{-06}	0.001	0.001
		Truck-based	2.20 x10^{+03}	2.20 x10^{+03}	3.91	1.95 x10^{+01}	1.10 x10^{+03}	1.10 x10^{+03}	1.76	8.79
		Backpack-based	2.29 x10^{+03}	2.29 x10^{+03}	4.08	2.04 x10^{+01}	1.15 x10^{+03}	1.15 x10^{+03}	1.83	9.17
	Permethrin	TRV (mg/L)	1.9x10^{-06}	1.9x10^{-06}	0.0027	0.0027	1.9x10^{-06}	1.9x10^{-06}	1.21x10^{-04}	1.21x10^{-04}
		Truck-based	2.89 x10^{+03}	2.89 x10^{+03}	5.75 x10^{-01}	2.04	2.89 x10^{+03}	2.89 x10^{+03}	3.04 x10^{+01}	45.5
		Backpack-based	2.89x10^{+03}	2.89x10^{+03}	6.00 x10^{-01}	2.04	2.89x10^{+03}	2.89x10^{+03}	3.17 x10^{+01}	45.5
Mating Disruption	SPLAT® LBAM	TRV (mg/L)	0.133	0.133	298.56	298.56	0.172	0.172	10.61	10.61
		Truck/Metered	2.50 x10^{-01}	2.50 x10^{-01}	2.23 x10^{-05}	1.11 x10^{-04}	9.66 x10^{-02}	9.66 x10^{-02}	3.13 x10^{-04}	1.57 x10^{-03}
		Caulk Gun	3.12 x10^{-01}	3.12 x10^{-01}	2.78 x10^{-05}	1.39 x10^{-04}	1.21 x10^{-01}	1.21 x10^{-01}	3.91 x10^{-04}	1.96 x10^{-03}
	Hercon Disrupt Bio-Flake® LBAM	TRV (mg/L)	3.66	3.66	12.25	12.25	15.95	15.95	123	123
		Pod Gun	7.56 x10^{-03}	7.56 x10^{-03}	4.52 x10^{-04}	2.26 x10^{-03}	8.67 x10^{-04}	8.67 x10^{-04}	2.25 x10^{-05}	1.12 x10^{-04}
	SPLAT® LBAM	TRV (mg/L)	0.133	0.133	298.56	298.56	0.172	0.172	10.61	10.61
		Aerial	7.44 x10^{-02}	7.44 x10^{-02}	6.63 x10^{-06}	3.31 x10^{-05}	2.88 x10^{-02}	2.88 x10^{-02}	9.32 x10^{-05}	4.66 x10^{-04}
	Hercon Disrupt Bio-Flake® LBAM	TRV (mg/L)	3.66	3.66	12.25	12.25	15.95	15.95	123	123
		Aerial	3.20 x10^{-03}	3.20 x10^{-03}	1.91 x10^{-04}	9.55 x10^{-04}	3.67 x10^{-04}	3.67 x10^{-04}	9.51 x10^{-06}	4.75 x10^{-05}

Table 12-9 Toxicity Reference Values and Hazard Quotients for Nontarget Wildlife and Aquatic Organisms

AQUATIC ORGANISMS - – HAZARD QUOTIENTS [TRVS] FOR AQUATIC EXPOSURE

			ACUTE TOXICITY				CHRONIC TOXICITY			
			Aquatic Invertebrates		Fish		Aquatic Invertebrates		Fish	
Alternative	Treatment	Application	SD Fairy Shrimp	CA FW Shrimp	Green Sturgeon	Rainbow Trout	SD Fairy Shrimp	CA FW Shrimp	Green Sturgeon	Rainbow Trout
Male Moth Attractant	SPLAT® LBAM	TRV (mg/L)	0.133	0.133	298.56	298.56	0.172	0.172	10.61	10.61
		Truck-based	9.76 x10^{-05}	9.76 x10^{-05}	8.69 x10^{-09}	4.35 x10^{-08}	3.77 x10^{-05}	3.77 x10^{-05}	1.22 x10^{-07}	6.12 x10^{-07}
	Permethrin	TRV (mg/L)	9.1x10^{-05}	9.1x10^{-05}	0.003421	0.003421	7.23 x10^{-4}	7.23 x10^{-4}	0.001229	0.001229
		Truck-based	0.856	0.856	4.55 x10^{-03}	0.0228	0.125	0.125	0.0147	0.0734
	1,2,4-trimethylbenzene	TRV (mg/L)	0.361	0.361	5.0	5.0	0.361	0.361	5.0	5.0
		Truck-based	2.34 x10^{-05}	2.34 x10^{-05}	3.39 x10^{-07}	1.69 x10^{-06}	1.17 x10^{-05}	1.17 x10^{-05}	1.69 x10^{-07}	8.46 x10^{-07}
	ethylbenzene	TRV (mg/L)	1.35	1.35	0.51	0.51	1.35	1.35	0.51	0.51
		Truck-based	4.70 x10^{-08}	4.70 x10^{-08}	2.49 x10^{-08}	1.24 x10^{-07}	2.35 x10^{-08}	2.35 x10^{-08}	1.24 x10^{-08}	6.22 x10^{-08}
Organically Approved Insecticides	Spinosad	TRV (mg/L)	0.976	0.976	0.498	0.498	0.62	0.62	3.0	3.0
		Truck-based	9.57 x10^{-03}	9.57 x10^{-03}	3.75 x10^{-03}	1.88 x10^{-02}	1.85 x10^{-02}	1.85 x10^{-02}	7.65 x10^{-04}	3.82 x10^{-03}
		Backpack-based	9.99 x10^{-03}	9.99 x10^{-03}	3.92 x10^{-03}	1.96 x10^{-02}	1.93 x10^{-02}	1.93 x10^{-02}	7.98 x10^{-04}	3.99 x10^{-03}
	Bacillus thuringiensis	TRV (mg/L)	10	10	10	10	17	17	1.4	1.4
		Truck-based	2.36x10^{-02}	2.36 x10^{-02}	4.71 x10^{-03}	2.36 x10^{-02}	7.99 x10^{-03}	7.99 x10^{-03}	1.94 x10^{-02}	9.71 x10^{-02}
		Backpack-based	2.46 x10^{-02}	2.46 x10^{-02}	4.92 x10^{-03}	2.46 x10^{-02}	8.34 x10^{-03}	8.34 x10^{-03}	2.03 x10^{-02}	0.101

Table 12-9 Toxicity Reference Values and Hazard Quotients for Nontarget Wildlife and Aquatic Organisms

NONTARGET INVERTEBRATES - – HAZARD QUOTIENTS FOR CONTACT

			Honeybee		Monarch Butterfly		Bay Checkerspot Butterfly		Kern Primrose Sphinx Moth	
Alternative	Treatment	Application	TRV (mg/g)	HQ	TRV (mg/g)	HQ	TRV (mg/g)	HQ	TRV (mg/g)	HQ
ACUTE TOXICITY										
No Program	Lambda-cyhalothrin	Truck-based	9.77X10^{-04}	3.20	1.32X10^{-05}	13.4	1.32X10^{-05}	15.0	1.32X10^{-05}	2.65X10^{+02}
		Backpack-based	9.77X10^{-04}	3.34	1.32X10^{-05}	14.0	1.32X10^{-05}	15.6	1.32X10^{-05}	2.76X10^{+02}
	Chlorpyrifos (ME)	Truck-based	6.34X10^{-05}	1.17X10^{+03}	3.17X10^{-05}	1.32X10^{+02}	3.17X10^{-05}	1.48X10^{+02}	3.17X10^{-05}	2.61X10^{+03}
		Backpack-based	6.34X10^{-05}	5.71X10^{+02}	3.17X10^{-05}	64.4	3.17X10^{-05}	72.2	3.17X10^{-05}	1.27X10^{+03}
	Chlorpyrifos (4E)	Truck-based	6.34X10^{-05}	5.47X10^{+02}	3.17X10^{-05}	61.7	3.17X10^{-05}	69.2	3.17X10^{-05}	1.22X10^{+03}
		Backpack-based	6.34X10^{-05}	5.71X10^{+02}	3.17X10^{-05}	64.4	3.17X10^{-05}	72.2	3.17X10^{-05}	1.27X10^{+03}
	Permethrin	Truck-based	1.40X10^{-04}	1.10X10^{+02}	6.99X10^{-05}	12.4	6.99X10^{-05}	13.9	6.99X10^{-05}	2.45X10^{+02}
		Backpack-based	1.40X10^{-04}	1.15X10^{+02}	6.99X10^{-05}	12.9	6.99X10^{-05}	14.5	6.99X10^{-05}	2.56X10^{+02}
Mating Disruption	SPLAT	Truck/Metered	1.04	1.12X10^{-02}	0.522	1.27X10^{-03}	0.522	1.42X10^{-03}	0.522	2.50X10^{-02}
		Caulk Gun	1.04	1.40X10^{-02}	0.522	1.58X10^{-03}	0.522	1.77X10^{-03}	0.522	3.13X10^{-02}
	Hercon	Pod Gun	1.04	9.34X10^{-03}	0.522	1.05X10^{-03}	0.522	1.18X10^{-03}	0.5221	2.08X10^{-02}
	SPLAT	Aerial	1.04	1.87X10^{-02}	0.522	2.11X10^{-03}	0.522	2.36X10^{-03}	0.522	4.17X10^{-02}
	Hercon	Aerial	1.04	2.21X10^{-02}	0.522	2.49X10^{-03}	0.522	2.79X10^{-03}	0.522	4.93X10^{-02}
Male Moth Attractant	SPLAT	Truck-based	1.04	4.38X10^{-06}	0.522	4.94X10^{-07}	0.522	5.54X10^{-07}	0.522	9.78X10^{-06}
	Permethrin	Truck-based	1.40X10^{-04}	0.196	6.99X10^{-05}	2.22X10^{-02}	6.99X10^{-05}	2.48X10^{-02}	6.99X10^{-05}	0.439
	1,2,4-trimethylbenzene	Truck-based	ND	ND	ND	ND	ND	ND	ND	ND
	ethylbenzene	Truck-based	ND	ND	ND	ND	ND	ND	ND	ND
Organically Approved Insecticides	Spinosad	Truck-based	3.12X10^{-06}	1.06X10^{+03}	1.56X10^{-06}	1.19X10^{+02}	1.56X10^{-06}	1.34X10^{+02}	1.56X10^{-06}	2.36X10^{+03}
		Backpack-based	3.12X10^{-06}	1.10X10^{+03}	1.56X10^{-06}	1.24X10^{+02}	1.56X10^{-06}	1.39X10^{+02}	1.56X10^{-06}	2.46X10^{+03}
	Bacillus thuringiensis	Truck-based	8.28X10^{-04}	1.00X10^{+02}	0.00577-0.0165**	0.563-16.1	0.000292-0.00833**	0.563-16.1	0.000327-0.00933**	0.563-16.1
		Backpack-based	8.28X10^{-04}	1.00X10^{+02}	0.00577-0.0165**	0.587-16.8	0.000292-0.00833**	0.587-16.8	0.000327-0.00933**	0.587-16.8

Table 12-9 Toxicity Reference Values and Hazard Quotients for Nontarget Wildlife and Aquatic Organisms

NONTARGET INVERTEBRATES - – HAZARD QUOTIENTS FOR CONTACT

Alternative	Treatment	Application	Honeybee		Monarch Butterfly		Bay Checkerspot Butterfly		Kern Primrose Sphinx Moth	
			TRV (mg/g)	HQ	TRV (mg/g)	HQ	TRV (mg/g)	HQ	TRV (mg/g)	HQ
CHRONIC TOXICITY										
No Program	Lambda-cyhalothrin	Truck-based	9.77X10^{-04}	5.21	1.32X10^{-05}	2.18X10+01	1.32X10^{-05}	24.4	1.32X10^{-05}	4.31X10^{+02}
		Backpack-based	9.77X10^{-05}	54.4	1.32X10^{-06}	2.27X10^{+02}	1.32X10^{-06}	2.54X10^{+02}	1.32X10^{-06}	4.49X10^{+03}
	Chlorpyrifos (ME)	Truck-based	6.34X10^{-05}	5.84X10^{+02}	3.17X10^{-05}	66.0	3.17X10^{-05}	7.39	3.17X10^{-05}	1.30X10^{+03}
		Backpack-based	6.34X10^{-05}	6.10X10^{+02}	3.17X10^{-05}	68.8	3.17X10^{-05}	7.71	3.17X10^{-05}	1.36X10^{+03}
	Chlorpyrifos (4E)	Truck-based	6.34X10^{-05}	2.74X10^{+02}	3.17X10^{-05}	30.9	3.17X10^{-05}	3.46	3.17X10^{-05}	6.11X10^{+02}
		Backpack-based	6.34X10^{-05}	2.86X10^{+02}	3.17X10^{-05}	32.2	3.17X10^{-05}	3.61	3.17X10^{-05}	6.37X10^{+02}
	Permethrin	Truck-based	1.40X10^{-04}	2.60X10^{+02}	6.99X10^{-05}	29.3	6.99X10^{-05}	3.28	6.99X10^{-05}	5.79X10^{+02}
		Backpack-based	1.40X10^{-04}	2.71X10^{+02}	6.99X10^{-05}	30.6	6.99X10^{-05}	3.42	6.99X10^{-05}	6.05X10^{+02}
Mating Disruption	SPLAT	Truck/Metered	1.04	3.14X10^{-02}	0.522	3.54X10^{-03}	0.522	3.97X10^{-03}	0.522	7.01X10^{-02}
		Caulk Gun	1.04	3.93X10^{-02}	0.5221	4.43X10^{-03}	0.522	4.96X10^{-03}	0.522	8.76X10^{-02}
	Hercon	Pod Gun	1.04	2.61X10^{-02}	0.522	2.95X10^{-03}	0.522	3.30X10^{-03}	0.522	5.83X10^{-02}
	SPLAT	Aerial	1.04	9.35X10^{-03}	0.522	1.06X10^{-03}	0.522	1.18X10^{-03}	0.522	2.09X10^{-02}
	Hercon	Aerial	1.04	1.11X10^{-02}	0.522	1.25X10^{-03}	0.522	1.40X10^{-03}	0.522	2.47X10^{-02}
Male Moth Attractant	SPLAT	Truck-based	1.04	1.23X10^{-05}	0.522	1.38X10^{-06}	0.522	1.55X10^{-06}	0.522	2.74X10^{-05}
	Permethrin	Truck-based	1.40	1.27	6.99X10^{-05}	0.144	6.99X10^{-05}	0.161	6.99X10^{-05}	2.84
	1,2,4-trimethylbenzene	Truck-based	ND	ND	ND	ND	ND	ND	ND	ND
	ethylbenzene	Truck-based	ND	ND	ND	ND	ND	ND	ND	ND
Organically Approved Insecticides	Spinosad	Truck-based	3.12X10^{-06}	7.26X10^{+03}	1.56X10^{-06}	8.20X10^{+02}	1.56X10^{-06}	9.18X10^{+02}	1.56X10^{-06}	1.62X10^{+04}
		Backpack-based	3.12X10^{-06}	7.58X10^{+03}	1.56X10^{-06}	8.55X10^{+02}	1.56X10^{-06}	9.58X10^{+02}	1.56X10^{-06}	1.69X10^{+04}
	Bacillus thuringiensis	Truck-based	8.28X10^{-04}	3.24X10^{+02}	0.00577-0.0165**	1.82-51.9**	0.000292-0.00833**	1.82-51.9**	0.000327-0.00933**	1.82-51.9**
		Backpack-based	8.28X10^{-04}	3.24X10^{+02}	0.00577-0.0165**	1.9-54.2**	0.000292-0.00833**	1.9-54.2**	0.000327-0.00933**	1.9-54.2**

*range indicated is a result of the range in converting BIU/acre to mg/m2, in which Btk formulations range from 14-48 BIU/lb (USDA 2002 as cited in USDA 2008b)

12.2.3 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 on an areawide basis by the USDA or CDFA. 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. Because No Program activity would not be actions taken by the CDFA or USDA, no mechanism exists for mitigation of potential impacts.

12.2.3.1 Exceedance of Federal or State Agency Surface or Groundwater Quality Standard or Water Quality Objective for Hazardous Materials or Priority Pollutants as recognized in the California Toxics Rule

The Central Valley RWQCB (2008) has summarized the ‘goals’ for surface water concentrations of chlorpyrifos and permethrin as provided in Table 12-10. These goals are based on criterion derived by the CDFG (Siepmann and Finlayson 2000), but do not represent national recommended criteria. No other federal or state promulgated standards were identified for groundwater or surface water quality for the treatment chemicals considered under the No Program Alternative, as applicable to ecological receptors. No water quality goals or criteria were identified for lambda-cyhalothrin, a synthetic pyrethroid that was established as an alternative to organophosphate products such as chlorpyrifos (He et al. 2008).

Table 12-10 Central Valley Regional Water Quality Control Board Goals for No Program Chemicals*

	Freshwater Organisms		Saltwater Organisms	
Chemical	Continuous Concentration (4-day average)	Maximum Concentration (1-hour average)	Continuous Concentration (4-day average)	Maximum Concentration (1-hour average))
Chlorpyrifos	0.014/0.041 ppb	0.02/0.083 ppb	0.09/0.0058 ppb	0.02/0.011 ppb
Permethrin		0.03 ppb		0.001 ppb

*No goals are specified for lambda-cyhalothrin by the Central Valley RWQCB.
ppb = parts per billion

As indicated in Table 12-4, the estimated maximum solubility for chlorpyrifos is estimated between 588 and 941 ppb, and for permethrin at 5.5 ppb. Based on air dispersion and deposition modeling, and the conservative assumptions for dilution in water from treatment (i.e., 1 meter depth of water upon which drift deposits at same rate as land applications and mixes to full dilution up to maximum solubility), the projected Duraguard ME concentrations could range from 37.6 ppb to 39.2 ppb, and the Dursban 4E concentrations from 17.6 to 18.3 ppb, depending on the application method (truck vs. backpack). The permethrin concentrations exceed the estimated solubility (7.7 to 8.1 ppb). In all cases, these values exceed the goals summarized by the Central Valley RWQCB in 2008. **Impacts to aquatic ecological receptor exposure are, therefore, considered potentially significant for chlorpyrifos and permethrin. As no criteria or goals for lambda-cyhalothrin are specified, the use of this conventional insecticide is considered to yield no impact, under this significance criterion.**

12.2.3.2 Exceedance of a Nonregulatory Literature-Based Toxicity Reference Value for Acute or Chronic Aquatic Animal Toxicity

Based on the conservative assumptions of the No Program Alternative treatments, wherein (1) drift from treatments deposits onto water bodies at the same rate as intended on land, and (2) the water depth is assumed to be 1 meter for dilution to maximum solubility for all receptors (except 5 meters for green sturgeon), HQs exceeded the screening level of concern ratio of ‘1.0’ for acute and chronic toxicity for all No Program chemicals, to at least some of the aquatic receptors modeled. The hazard screening criteria was exceeded for all species under the two chlorpyrifos formulations (acute and chronic), for just fish under lambda-cyhalothrin (acute and chronic), and for all species modeled except acute toxicity for green sturgeon with permethrin. With the exception of chlorpyrifos and permethrin for aquatic invertebrates, all exceedances were less than 50 for acute exposure (Table 12-9). Estimated chronic exposures to all No Program pesticides evaluated resulted in HQ exceedances of 1 for all fish and invertebrate species except lambda-cyhalothrin for aquatic invertebrates. Lambda-cyhalothrin exposure did not result in an exceedance of ‘1.0’ for the aquatic invertebrates modeled under either acute or chronic exposure. Permethrin only marginally exceeded an HQ of ‘1.0’ for acute exposure to rainbow trout, but not for green sturgeon acute exposure. However, the HQs for chlorpyrifos and permethrin were several orders of magnitude above 1.0 for aquatic invertebrates.

Although the methods of treatment (truck and backpack) allow for tight control over treatment areas, and the ability to prevent significant drift on or towards water, using the methods applied for estimating water concentrations from applications applied for this PEIR yields HQ exceedances of each of the No Program pesticides, for at least one species, under both acute and chronic exposure durations considered. Therefore, it is concluded that **impacts to aquatic ecological receptors would be potentially significant from the use of chlorpyrifos, permethrin, or lambda-cyhalothrin under the No Program Alternative.**

12.2.3.3 Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Ingestion Uptake in Relevant Terrestrial or Avian Wildlife

No HQ exceedances exist in mammalian species for acute ingestion for any of the No Program chemicals. In contrast, exceedances occurred under chronic exposure to chlorpyrifos (both formulations) for the rat, lake shrew, black bear, raccoon, and red fox. Chronic exposure to the Dursban ME formulation of chlorpyrifos in the sea otter also marginally exceeded a HQ of 1.0. With the exception of the red fox, all chronic HQs were less than 10 for chlorpyrifos. Based on the significance criteria, and despite the finding that exposure to several species did not indicate potential risks based on HQ estimates below ‘1.0’, it is concluded that **ingestion exposure to chlorpyrifos in several mammalian species could be adverse and a potentially significant impact is concluded for chlorpyrifos use under the No Program Alternative.**

As summarized in Table 12-9, and detailed in Appendix F, Section F5.1.1, some mammalian species (e.g., red fox) consistently generated higher HQs compared to other mammalian species owing to the application of up to a two-and-a-half-fold safety factor to the TRVs to account for differences in the test species from which data were derived plus differences in species guilds. Thus, risks to these species are likely highly exaggerated using the screening level guidance applied to the risk assessment. Highly mobile animals, such as the red fox, will avoid areas of high activity that would be associated with treatments, and it is extremely unlikely that mobile species would experience the maximum exposure doses that were considered in the risk screening from the air dispersion modeling. Thus, despite chronic HQs for permethrin between 1 and 10 in the red fox, **it is concluded that the use of permethrin or lambda-cyhalothrin would yield less-than-significant impacts under this criterion**. This impact conclusion is justified because of all the species modeled only the red fox HQ exceeded 1, and only for chronic exposure. The red fox can be expected to behaviorally avoid treatment areas due to noise generated, and its largely nocturnal behavior. Chronic exposure is, therefore, extremely unlikely for this animal, and the use of multifold safety factors that have maximized the dosage estimates for this animal supports the less-than-significant impact conclusion.

In birds, no HQs exceeded the level of concern of 1 under acute exposure scenarios for the No Program chemicals. Only chlorpyrifos exceeded HQ estimations of 1.0 under the chronic exposure conditions modeled. Chronic avian exposure exceedances occurred for the least Bell's vireo, southwestern willow flycatcher, marsh wren, American robin, and great blue heron for chlorpyrifos ME, and only the marsh wren and American robin for chlorpyrifos 4E. In general, HQs were low (maximum of 4.1), suggesting possible but unlikely risks due to the application of multiple safety factors applied to nontested species. The species that were typically tested, mallard duck and bobwhite quail, generated HQs for these species that were 2 to 3 orders of magnitude below 1. No HQs for lambda-cyhalothrin or permethrin exceeded 1.0 in birds and no effect is anticipated from their use under the No Program Alternative. However, because the use of chlorpyrifos generated HQs that exceeded 1.0 consistently across multiple species, it is concluded that the **No Program impacts from chlorpyrifos to birds would be potentially significant.**

12.2.3.4 Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Inhalation Uptake in Terrestrial Wildlife

Based on comparing estimated air concentrations from dispersion modeling to inhalation-based TRVs, none of the No Program chemicals resulted in HQs that exceeded the level of concern of '1.0' in mammalian receptors via inhalation exposure. Except for most of the herbivores under the chlorpyrifos formulations, chronic estimates for inhalation were lower than acute, which is largely a reflection that for this exposure pathway where the maximum 1-hour concentration value post-treatment was conservatively assumed to be the exposure concentration to which mammals could be exposed throughout the acute exposure duration (24 hours).

Inhalation estimates were not possible for avian receptors because inhalation rates could not be verified. Disturbance from the application procedures should greatly reduce the potential for acute inhalation exposures that would approximate the concentration modeled, because animals should actively avoid the treatment area during treatment. **No impact is anticipated with the use of No Program chemicals in mammals. The lack of data on inhalation rates from which to gauge potential effects in avian wildlife represent supports a more conservative conclusion for avian wildlife of less than significant.**

12.2.3.5 Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Ingestion Uptake in Relevant Amphibians or Reptiles

In the analysis of potential effects from ingestion exposure, the risk assessment considered the adult life stages of herptiles only. With the exception of chronic ingestion of chlorpyrifos ME under the No Program (i.e., for pond turtle and garter snake), no HQs for ingestion exceeded the screening level for the No Program Alternative chemicals (Table 12-9). With chlorpyrifos, the HQs were only marginally above 1.0 (2.0), but the mobility of these animals to avoid exposure is generally less than other mobile vertebrates. **Therefore, impacts to herptiles from exposure to chlorpyrifos would be potentially significant. Impacts to herptiles from the other No Program chemicals are considered less than significant (i.e., as opposed to No Impact) to account for the lack of amphibian testing data.**

12.2.3.6 Exceedance of a Literature-Based Toxicity Reference Value for Plant Toxicity

None of the chemicals registered for use under the No Program Alternative are recognized to pose phytoxicity risks at the label application rates, and none have been developed for herbicidal activity. **No impact is anticipated to plant species from toxicity.**

12.2.3.7 Exceedance of Literature-Based Toxicity Reference Value for Nontarget Invertebrates and Pollinators

Impacts to nontarget insects and pollinators (e.g., bees) is considered possible for all No Program formulations evaluated, as all HQs exceeded 1.0 for the estimated exposure to these chemicals for all insects evaluated. These chemicals are not highly specific, unlike the LBAM pheromone or to a less extent Btk treatments. As detailed in Appendix F, Section F3, all of the No Program formulations evaluated are recognized as highly toxic to bees (He et al. 2008; USEPA 2007e; Extension Toxicology Network 1996a, b)**.** Although permethrin can have a strong repellent effect in the environment that could reduce exposure-based risks to bees (National Pesticide Telecommunication Network 1997), based on the modeling conducted for this PEIR, **it is concluded that impacts to nontarget invertebrates and pollinators would be potentially significant under the No Program Alternative for this criterion.**

12.2.3.8 Cause a Spill or Leak that would Contaminate the Soil or Waters to the Extent of Eradicating the Existing Vegetation, Inhibiting Revegetation, or Migrating to Other Areas and Affecting Soil and/or Aquatic Ecosystems

The No Program chemicals evaluated exhibit variable bioconcentration potential in aquatic environments. However, none are recognized as persistent bioaccumulative toxicants by the USEPA and are not expected to biomagnify up the food chain. All of the No Program Alternative active ingredient chemicals have some limited level of persistence on the order of weeks in soils to be effective on the target insects. All will degrade by photolytic, hydrolytic, and biological mechanisms (see Appendix F, Section F.3.1). The envisioned applications under the No Program Alternative would not cause a spill or unintentional leak. The short-term persistence in the environmental media upon which treatment chemicals could be expected from deposition modeling will not result in the eradication of existing vegetation. However, based on their physical and chemical properties that lend to moderate persistence, the lack of direct control over applications by home owners, and the presumption underpinning No Program that the use of these chemicals for moth control could continue indefinitely (i.e., as opposed to eradication under the Program alternatives), it is concluded that the **No Program impacts to this criterion would be less than significant**. ‘No impact’ is rejected as the appropriate conclusion because of the uncertainty around spill potential for applications of No Program chemicals where their use could continue into the indefinite future, which is consistent with an invasive species control program versus a short-term eradication program.

12.2.3.9 Create a Potential Health Hazard or Involve the Use, Production, or Disposal of Materials in a Manner That Would be Expected to Pose a Hazard to a Wildlife or Fish Population in the Program Area

Health hazards, as previously discussed, were evaluated by estimating dosage relative to effects concentrations in wildlife and fish from relevant media into which treatment chemicals under the No Program Alternative could be liberated and which could be assimilated by ecological receptors. Because HQs were calculated that exceeded 1.0 for at least one species under the exposure pathways analyzed, it is concluded that the **No Program impacts to wildlife and fish would be potentially significant.**

12.2.3.10 Create a Potential Health Hazard or Involve the Use, Production, or Disposal of Materials that Pose a Hazard to a Special-Status Species Population in the Program Area

Special-status species concerns were incorporated into the screening level risk assessment by applying multiple safety factors to the TRV values established in test species, and by using the NOAEC as the TRV value from which to characterize risks. Special-status species would include the listed plants, and animals of the state within the 13 ecological subregions wherein treatments might occur, and for which select species were modeled as surrogates (e.g., Buena Vista lake shrew, least Bell's vireo, sphinx moth). The mechanism of action by which these species could be impacted is considered to be similar to nonlisted species. **Thus, impacts to special-status species populations are considered potentially significant for the No Program chemicals.**

12.2.3.11 Increase the Likelihood of Impact to Fish and Wildlife in the Event of an Accidental Spill of Hazardous Materials

The use of No Program chemicals would increase the likelihood of impact to fish and wildlife in the event of an accidental spill over existing conditions. Predicting spill potential at the statewide scale was not attempted, but the simple process of chemical transport, over a 'no-action' baseline where no transport could occur, increases the potential that a spill could occur. **Impacts to fish and wildlife from accidental chemical spills would be potentially significant.**

12.2.4 Mating Disruption (Alternative MD)

12.2.4.1 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) (USDA 2008a). Twist ties would be used as a stand-alone treatment or in conjunction with larval Btk or spinosad against the heaviest populations. No large-scale, heavy-duty equipment is required for this application method.

Twist ties contain only the active ingredient pheromone, in a porous plastic matrix designed to liberate pheromone slowly (USDA 2008a). Based on the method of application, the expected environmental concentration of the pheromone would be significantly less than that of Alternatives MD-2 and MD-3. The only formal dosage modeling conducted was based on inhalation risks to mammalian receptors (Table 12-9). For all other pathways and ecological receptors, the method of application was assumed to pose no significant risk because the exposure pathway for ecological receptors is essentially incomplete or considered insignificant (e.g., ingestion of twist ties considered improbable). Therefore, significance conclusions of Alternatives MD-2 and MD-3 were considered applicable to Alternative MD-1 for ingestion, aquatic, and contact exposure to ecological receptors. Overall, little to no toxicity concerns are connected with Isomate®-LBAM Plus due both to the low inherent toxicity of the ingredients and the manner of application (twist ties).

Exceedance of Federal or State Agency Surface or Groundwater Quality Standard or Water Quality Objective for Hazardous Materials or Priority Pollutants as recognized in the California Toxics Rule

No federal or state promulgated standards for groundwater or surface water quality were identified for Isomate®-LBAM Plus ingredients.

Impact ECO-1: Alternative MD-1 would not result in exceedance of water standards, and no impact would occur. Therefore, mitigation is not required.

Exceedance of a Nonregulatory Literature-Based Toxicity Reference Value for Acute or Chronic Aquatic Animal Toxicity

Environmental media concentrations from MD-1 of the active ingredient will be significantly lower than that projected under Alternatives MD-2 and MD-3. No exceedances of TRVs were estimated for MD-2 or MD-3 (see Sections 12.2.4.2 and 12.2.4.3). Additionally, Isomate®-LBAM Plus twist ties are insoluble in water (Pacific Biocontrol Corporation 2007). Therefore, no impact is anticipated under Alternative MD-1.

Impact ECO-2: **Alternative MD-1 will not exceed literature-based TRV-values for aquatic animal toxicity, and no impact would occur. Therefore, mitigation is not required.**

Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Ingestion Uptake in Relevant Terrestrial or Avian Wildlife

Environmental media concentrations from MD-1 of the active ingredient will be significantly lower than that projected under Alternatives MD-2 and MD-3. No exceedances of TRVs were estimated for MD-2 or MD-3 (see Sections 12.2.4.2 and 12.2.4.3). Toxicity testing with the Isomate twist ties resulted in acute LD_{50}s that were practically nontoxic to mammalian receptors, according to the USEPA Toxicity Hazard Ratings (Pacific Biocontrol Corporation 2007). Therefore, no impact is anticipated under Alternative MD-1.

Impact ECO-3: **Alternative MD-1 will not exceed literature-based TRV-values for terrestrial and avian ingestion, and no impact would occur. Therefore, mitigation is not required.**

Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Inhalation Uptake in Terrestrial Wildlife

Exposure-based modeling for inhalation uptake of Isomate®-LBAM Plus by mammalian receptors resulted in no HQ exceedances above 1. Relative values for each species tested were at least 6 orders of magnitude lower than the screening criteria. No risks are anticipated from inhalation exposure to Isomate®-LBAM Plus.

Impact ECO-4: **Alternative MD-1 will not exceed literature-based TRV-values for terrestrial mammal inhalation, and no impact is predicted. Therefore, mitigation is not required.**

Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Ingestion Uptake in Amphibians or Reptiles

Environmental media concentrations from Alternative MD-1 of the active ingredient will be significantly lower than that projected under Alternatives MD-2 and MD-3. No exceedances of ingestion TRVs were estimated for MD-2 or MD-3 (see Sections 12.2.4.2 and 12.2.4.3); therefore, no impact is anticipated under Alternative MD-1.

Impact ECO-5: **Alternative MD-1 will not exceed literature-based TRV-values in herptiles by the ingestion pathway, and no impact would occur. Therefore, mitigation is not required.**

Exceedance of a Literature-Based Toxicity Reference Value for Plants

Plants exhibit no sensitivity to the pheromone and the method of application for the twist ties to the foliage should have no adverse effect.

Impact ECO-6: Alternative MD-1 will not exceed literature-based toxicity reference values for plants. Phytotoxicity is not inherent to the LBAM pheromones and no impact would occur. Therefore, mitigation is not required.

Exceedance of Literature-Based Toxicity Reference Value for Nontarget Invertebrates and Pollinators

Application of the twist ties is localized and the pheromone is species specific; therefore, no TRVs would be exceeded for nontarget insects and pollinators.

Impact ECO-7: Alternative MD-1 would not result in the exceedance of literature-based toxicity reference values for nontarget invertebrates or pollinators. No impact would occur, therefore, mitigation is not required.

Cause a Spill or Leak that would Contaminate the Soil or Waters to the Extent of Eradicating the Existing Vegetation, Inhibiting Revegetation, or Migrating to Other Areas and Affecting Soil and/or Aquatic Ecosystems

The method of application would not involve the use of solvents or other constituents, as the pheromone is contained within the twist ties. Spills or leaks are not likely under this alternative, as no combustible equipment, other than vehicles used to transport crews that will be fueled off site, would be used.

Impact ECO-8: Alternative MD-1 would not cause a spill or leak that would contaminate soil or water that could eradicate or inhibit existing vegetation, or migrate off site to affect soil or aquatic ecosystems. No impact would occur and, therefore, mitigation is not required.

Create a Potential Health Hazard or Involve the Use, Production, or Disposal of Materials in a Manner That Would be Expected to Pose a Hazard to a Wildlife or Fish Population in the Program Area

The use of twist ties will not liberate toxic chemicals that pose a risk to fish and wildlife. Additionally, Isomate®-LBAM Plus twist ties are insoluble in water (Pacific Biocontrol Corporation 2007). A remote potential may exist for ingestion of the twist ties by birds if mistaken for food, which could have an obstructing adverse effect on the individual's health. No empirical observations are known to support or refute this contention. As the twist ties are not baited, per se, and would not represent food, such an outcome is highly unlikely. However, as it cannot be eliminated, a less-than-significant impact is concluded.

Impact ECO-9: Alternative MD-1 would not create a potential health hazard from the use, production or disposal of materials expected to pose a hazard to wildlife or fish. A less-than-significant impact is predicted and, therefore, mitigation is not required.

Create a Potential Health Hazard or Involve the Use, Production, or Disposal of Materials that Pose a Hazard to a Special-Status Species Population in the Program Area

Risks of accidental ingestion are also applicable to this impact statement, as in Impact ECO-9 above.

Impact ECO-10: Concerning hazards to special-status species, a less-than-significant impact would be anticipated. Therefore, mitigation is not required.

Increase the Likelihood of Impact to Fish and Wildlife in the Event of an Accidental Spill of Hazardous Materials

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

Impact ECO-11: Alternative MD-1 would not increase impacts to fish and wildlife in the event of a spill. No impact would occur. Therefore, mitigation is not required.

12.2.4.2 Ground Application (Alternative MD-2)

Several different methods exist for applying treatment compounds using ground-based equipment. The methods identified by the USDA (2008a) include:

- **Caulk Gun.** A dollop of treatment compound (almost a toothpaste consistency) is squeezed onto the target. The target would either be trees and shrubs or telephone poles on private or public land. Pheromone by itself (or pheromone and permethrin under Alternative MMA in Section 12.2.5) would be applied by this method. No drift is associated with this method away from the immediate treatment area.
- **Measured Dose Spray.** Depending on the treatment compound, a different delivery method may be used. For all methods, a pre-determined amount of treatment compound is applied per "shot."
  - **Pod Gun** is used for Hercon Disrupt Bio-Flake® LBAM pheromone treatment. A pod gun is backpack-based and uses compressed air to shoot a very sticky mixture of Hercon Disrupt Bio-Flake® LBAM and glue into trees and shrubs. Very little, if any, drift is associated with this application method. Applications could occur on either public or private land.
  - **Backpack Dose Spray Gun** is used for SPLAT® LBAM (and the SPLAT® LBAM /permethrin combination, Alternative MMA). This delivery system also uses compressed air and operates more like a nozzle with negligible drift. This method would be used on public and private lands and target trees, shrubs, and structures like telephone poles.
  - **Truck Dose Spray Gun** is very similar to the backpack dose spray gun except the treatment compound and compressed air system are mounted in the back of a light duty truck. This method would be used by personnel who would drive along public streets and stop to apply the treatment compound to trees and poles that border the street. It is a quicker method of application since it only targets public lands and the vehicle only has to stop for a few seconds to apply the target dose.

The coverage rate, or area that can be treated per day, depends on whether the treatment is being applied along public streets (truck dose spray gun) or to yards (all other ground application methods). The CDFA supplied average and maximum coverage rates for each:

- **Street Application by Truck-Mounted Hydraulic Sprayer**: 640 acres per day average, 960 acres per day maximum
- **Yard Application by Manual Backpack Sprayer:** 2 acres per day average, 3 acres per day maximum

The pheromone treatments may be applied to the ground most commonly for two scenarios: (1) to the trees and shrubs in residential yards and (2) to telephone poles and trees on public property alongside the roadways. Each has different application mechanisms.

- For application to trees and shrubs in front- and backyards using ground-based equipment, both SPLAT® LBAM and Hercon Disrupt Bio-Flake® LBAM treatments would be used. The Hercon Disrupt Bio-Flake® LBAM pheromone treatment would be mixed with a sticky inert ingredient (Micro-Tac II®) and applied using a pod gun, which places the pheromone at an elevated position in trees, telephone posts, and large bushes. For SPLAT® LBAM, two delivery mechanisms may be used: the first is the use of a "caulk gun" to deliver a one-teaspoon-sized dollop; the second is the use of a backpack-based "nozzle" to deliver a measured amount of pheromone to the target.

- For application to telephone poles and trees on public property alongside roadways, the SPLAT® LBAM formulation would be used primarily. SPLAT® LBAM is to be applied using a truck-based spray system, again similar to a "nozzle." This method applies a measured amount of SPLAT® LBAM on each target.

It is expected that equipment and activity would be at a particular location no more than 3 hours, and for ground-based manual spraying, on the order of 5 to 30 minutes for truck-mounted spraying. Any subsequent events at a particular location, if necessary, would be approximately every 90 days.

Exceedance of Federal or State Agency Surface or Groundwater Quality Standard or Water Quality Objective for Hazardous Materials or Priority Pollutants as recognized in the California Toxics Rule

No federal or state promulgated standards for groundwater or surface water quality have been developed for Hercon Disrupt Bio-Flake® LBAM or SPLAT® LBAM, or the pheromone active ingredients in these formulations.

Impact ECO-12: Alternative MD-2 would not result in exceedance of water quality standards, and no impact would occur. Therefore, mitigation is not required.

Exceedance of a Nonregulatory Literature-Based Toxicity Reference Value for Acute or Chronic Aquatic Animal Toxicity

The HQs for Hercon Disrupt Bio-Flake® LBAM and SPLAT® LBAM under ground-based applications did not exceed the screening level of concern value of '1.0.' The pheromone SPLAT® LBAM has limited solubility in water and Hercon Disrupt Bio-Flake® LBAM is not soluble in water, which is most likely why toxicity testing to aquatic organisms was not rated above "moderately toxic," as defined by the USEPA (CDFG 2008e, 2008f). Additionally, in a comparison toxicity study between the sticky inert ingredient (Micro-Tac II®) alone and in combination with Hercon Disrupt Bio-Flake® LBAM for two fish species, rainbow trout (*Oncorhynchus mykiss*) and fathead minnow (*Pimaphales promelas*), the addition of Hercon Disrupt Bio-Flake® LBAM did not result in any change to the toxicity of the pheromone formulation (CDFG 2008e).

Impact ECO-13: Alternative MD-2 would not result in exceedance of a toxicity reference value for aquatic animals, and no impact would occur. Therefore, mitigation is not required.

Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Ingestion Uptake in Relevant Terrestrial or Avian Wildlife

The HQ for Hercon Disrupt Bio-Flake® LBAM and SPLAT® LBAM did not exceed the screening level of concern value of '1.0' for dietary ingestion in birds or mammals. Oral toxicity testing has proven to be difficult for Hercon Disrupt Bio-Flake® LBAM because it was not possible to grind (a previous formulation of) the flake to an acceptable size for administration (Kuhn 2008). Although an acceptable amount of test substance was provided for toxicity testing of SPLAT® LBAM, even the highest dose (>5,000 mg/kg) elicited no response in rats. Based on the low acute toxicity reported for straight chained lepidopteran pheromones, and the low potential for long-term exposure, the USEPA (2007f) did not require chronic testing, which provides further indication of the low level of concern for these substances to mammalian and avian receptors.

Impact ECO-14: Alternative MD-2 would not result in exceedance of a toxicity reference value for aquatic animals, and no impact would occur. Therefore, mitigation is not required.

Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Inhalation Uptake in Terrestrial Wildlife

The HQ for Hercon Disrupt Bio-Flake® LBAM and SPLAT® LBAM did not exceed the screening level of concern value of ‘1.0’ for inhalation in mammals. Acute inhalation studies in rats found that <0.1 percent of the Hercon Disrupt Bio-Flake® LBAM test substance was suitable for aerosolization (Crutchfield 2008b). Although inhalation toxicity testing was possible for SPLAT® LBAM, the compound did not elicit clinical signs of toxicity in the test species (Crutchfield 2008a).

Impact ECO-15: Alternative MD-2 would not result in exceedance of a toxicity reference value for mammals, and no impact would occur. Therefore, mitigation is not required.

Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Ingestion Uptake in Amphibians or Reptiles

The HQ for Hercon Disrupt Bio-Flake® LBAM and SPLAT® LBAM did not exceed the screening level of concern value of ‘1.0’ for ingestion by reptiles and amphibians.

Impact ECO-16: Alternative MD-2 would not result in exceedance of a toxicity reference value for amphibians or reptiles, and no impact would occur. Therefore, mitigation is not required.

Exceedance of a Literature-Based Toxicity Reference Value for Plants

Hercon Disrupt Bio-Flake® LBAM and SPLAT® LBAM are not recognized to pose phytoxicity risks at the label application rates, and these products assert their activity through nontoxic means on target insects and lack herbicidal activity.

Impact ECO-17: Alternative MD-2 would not result in exceedance of a toxicity reference value for plants, and no impact would occur. Therefore, mitigation is not required.

Exceedance of Literature-Based Toxicity Reference Value for Nontarget Invertebrates and Pollinators

Based on a TRV developed from honeybee toxicity tested against Checkmate (see Appendix F, Table F3-40), which contains the same active straight chain lepidopteran pheromone as both SPLAT® LBAM and Hercon Disrupt Bio-Flake® LBAM, no exceedances of HQs above ‘1.0’ were calculated for Alternative MD-2 treatments for acute or chronic exposures under the ground application provisions of Alternative MD-2 to nontarget invertebrates or pollinators (Table 12-9). Alternative MD-2 should otherwise not result in toxicologically based risks to nontarget invertebrates and pollinators. Some uncertainty remains, however, with respect to insect modeling, based on a limited number of test species, and the potential for attracting closely related nontarget lepidopterans based on anecdotal results from trapping (Dowell 2007).

Impact ECO-18: Therefore, based on this uncertainty, Alternative MD-2 would have a less-than-significant impact on nontarget invertebrates and pollinators. Therefore, mitigation is not required.

Cause a Spill or Leak that would Contaminate the Soil or Waters to the Extent of Eradicating the Existing Vegetation, Inhibiting Revegetation, or Migrating to Other Areas and Affecting Soil and/or Aquatic Ecosystems

Hercon Disrupt Bio-Flake® LBAM and SPLAT® LBAM have active ingredient chemicals with some limited level of persistence on the order of weeks in soils to enable their efficacy towards the target insects (DPR 2008b; Hercon 2008). Both will degrade by photolytic, hydrolytic, and biological mechanisms. The envisioned applications under Alternative MD-2 would not likely cause a spill or unintentional leak. The short-term persistence in the environmental media, upon which treatment chemicals could be expected from deposition modeling, would not result in the eradication of existing vegetation.

Impact ECO-19: Alternative MD-2 would not cause a spill or leak that would contaminate soil or water affecting vegetation or aquatic ecosystems, and no impact would occur. Therefore, mitigation is not required.

Create a Potential Health Hazard or Involve the Use, Production, or Disposal of Materials in a Manner That Would be Expected to Pose a Hazard to a Wildlife or Fish Population in the Program Area

Ecological health hazards were evaluated by estimating dosage relative to effects concentrations in wildlife and fish from relevant media into which treatment chemicals under Alternative MD-2 could be liberated and which could be assimilated by ecological receptors. Based on effects and dosage modeling, no adverse ecological effects are anticipated from the use, production, or disposal of materials associated with the LBAM pheromone under Alternative MD-2.

Impact ECO-20: Alternative MD-2 would not create a potential health hazard or involve materials that could harm wildlife or fish, and no impact would occur. Therefore, mitigation is not required.

Create a Potential Health Hazard or Involve the Use, Production, or Disposal of Materials that Pose a Hazard to a Special-Status Species Population in the Program Area

Special-status species concerns were incorporated into the screening level risk assessment by applying multiple safety factors to the TRV values established in test species, and by using the NOAEC as the TRV value from which to characterize risks. The comparisons of estimated dose relative to estimated TRVs did not yield any HQs exceeding ‘1.0’ for Alternative MD-2, for any of the special-status species modeled, indicating toxicological hazards are insignificant. However, uncertainty related, in particular, to modeling nontarget special-status lepidopterans remains, particularly with respect to potential effects on their pheromone-affected mating behavior.

Impact ECO-21: Therefore, based on the uncertainty associated with special-status lepidopterans, Alternative MD-2 would not create a potential health hazard or involve materials that could harm special-status species, and the impact from Alternative MD-2 is considered less than significant. Therefore, mitigation is not required.

Increase the Likelihood of Impact to Fish and Wildlife in the Event of an Accidental Spill of Hazardous Materials

The use of Hercon Disrupt Bio-Flake® LBAM and SPLAT® LBAM could increase the likelihood of impact to fish and wildlife in the event of an accidental spill over existing conditions. Predicting spill potential at the statewide scale was not attempted, but the simple process of chemical transport, over a baseline where no transport could occur, increases the potential that a spill could occur. However, because the Hercon Disrupt Bio-Flake® LBAM and SPLAT® LBAM formulations do not elicit toxicity in the tests that have been conducted to date on standard test species (see Appendix F, Sections F3.2.1 and F3.2.5), 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 ECO-22: It is highly unlikely that Alternative MD-2 would increase impacts to fish and wildlife from an accidental spill because the pheromone formulations are 'practically nontoxic' based on hazard rating information from toxicity tests. Impacts would be less than significant. Therefore, mitigation is not required.

12.2.4.3 Aerial Application (Alternative MD-3)

Aerial applications 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.

The proposed aerial applications would be performed by Beechcraft A90 King Air Aircraft. The King Air is a land-based twin-engine turboprop airplane equipped with Pratt & Whitney Canada PT6A-20 or PT6A-21 engines. The aircraft type was built between 1966 and 1968. FAA certification documents for the type, including noise signatures for the entire aircraft as a system in various operational flight envelopes were obtained for this evaluation. The FAA certification indicates compliance with 14 CFR Part 36.

The use of aerial release of pheromones is on hold while (1) the CDFA completes this PEIR, and (2) the OEHHA and DPR, in consultation with the DPH, finish a review of possible formulations in late 2009 or early 2010. After that time, aerial application of the pheromone in agricultural or undeveloped areas may be considered where ground applications of the pheromone are not feasible.

Exceedance of Federal or State Agency Surface or Groundwater Quality Standard or Water Quality Objective for Hazardous Materials or Priority Pollutants as recognized in the California Toxics Rule

No federal or state promulgated standards for groundwater or surface water quality were identified for Hercon Disrupt Bio-Flake® LBAM or SPLAT® LBAM.

Impact ECO-23: Alternative MD-3 would not result in exceedance of water standards, and no impact would occur. Therefore, mitigation is not required.

Exceedance of a Nonregulatory Literature-Based Toxicity Reference Value for Acute or Chronic Aquatic Animal Toxicity

The HQ for Hercon Disrupt Bio-Flake® LBAM and SPLAT® LBAM did not exceed the screening level of concern value of '1.0' for aquatic toxicity to aquatic ecological receptors. The same conditions that limit exposure to aquatic organisms (e.g., limited to no solubility) that were stated for ground application (Alternative MD-2) are also applicable for aerial application.

Impact ECO-24: Alternative MD-3 would not result in exceedance of a toxicity reference value for aquatic animals, and no impact would occur. Therefore, mitigation is not required.

Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Ingestion Uptake in Relevant Terrestrial or Avian Wildlife

The HQ for Hercon Disrupt Bio-Flake® LBAM and SPLAT® LBAM did not exceed the screening level of concern value of '1.0' for ingestion in mammals or birds. The same conditions that limit exposure to terrestrial organisms that were stated for ground application (Alternative MD-2) are also applicable for aerial application.

Impact ECO-25: Alternative MD-3 would not result in exceedance of a toxicity reference value for aquatic animals, and no impact would occur. Therefore, mitigation is not required.

Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Inhalation Uptake in Terrestrial Wildlife

The HQ for Hercon Disrupt Bio-Flake® LBAM and SPLAT® LBAM did not exceed the screening level of concern value of '1.0' in mammals by the inhalation exposure pathway. No TRV for inhalation was available from which to derive a TRV. The same conditions that limit exposure to mammals that were stated for ground application (Alternative MD-2) are also applicable for aerial application.

Impact ECO-26: Alternative MD-3 would not result in exceedance of a toxicity reference value for mammals, and no impact would occur. Therefore, mitigation is not required.

Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Ingestion Uptake in Amphibians or Reptiles

The HQs for Hercon Disrupt Bio-Flake® LBAM and SPLAT® LBAM did not exceed the screening level of concern value of '1.0' in amphibians or reptiles.

Impact ECO-27: Alternative MD-3 would not result in exceedance of a toxicity reference value for amphibians or reptiles, and no impact would occur. Therefore, mitigation is not required.

Exceedance of a Literature-Based Toxicity Reference Value for Plants

Hercon Disrupt Bio-Flake® LBAM and SPLAT® LBAM are not recognized to pose phytoxicity risks at the label application rates, and have been developed as species-specific hormonal attractants. They have no recognized toxic mechanism of action in plants.

Impact ECO-28: Alternative MD-3 would not result in exceedance of a toxicity reference value for plants, and no impact would occur. Therefore, mitigation is not required.

Exceedance of Literature-Based Toxicity Reference Value for Nontarget Invertebrates and Pollinators

No exceedances of HQs above '1.0' were calculated for Alternative MD-3 treatments for acute or chronic exposure durations envisioned under Alternative MD-3. Recognizing some uncertainty with respect to insect modeling based on a limited number of test species, the potential remains for attracting or otherwise disrupting mating behavior of nontarget lepidopterans.

Impact ECO-29: Therefore, based on this uncertainty, Alternative MD-3 would have a less-than-significant impact on nontarget invertebrates and pollinators. Therefore, mitigation is not required.

Cause a Spill or Leak that would Contaminate the Soil or Waters to the Extent of Eradicating the Existing Vegetation, Inhibiting Revegetation, or Migrating to Other Areas and Affecting Soil and/or Aquatic Ecosystems

Hercon Disrupt Bio-Flake® LBAM and SPLAT® LBAM have active ingredient chemicals with some limited level of persistence on the order of weeks in soils to enable their efficacy towards the target insects (DPR 2008b; Hercon 2008). Both will degrade by photolytic, hydrolytic, and biological mechanisms. The envisioned applications under Alternative MD-3 would not cause a spill or unintentional leak. The short-term persistence in the environmental media upon which treatment chemicals could be expected from deposition modeling will not result in the eradication of existing vegetation.

Impact ECO-30: Alternative MD-3 would not cause a spill or leak that would contaminate soil or water affecting vegetation or aquatic ecosystems, and no impact would occur. Therefore, mitigation is not required.

Create a Potential Health Hazard or Involve the Use, Production, or Disposal of Materials in a Manner That Would be Expected to Pose a Hazard to a Wildlife or Fish Population in the Program Area

Health hazards were evaluated by estimating dosage relative to effects concentrations in wildlife and fish from relevant media into which treatment chemicals under Alternatives MD-3 could be liberated and which could be assimilated by ecological receptors. As discussed previously, no HQ estimations by any relevant pathway exceeded the screening level of ‘1.0’ in fish or wildlife.

Impact ECO-31: Alternative MD-3 would not create a potential health hazard or involve materials that could harm wildlife or fish, and no impact would occur. Therefore, mitigation is not required.

Create a Potential Health Hazard or Involve the Use, Production, or Disposal of Materials that Pose a Hazard to a Special-Status Species Population in the Program Area

Special-status species concerns were incorporated into the screening level risk assessment by applying multiple safety factors to the TRV values established in test species, and by using the NOAEC as the TRV value from which to characterize risks. The comparisons of estimated dose relative to estimated TRVs did not yield any HQs exceeding ‘1.0’ for Alternative MD-3, for any special-status species. However, uncertainty related, in particular, to modeling nontarget special-status lepidopteran effects remain, particularly with respect to potential effects on their pheromone-influenced mating behavior.

Impact ECO-32: Alternative MD-3 would not create a potential health hazard or involve materials that could harm special-status species, and its impact would be less than significant based on the conclusions of potential effects to nontarget insects, including lepidoptera, that are registered as special-status species. Therefore, mitigation is not required.

Increase the Likelihood of Impact to Fish and Wildlife in the Event of an Accidental Spill of Hazardous Materials

The use of Hercon Disrupt Bio-Flake® LBAM and SPLAT® LBAM would increase the likelihood of impacts to fish, and wildlife in the event of an accidental spill over existing conditions. Predicting spill potential at the statewide scale was not attempted, but the simple process of chemical transport, over a baseline where no transport could occur, increases the potential that a spill could occur. As the Hercon

Disrupt Bio-Flake® LBAM and SPLAT® LBAM 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 ECO-33: Alternative MD-3 would not increase impacts to fish and wildlife from an accidental spill. Impacts would be less than significant. Therefore, mitigation is not required.

12.2.5 Male Moth Attractant (Alternative MMA)

This alternative involves ground treatment with the LBAM-specific pheromone plus permethrin to kill male moths. Alternative MMA is conducted in advance of the aerial mating disruption (if needed) to enhance the efficacy of the aerial mating disruption pheromone applications. 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. Male attractant treatment sites would be out of reach of the general public. The method of application would be the same as that discussed for the ground application of SPLAT® LBAM in Section 12.2.4.2; however, it would be limited to truck-mounted spraying only.

It is expected that equipment and activity would be at a particular location no more than 5 to 30 minutes for truck-mounted spraying. Any subsequent events at a particular location, if necessary, would be approximately every 90 days.

12.2.5.1 Exceedance of Federal or State Agency Surface or Groundwater Quality Standard or Water Quality Objective for Hazardous Materials or Priority Pollutants as recognized in the California Toxics Rule

No federal or state promulgated standards have been identified for groundwater or surface water quality for the treatment chemicals considered under Alternative MMA, as applicable to ecological receptors. The Central Valley RWQCB (2008) has indicated the nonpromulgated 'goals' for permethrin, previously referenced in Table 12-10 as 0.03 and 0.001 ppb (1-hour average maximum concentrations) for fresh- and saltwater, respectively. No other constituents in the MMA treatment had surface or groundwater standards that were identified.

Based on MMA application methods and dispersion modeling of nontarget deposition from this method (i.e., drift and deposition from the application that *doesn't* hit the 'target' utility poles and deposits nearby to facilitate potential exposure), the projected concentrations for permethrin, assuming all nontarget permethrin drift deposits onto adjacent water and dilutes as described in Section 12.2.2.2, would be extremely low (Table 12-2**)**. However, even these extremely conservative surface water goals for permethrin (notably below typical method detection limits) are projected to be exceeded nominally at the 10-centimeter dilution depth (freshwater) and at both the 10-centimeter and 1-meter dilution depths (saltwater) from the modeling assumptions conducted for this PEIR. In practice, given the MMA method of application will not be implemented adjacent to or over water, it would appear the water quality goals for permethrin would be extremely unlikely to be exceeded. The permethrin is applied with SPLAT® LBAM and the pheromone in a sticky matrix as dollops on utility poles, after drying, it is essentially 'fixed' in the insoluble matrix. The only potential for concentrated environmental release to waters is, therefore, during application when a small proportion of the applied formulation is assumed to miss the target. Notwithstanding, the estimation of surface water concentrations assumed for aquatic life exposure, potential remains that the permethrin goal(s) could be exceeded.

Impact ECO-34: Alternative MMA could result in the exceedance of a surface water quality standard from the use of permethrin. Impacts are considered potentially significant but mitigable.

Mitigation Measure ECO-34: The CDFA will maintain 25-foot buffer areas from bodies of water, and spraying shall not occur on days with wind speeds exceeding 11.5 miles per hour. Additional mitigation, wherein spraying is avoided near open water when wind direction is towards nearby water, should be implemented.

Significance after Mitigation: Less than significant

12.2.5.2 Exceedance of a Nonregulatory Literature-Based Toxicity Reference Value for Acute or Chronic Aquatic Animal Toxicity

Based on the toxicity data available for MMA chemical alternatives, no HQ exceedances above ‘1.0’ would occur for either the acute or chronic exposure durations modeled from the MMA application projected (Table 12-9). Further, it was noted in the most recent laboratory report that tested the SPLAT® LBAM in combination with permethrin that “LBAM pheromones were not detected at any of the concentrations tested, LC_{50} values obtained are most likely that of permethrin.” In other testing conducted by the CDFG on behalf of the CDFA, the pheromone formulation in SPLAT® LBAM was determined to be essentially insoluble in water, as summarized in Appendix F, Section F3.2.5, and toxicity could not be demonstrated in their tests at concentrations far in excess of what could occur in the environment.

Impact ECO-35: Alternative MMA would not result in exceedance of a nonregulatory literature-based toxicity reference value for aquatic organisms, and no impacts to aquatic organism are expected from this alternative. Therefore, mitigation is not required.

12.2.5.3 Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Ingestion Uptake in Relevant Terrestrial Avian Wildlife

Acute and chronic ingestion exposure doses under Alternative MMA, based on the nontarget air dispersion and deposition rates modeled, did not exceed avian and mammal TRVs and, thus, no HQs above the level of concern of ‘1.0’ were projected (Table 12-9). Furthermore, the MMA application procedures involve dispensing the SPLAT® LBAM formulation with permethrin on telephone poles and other standing structures at a height of approximately 8 feet, greatly reducing the potential for direct exposure to the applied chemical in ecological receptors. Therefore, potential exposure to ecological receptors is extremely low. Ingestion exposure doses of other constituents associated with Alternative MMA did not exceed TRVs and no adverse effects are expected from exposure through this pathway.

Impact ECO-36: Alternative MMA did not exceed the screening criteria of ingestion-based toxicity reference values for Alternative MMA in terrestrial or avian wildlife. Therefore, no impact would occur and mitigation is not required.

12.2.5.4 Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Inhalation Uptake in Terrestrial Wildlife

As reflected in Table 12-9, the HQs under Alternative MMA did not exceed the level of concern of 1.0 for any mammal species modeled under the inhalation exposure pathway. As no inhalation effects have been empirically identified from testing with SPLAT® LBAM, and because drift beyond the immediate treatment area will not occur with this treatment method, no risk is likely from this alternative through inhalation. Further, as the application procedure will place the chemicals in ‘dollops’ roughly 8 feet above ground, inhalation exposure will be more localized than could be considered in air modeling. Ground dwelling animals, in particular, will have significant spatial separation from treatments, will be dissuaded from active treatment area from the disturbance created by application equipment, and will thereby likely avoid the acute inhalation concentrations that were modeled.

Impact ECO-37: Alternative MMA would not result in inhalation-based health risks to mammals, and no inhalation-based toxic impact is expected. Therefore, mitigation is not required.

12.2.5.5 Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Ingestion Uptake in Relevant Amphibians or Reptiles

In the analysis of potential effects from ingestion exposure for Alternative MMA, only adult life stages of herptiles were considered. No exceedances for ingestion beyond the screening level for Alternative MMA resulted from the species modeled. As was stated earlier, the application methodology would reduce potential exposure to ecological receptors, and will likely be significantly below even that which was assumed in screening level modeling.

It is recognized that the ingestion analysis did not account for potential effects to aquatic amphibian life stages, representing a data gap. Sensitivity of these life stages can be considered by examining potential effects to other obligate aquatic receptors (e.g., fish), and no impact was identified for these receptors for this alternative, suggesting no adverse effect in juvenile amphibians as well.

Impact ECO-38: Alternative MMA would not result in exceedance of ingestion-based toxicity reference values for adult amphibians or reptiles, and no impact would occur. No impact would befall juvenile amphibians based on the assessment of no impacts to other aquatic ecological receptors. Therefore, mitigation is not required.

12.2.5.6 Exceedance of a Literature-Based Toxicity Reference Value for Plants

None of the chemicals proposed for use under Alternative MMA are recognized to pose phytoxicity risks at the label application rates, and none have been developed for herbicidal activity.

Impact ECO-39: Alternative MMA would not result in exceedance of a toxicity reference value for plants, and no impact would occur. Therefore, mitigation is not required.

12.2.5.7 Exceedance of Literature-Based Toxicity Reference Value for Nontarget Invertebrates and Pollinators

No HQs for the active pheromone ingredients under MMA, SPLAT® LBAM, exceeded HQs of ‘1’ for nontarget invertebrates or pollinators, in the nontarget deposition zone modeled (Table 12-9). A marginal exceedance, however, from the use of permethrin was identified for two of the nontarget insects evaluated under this alternative via chronic exposure (i.e., 1.40 for honeybee, 2.84 for sphinx moth). Although permethrin is rated as a highly toxic chemical to honeybees (USEPA 2007e; Theiling and Croft 1988; Appendix F3.1.3.2), areas at the height of the applications (~ 8 feet) and the substrate upon which applications would occur (utility poles) are not habitats that would normally attract pollinators or most other nontarget invertebrates. Further, permethrin has a strong repellent effect to bees (NPTN 1997). Thus, even though the permethrin concentrations associated with SPLAT® LBAM applied (on target) on the utility poles and (potentially) in the immediate ‘nontarget’ deposition zone around the poles would be adequate to kill bees and other nontarget insects if they contact it, the likelihood of quantitative significance to bees (in particular) under this alternative is low because both the habitat on the poles, and the repellent effects of permethrin should not attract bees to the extent that contact exposure should occur to lead to a toxicological outcome (i.e., exposure is possible, but likely insignificant). Finally, as this alternative is part of the Program methods for eradication, extended treatment is not envisioned and the duration of the action can be considered to be short term.

No toxicity information was identified for 1,2,4-trimethylbenzene or ethylbenzene that was applicable to insects. As these compounds are highly volatile (Hazardous Substances Data Base 2009), exposure would be expected to be extremely transient under MMA, if it were to occur. As no toxicity data were identified from which to develop a TRV for these solvents, no HQs could be calculated.

Impact ECO-40: Alternative MMA is not anticipated to result in health risks to nontarget invertebrates and pollinators. Due to uncertainty regarding toxicity of 1,2, trimethylbenzene and ethylbenzene in insects, and the potential for attraction of nontarget lepidopterans and inadvertent landing of bees onto utility poles where permethrin exposure could occur, the impact is considered less than significant (i.e., rather than 'no impact'). Therefore, mitigation is not required.

12.2.5.8 Cause a Spill or Leak that would Contaminate the Soil or Waters to the Extent of Eradicating the Existing Vegetation, Inhibiting Revegetation, or Migrating to Other Areas and Affecting Soil and/or Aquatic Ecosystems

All Alternative MMA chemicals have active ingredient chemicals with some limited level of persistence on the order of weeks in soils to enable their efficacy towards the target insects. All will degrade by photolytic, hydrolytic, and biological mechanisms. The envisioned applications under Alternative MMA would not cause a spill or unintentional leak. The short-term persistence in the environmental media upon which treatment chemicals could be expected from deposition modeling will not result in the eradication of existing vegetation.

Impact ECO-41: Alternative MMA would not cause a spill or leak that would contaminate soil or water affecting vegetation or aquatic ecosystems, and no impact would occur. Therefore, mitigation is not required.

12.2.5.9 Create a Potential Health Hazard or Involve the Use, Production, or Disposal of Materials in a Manner That Would be Expected to Pose a Hazard to a Wildlife or Fish Population in the Program Area

Health hazards, as previously discussed, were evaluated by estimating dosage relative to effects concentrations in wildlife and fish from relevant media into which treatment chemicals under Alternative MMA could be liberated and which could be assimilated by ecological receptors (HQ values). Based on the HQ screening level of '1.0', no exceedances of TRVs were observed for any of the constituents under Alternative MMA.

Impact ECO-42: Alternative MMA would not create a potential health hazard or involve materials that could harm wildlife or fish, and impacts would be less than significant. Therefore, mitigation is not required.

12.2.5.10 Create a Potential Health Hazard or Involve the Use, Production, or Disposal of Materials that Pose a Hazard to a Special-Status Species Population in the Program Area

Special-status species concerns were incorporated into the screening level risk assessment by applying multiple safety factors to the TRV values established in test species, and by using the NOAEC as the TRV value from which to characterize risks. Because the permethrin in Alternative MMA is a broad-spectrum insecticide, contact by special-status insects on utility poles could occur for this constituent in the alternative, or by contact in the immediate ‘nontarget’ deposition zone modeled around the poles. To this end, a marginal exceedance, however, from the use of permethrin was identified via chronic exposure for the special-status sphinx moth (HQ = 2.84). Noninsect special-status species have no realistic potential to experience exposure under Alternative MMA that would lead to health hazards, and no HQs for species in other guilds (e.g., birds, mammals) exceeded the HQ level of concern of 1.0 under this alternative.

Impact ECO-43: Alternative MMA would not create a potential health hazard or involve materials that could harm special-status species because locations of special-status species populations will be avoided with this treatment method. Due to uncertainty regarding toxicity of 1,2, trimethylbenzene and ethylbenzene in special-status insects, and the remote potential for attraction of special-status lepidopterans onto utility poles or within the nontarget deposition zone modeled around the target poles, the impact is considered less than significant (i.e., rather than ‘no impact’). Therefore, mitigation is not required.

12.2.5.11 Increase the Likelihood of Impact to Fish and Wildlife in the Event of an Accidental Spill of Hazardous Materials

The use of Program chemicals, including those under Alternative MMA, will increase the likelihood of impact to fish, and wildlife in the event of an accidental spill over a baseline condition wherein no action would be implemented to try to control the LBAM. Predicting spill potential, and the constituents in a spill (e.g., combustible fuels, program chemicals, etc.) at the statewide scale was not attempted, but the simple process of chemical transport, over a baseline where no transport could occur, increases the potential that a spill could occur. As Alternative MMA formulations do not elicit toxicity in the tests that have been conducted to date on standard aquatic 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 ECO-44: Alternative MMA would not increase impacts to fish and wildlife from an accidental spill, and impacts would be less than significant. Therefore, mitigation is not required.

12.2.6 Organically Approved Insecticides (Alternatives Btk and S)

Application methods for this alternative would include hydraulic spraying, where a medium to coarse spray is continuously applied by either truck-based equipment or backpack-based equipment. The target vegetation would be trees or shrubs on private or public land.

It is expected that equipment and spray activity would be at a particular location no more than 3 hours, and for ground-based manual spraying, on the order of 5 to 30 minutes for truck-mounted spraying. Any subsequent events at a particular location, if necessary, would be approximately every 90 days.

12.2.6.1 Exceedance of Federal or State Agency Surface or Groundwater Quality Standard or Water Quality Objective for Hazardous Materials or Priority Pollutants as recognized in the California Toxics Rule

No federal or state promulgated standards for groundwater or surface water quality were identified for Btk and spinosad.

Impact ECO-45: Alternatives Btk and S would not result in exceedance of water standards because none exist. No impact would occur and, therefore, mitigation is not required.

12.2.6.2 Exceedance of a Nonregulatory Literature-Based Toxicity Reference Value for Acute or Chronic Aquatic Animal Toxicity

The HQ for Btk and spinosad did not exceed the screening level of concern value of '1.0' for any aquatic animals. According to the USEPA (1997), no acute or chronic levels of concern exist for aquatic species with the use of spinosad. However, direct application to surface water or intertidal areas below the mean high water mark has been shown to be detrimental to aquatic life (Dow 2007). Such effects occurred at concentrations much higher than that projected from the conservative modeling applied for this PEIR. Similarly, Btk also has low acute aquatic vertebrate toxicity (Appendix F, Section F3.4.2). Results from several laboratory studies are supported by field data that suggest minimal effects to aquatic invertebrates from Btk use (Richardson and Perrin 1994; Kreutzweiser et al. 1992; USFS 2008b).

Impact ECO-46: Alternatives Btk and S would not result in exceedance of a toxicity reference value for aquatic animals, and no impact would occur. Therefore, mitigation is not required.

12.2.6.3 Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Ingestion Uptake in Relevant Terrestrial or Avian Wildlife

No HQs exceeded the screening level of concern value of '1.0' for ingestion exposure in birds or mammals, and no adverse effects are anticipated. According to the USEPA (1997), no acute or chronic levels of concern exist for terrestrial wildlife with the use of spinosad. Spinosad shows minimal acute toxicity to mammals (Dow 1998). Spinosad is considered practically nontoxic to birds based on dietary exposure ($LC50 > 5,000$ mg/kg).

The ICPs, spores, and vegetative cells of the Btk and other Bt subspecies, administered by different routes were mostly nonpathogenic and nontoxic to the various animal species tested. Toxicity studies submitted to the USEPA to support registration of Btk and various subspecies did not show any significant adverse effects on body weight gain, clinical observations, or necropsy (USEPA 1998a; Appendix F, Section F3.4.2).

Impact ECO-47: Alternatives Btk and S would not result in exceedance of a toxicity reference value for terrestrial mammals or birds. No impact would occur. Therefore, mitigation is not required.

12.2.6.4 Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Inhalation Uptake in Terrestrial Wildlife

Modeled Btk inhalation did not exceed the screening criteria of '1.0.' Btk inhalation has not been identified as an inhalation toxicant because testing conducted to date has not generally been able to generate sufficient quantities of respirable particles to generate adverse effects by this pathway (WHO 1999, summarized in

Appendix F, Section F3.4). The TRV for the microbial pest control agent was, therefore, based on the highest dose tested, with safety factors applied. Overall, inhalation exposure should be insignificant for these species. No relevant inhalation exposure TRV was identified for spinosad from which to develop inhalation-based HQs for mammals over the exposure durations modeled for other alternatives. A 4-hour inhalation test at 5.18 mg/L yielded no ill effects in the test animals (Dow AgroSciences 2007); this test concentration is over 5 orders of magnitude greater than the highest estimated air concentration from air dispersion modeling.

Impact ECO-48: Alternatives Btk and S would not result in exceedance of a toxicity reference value for mammalian species modeled. Additionally, behavioral avoidance and conservatism factored into the analysis indicate no impact would occur through inhalation exposure. Therefore, mitigation is not required.

12.2.6.5 Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Ingestion Uptake in Relevant Amphibians or Reptiles

In the analysis of potential effects from ingestion exposure, only adult life stages of herptiles were considered. No HQs for ingestion exceeded the screening level of ‘1.0’ for Alternatives Btk and S.

It is recognized that the ingestion analysis did not account for potential effects to aquatic amphibian life stages, representing a data gap. Sensitivity of these life stages may be best reflected by examining potential effects to other obligate aquatic receptors (e.g., fish) through aquatic exposure (bioconcentration), and no impact was concluded for fish or aquatic invertebrate exposure to Btk or spinosad based on the estimated maximum water concentrations conservatively predicted.

Impact ECO-49: Alternatives Btk and S would not result in exceedance of a toxicity reference value for amphibians or reptiles, and no impact would occur. Therefore, mitigation is not required.

12.2.6.6 Exceedance of a Literature-Based Toxicity Reference Value for Plants

None of the chemicals proposed for use under Alternatives Btk and S are recognized to pose phytoxicity risks at the label application rates, and none have been developed for herbicidal activity.

Impact ECO-50: Alternatives Btk and S would not result in exceedance of a toxicity reference value for plants, and no impact would occur. Therefore, mitigation is not required.

12.2.6.7 Exceedance of Literature-Based Toxicity Reference Value for Nontarget Invertebrates and Pollinators

Alternatives Btk and S could yield impacts to nontarget insects and pollinators based on HQs for all species modeled that exceed ‘1.’ Spinosad is considered broader in spectrum than Btk, and can also be toxic to beetles, flies, and thrips (USDA 2008a; Morandin et al. 2005; Mayes et al. 2003; WHO 1999). The USEPA’s (1998a) recent risk assessment cites an earlier study (Atkins 1991) that indicates adult worker honeybees may be somewhat more sensitive than some nontarget lepidopterans to Btk exposure. Based on application methods, the impact would be short term and localized and should not affect nontarget species at a population level. As any nontarget insect populations would be expected to recover from any population-level effects under the proposed application regime, long-term effects are not anticipated.

Impact ECO-51: Alternatives Btk and S would result in exceedance of a toxicity reference value for some invertebrates and pollinators. Impacts would be less than significant because populations would recover in the short term. Mitigation is not required.

12.2.6.8 Cause a Spill or Leak that would Contaminate the Soil or Waters to the Extent of Eradicating the Existing Vegetation, Inhibiting Revegetation, or Migrating to Other Areas and Affecting Soil and/or Aquatic Ecosystems

Both Btk and spinosad have active ingredient chemicals with some limited level of persistence and activity on the order of weeks in soils to enable their efficacy towards the target insects. All will degrade by photolytic, hydrolytic, and biological mechanisms. The envisioned applications under Alternatives Btk and S would not cause a spill or unintentional leak. The short-term persistence in the environmental media upon which treatment chemicals could be expected from deposition modeling will not result in the eradication of existing vegetation. Neither Btk nor spinosad are recognized as persistent bioaccumulative toxicicants, and both are relatively immobile in soils.

Impact ECO-52: Alternatives Btk and S would not cause a spill or leak that would contaminate soil or water affecting vegetation or aquatic ecosystems. No impact would occur, and mitigation is not required.

12.2.6.9 Create a Potential Health Hazard or Involve the Use, Production, or Disposal of Materials in a Manner That Would be Expected to Pose a Hazard to a Wildlife or Fish Population in the Program Area

Health hazards, as previously discussed, were evaluated by estimating dosage relative to effects concentrations in wildlife and fish from relevant media into which treatment chemicals under Alternatives Btk and S could be liberated and which could be assimilated by ecological receptors. The impacts would be consistent with that identified for fish, terrestrial mammals, and birds, via ingestion and inhalation exposures. No HQs for these animals or exposure pathways exceeded the level of concern of ‘1.0’ for Alternatives Btk and S.

Impact ECO-53: Alternatives Btk and S would not create a potential health hazard or involve materials that could harm wildlife or fish. No impact would occur during the use of spinosad, and a less-than-significant impact is concluded for Btk. Therefore, mitigation is not required.

12.2.6.10 Create a Potential Health Hazard or Involve the Use, Production, or Disposal of Materials that Pose a Hazard to a Special-Status Species Population in the Program Area

Special-status species concerns were incorporated into the screening level risk assessment by applying multiple safety factors to the TRV values established in test species, and by using the NOAEC as the TRV value from which to characterize risks. The impact conclusions under this statement, therefore, reflect the most conservative significance conclusions by chemical. Impacts to special-status species (e.g., listed lepidopterans) cannot be precluded because HQs exceeded the level of concern of ‘1.0’ for both Alternatives Btk and S; impacts to other (noninsect) special-status species are not anticipated.

Impact ECO-54: Alternatives Btk and S may cause significant but mitigable impacts to special-status insects, and mitigation would be required.

Mitigation Measure ECO-54: Avoid spraying areas with Btk and spinosad in localized areas known to harbor special-status insects. The CDFA will identify habitat for special-status insects prior to treatment. No Btk or spinosad treatments would be conducted within 1 mile of known populations of special-status insects.

Significance after Mitigation: Less than significant

12.2.6.11 Increase the Likelihood of Impact to Fish and Wildlife in the Event of an Accidental Spill of Hazardous Materials

The use of Btk and spinosad would increase the likelihood of impact to fish, and wildlife in the event of an accidental spill over a baseline condition wherein no action by the CDFA would be implemented to try to eradicate the LBAM. Predicting spill potential, and the substances that might be spilled (combustible fuels as well as organically approved insecticides) at the statewide scale was not attempted, but the simple process of chemical transport, over a baseline where no transport could occur, increases the potential that a spill could occur. Fish and wildlife are not sensitive to Btk or spinosad, but nontarget insects and special-status insects could be. Population-level effects in the event of a spill are unlikely, and recoverable. Furthermore, spill prevention and control plans and safe-handling procedures required of all licensed pesticide applicators will be implemented that will minimize any potential impacts from spills.

Impact ECO-55: Alternatives Btk and S would not increase impacts to fish and wildlife from an accidental spill. Impacts are less than significant due to implementation of safe handling and spill prevention procedures. Therefore, mitigation is not required.

12.2.7 Inundative Parasite Wasp Releases (Alternative Bio-P)

Inundative *Trichogramma* species (stingless parasite wasp) releases may be made in areas with more than 50 LBAM detections. This form of biological control would use native, commercially available parasitic wasps.

The estimated number of the native wasp species (*T. platerni* and *T. pretiosum*) to be released is 1,000,000 per square mile (based on release rates used in commercial agriculture for the same insects). Wasp eggs are attached to index cards with Elmer's® glue and then attached to foliage where LBAM has been detected.

12.2.7.1 Exceedance of Federal or State Agency Surface or Groundwater Quality Standard or Water Quality Objective for Hazardous Materials or Priority Pollutants as recognized in the California Toxics Rule

No hazardous materials or priority pollutants are associated with Alternative Bio-P.

Impact ECO-56: Alternative Bio-P would not result in exceedance of water standards. No impact would occur. Therefore, mitigation is not required.

12.2.7.2 Exceedance of a Nonregulatory Literature-Based Toxicity Reference Value for Acute or Chronic Aquatic Animal Toxicity

No hazardous materials or priority pollutants are associated with Alternative Bio-P.

Impact ECO-57: Alternative Bio-P would not result in exceedance of a toxicity reference value for aquatic animals. No impact would occur. Therefore, mitigation is not required.

12.2.7.3 Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Ingestion Uptake in Relevant Terrestrial or Avian Wildlife

No hazardous materials or priority pollutants are associated with Alternative Bio-P.

Impact ECO-58: Alternative Bio-P would not result in exceedance of a toxicity reference value for terrestrial or avian wildlife. No impact would occur. Therefore, mitigation is not required.

12.2.7.4 Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Inhalation Uptake in Terrestrial Wildlife

No hazardous materials or priority pollutants are associated with Alternative Bio-P.

Impact ECO-59: Alternative Bio-P would not result in exceedance of a toxicity reference value for mammal inhalation. No impact would occur. Therefore, mitigation is not required.

12.2.7.5 Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Ingestion Uptake in Amphibians or Reptiles

No hazardous materials or priority pollutants are associated with Alternative Bio-P.

Impact ECO-60: Alternative Bio-P would not result in exceedance of a toxicity reference value for amphibians or reptiles. No impact would occur. Therefore, mitigation is not required.

12.2.7.6 Exceedance of a Literature-Based Toxicity Reference Value for Plants

No hazardous materials or priority pollutants are associated with Alternative Bio-P.

Impact ECO-61: Alternative Bio-P would not result in exceedance of a toxicity reference value for plants. No impact would occur. Therefore, mitigation is not required.

12.2.7.7 Exceedance of Literature-Based Toxicity Reference Value for Nontarget Invertebrates and Pollinators

No hazardous materials or priority pollutants are associated with Alternative Bio-P.

Impact ECO-62: Alternative Bio-P would not result in exceedance of a toxicity reference value for invertebrates and pollinators. No impact would occur. Therefore, mitigation is not required.

12.2.7.8 Cause a Spill or Leak that would Contaminate the Soil or Waters to the Extent of Eradicating the Existing Vegetation, Inhibiting Revegetation, or Migrating to Other Areas and Affecting Soil and/or Aquatic Ecosystems

No hazardous materials or priority pollutants are associated with Alternative Bio-P. Any leakage of Elmer's® glue would not impact vegetation or ecosystems.

Impact ECO-63: Alternative Bio-P would not cause a spill or leak that would contaminate soil or water affecting vegetation or aquatic ecosystems. No impact would occur. Therefore, mitigation is not required.

12.2.7.9 Create a Potential Health Hazard or Involve the Use, Production, or Disposal of Materials in a Manner That Would be Expected to Pose a Hazard to a Wildlife or Fish Population in the Program Area

No hazardous materials or priority pollutants are associated with Alternative Bio-P. Any leakage of Elmer's® glue would not impact wildlife or fish.

Impact ECO-64: Alternative Bio-P would not create a potential health hazard or involve materials that could harm wildlife or fish. No impact would occur. Therefore, mitigation is not required.

12.2.7.10 Create a Potential Health Hazard or Involve the Use, Production, or Disposal of Materials that Pose a Hazard to a Special-Status Species Population in the Program Area

No hazardous materials or priority pollutants are associated with Alternative Bio-P. Any leakage of Elmer's® glue would not impact special-status species.

Impact ECO-65: Alternative Bio-P would not create a potential health hazard or involve materials that could harm special-status species. No impact would occur. Therefore, mitigation is not required.

12.2.7.11 Increase the Likelihood of Impact to Fish and Wildlife in the Event of an Accidental Spill of Hazardous Materials

No hazardous materials or priority pollutants Bio-P are associated with Alternative Bio-P. Any leakage of Elmer's® glue would not impact wildlife or fish.

Impact ECO-66: Alternative Bio-P would not increase impacts to fish and wildlife from an accidental spill. No impact would occur. Therefore, mitigation is not required.

12.2.8 Sterile Insect Technique (Alternative SIT)

SIT will be the primary tool for LBAM eradication in California when it becomes fully operational. The Program would release sterile moths into the environment to disrupt mating and eradicate the population. The USDA has already accelerated the process of developing large-scale mass-rearing capabilities in support of LBAM eradication. The goal is to produce and release a minimum of 20 million sterile male moths per day at full capacity.

The equipment used for aerial application is a Beechcraft twin engine A90, flying at 300 to 500 feet with an average projected release altitude of about 2,000 feet during daylight hours. It is expected that equipment and activity would be at a particular location no more than 3 hours, and for individual overflights or "passes" in the seconds, with a 14-pass operation taking no more than 15 to 30 minutes. Any subsequent events at a particular location, if necessary, would be approximately every 30 to 60 days.

12.2.8.1 Exceedance of Federal or State Agency Surface or Groundwater Quality Standard or Water Quality Objective for Hazardous Materials or Priority Pollutants as recognized in the California Toxics Rule

No hazardous materials or priority pollutants are associated with Alternative SIT.

Impact ECO-67: Alternative SIT would not result in exceedance of water standards. No impact would occur. Therefore, mitigation is not required.

12.2.8.2 Exceedance of a Nonregulatory Literature-Based Toxicity Reference Value for Acute or Chronic Aquatic Animal Toxicity

No hazardous materials or priority pollutants are associated with Alternative SIT.

Impact ECO-68: Alternative SIT would not result in exceedance of a toxicity reference value for aquatic animals. No impact would occur. Therefore, mitigation is not required.

12.2.8.3 Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Ingestion Uptake in Relevant Terrestrial or Avian Wildlife

No hazardous materials or priority pollutants are associated with Alternative SIT.

Impact ECO-69: Alternative SIT would not result in exceedance of a toxicity reference value for aquatic animals. No impact would occur. Therefore, mitigation is not required.

12.2.8.4 Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Inhalation Uptake in Terrestrial Wildlife

No hazardous materials or priority pollutants are associated with Alternative SIT.

Impact ECO-70: Alternative SIT would not result in exceedance of a toxicity reference value for mammals. No impact would occur. Therefore, mitigation is not required.

12.2.8.5 Exceedance of a Literature-Based Toxicity Reference Value for Acute or Chronic Ingestion Uptake in Relevant Amphibians or Reptiles

No hazardous materials or priority pollutants are associated with Alternative SIT.

Impact ECO-71: Alternative SIT would not result in exceedance of a toxicity reference value for amphibians or reptiles. No impact would occur. Therefore, mitigation is not required.

12.2.8.6 Exceedance of a Literature-Based Toxicity Reference Value for Plants

No hazardous materials or priority pollutants are associated with Alternative SIT.

Impact ECO-72: Alternative SIT would not result in exceedance of a toxicity reference value for plants. No impact would occur. Therefore, mitigation is not required.

12.2.8.7 Exceedance of Literature-Based Toxicity Reference Value for Nontarget Invertebrates and Pollinators

No hazardous materials or priority pollutants are associated with Alternative SIT.

Impact ECO-73: Alternative SIT would not result in exceedance of a toxicity reference value for invertebrates and pollinators. No impact would occur. Therefore, mitigation is not required.

12.2.8.8 Cause a Spill or Leak that would Contaminate the Soil or Waters to the Extent of Eradicating the Existing Vegetation, Inhibiting Revegetation, or Migrating to Other Areas and Affecting Soil and/or Aquatic Ecosystems

No hazardous materials or priority pollutants are associated with Alternative SIT.

Impact ECO-74: Alternative SIT would not cause a spill or leak that would contaminate soil or water affecting vegetation or aquatic ecosystems. No impact would occur. Therefore, mitigation is not required.

12.2.8.9 Create a Potential Health Hazard or Involve the Use, Production, or Disposal of Materials in a Manner That Would be Expected to Pose a Hazard to a Wildlife or Fish Population in the Program Area

No hazardous materials or priority pollutants are associated with Alternative SIT.

Impact ECO-75: Alternative SIT would not create a potential health hazard or involve materials that could harm wildlife or fish. No impact would occur. Therefore, mitigation is not required.

12.2.8.10 Create a Potential Health Hazard or Involve the Use, Production, or Disposal of Materials that Pose a Hazard to a Special-Status Species Population in the Program Area

No hazardous materials or priority pollutants are associated with Alternative SIT.

Impact ECO-76: Alternative SIT would not create a potential health hazard or involve materials that could harm special-status species. No impact would occur. Therefore, mitigation is not required.

12.2.8.11 Increase the Likelihood of Impact to Fish and Wildlife in the Event of an Accidental Spill of Hazardous Materials

No hazardous materials or priority pollutants are associated with Alternative SIT.

Impact ECO-77: Alternative SIT would not increase impacts to fish and wildlife from an accidental spill. No impact would occur. Therefore, mitigation is not required.

12.2.9 Cumulative Impacts

"Cumulative impacts" are defined as "two or more individual effects which, when considered together, are considerable or compound or increase other environmental impacts (CEQA Guidelines, Section 15355). Cumulative impacts, as they relate to ecological health, includes past, present, and reasonably foreseeable actions that potentially impact terrestrial mammalian and avian wildlife, herptiles, aquatic organisms, nontarget invertebrates and pollinators, and botanical resources. Cumulative impacts can result from individually minor, but collectively significant, projects taking place over a period of time. The determination is whether the proposed project's incremental contribution to a cumulative impact results in a potentially "considerable" (i.e., significant) cumulative impact, and, if so, whether the project's incremental contribution can be mitigated to a less-than-significant level.

Under CEQA Guidelines Section 15064(h)(4), a project does not have cumulative impacts unless it contributes some amount to the cumulative conditions. In other words, the mere existence of significant cumulative impacts caused by other projects alone – without a contribution from the project at issue – does not equate to a finding that the *project*'s incremental effects are cumulatively considerable. In this case, when the LBAM Program, or an alternative considered for the Program, makes no incremental contribution at all to a significant cumulative impact caused by other plans, programs, and projects (i.e., the "no impact" determination for a Program alternative), then it cannot be called cumulatively considerable. Even if existing cumulative impacts are significant, it does not follow that any level of incremental contribution to that impact by the Proposed Program results in it having cumulatively considerable impacts.

A summary of the level of significance of the individual Program actions on ecological receptors and pathways is presented in Table 12-11. The following is a discussion of how these impacts could become cumulatively considerable through compound utilization or accumulation in the environment. To make this determination, consideration is given to the combined contribution of Program impacts considered together with impacts that exist outside of the Program. If those impacts, taken all together using a 'summary of projections method,' result in a significant impact, then the Program's incremental contribution to the combined significant cumulative impact is "cumulatively considerable."

Two methods exist for analyzing the cumulative impacts of past, present, and reasonably foreseeable future projects: the "list method" and the "summary of projections method" (CEQA Guidelines Section 15130). Both of these methods are most appropriate to the evaluation of land development or projects involving changes in land use and related activities.

- The list method requires a discussion of related past, present, and future projects; and in the case of human health, it would require discovering and disclosing impacts to ecological health from all of these projects. This approach is not practical given the LBAM Program's nearly statewide extent, which makes the development of a list of projects most difficult and would then require a ecological health impact assessment for a very long list and variety of projects potentially creating a physical change in the environment.
- The summary of projections method relies on projections contained in approved land use documents such as general plans, specific plans, and local coastal plans to serve as the foundation for the cumulative analysis. The issue is whether the project under evaluation is consistent with the forecasts of economic and population growth contained in the planning documents and, therefore, already addressed in the certified EIRs on these plans and projects. Can the agency rely on the cumulative analyses addressed in a prior EIR to say that no further analysis is needed?

The LBAM Program would not result in additional housing or commercial/industrial development in an area. However, it does result in the use of pesticides, and for some materials, an increase in pesticide use over existing conditions. Local plans do not forecast future pesticide use and neither does the CDFA or DPR. However, the cumulative analysis for ecological health concerns can address the question of increases in pesticide use as a result of the Program alternatives as a variation of the summary of projections method to address statewide cumulative impacts of pesticide use and whether the incremental contributions of the Program's chemical treatment methods contribute to cumulative health-related impacts. The estimates of pesticide use provided in the analysis below are not based on population or housing units or employees in the state but rather on past trends in pesticide use from available data on pesticide sales as reported to the DPR. The analysis seeks to provide the statewide context needed for a reasonable discussion of cumulative impacts. Just as local and regional plans project growth based on past trends, the analysis below relies on past trends to address changes in pesticide use and potential cumulative ecological health impacts.

Because the Program Area is large, the impacts are explained in the context of a statewide or regional environmental concern. In summary, only the Program alternatives' less-than-significant and potentially significant impacts have the potential to add an incremental effect to a cumulatively significant impact. Discussion of "no impacts" and the No Program Alternative are provided for informational purposes.

12.2.9.1 No Impact

For a number of pathways Program chemicals and biological agents would not adversely affect ecological heath (Table 12-11). This determination was based on exposure modeling that did not indicate environmental exposures would exceed screening criteria or water quality regulations, and background information was sufficient to support this conclusion for the groups of species (guilds) modeled. Because no impacts were identified in association with these chemical and nonchemical treatment alternatives, the Program makes no incremental contributions to any pre-existing cumulative impacts.

12.2.9.2 Less-Than-Significant Impacts

This analysis considers whether potential exists for any incremental contribution of chemical use from the LBAM Program, when combined with other reasonably foreseeable uses of the specific pesticides considered here, which would result in cumulative impacts that could be considered "cumulatively considerable" to ecological health. Program alternative impacts were identified as "less than significant" if:

- An individual HQ exceedance only marginally exceeded 1.0 for an exposure route to an ecological receptor modeled, but the method of application indicated no significant effect was likely because exposure could be considered likely incomplete or of such short duration (in keeping with the Program's eradication parameters) as to not justify a potentially significant impact to ecological health,
- HQs were below the level of concern of 1.0, but significant toxicity data gaps creating uncertainty suggested a 'no impact' conclusion was not fully supported, or
- The incorporation of mitigation measures (Program alternatives only) reduced an impact from "potentially significant impact" to a "less-than-significant impact."
- The following discussion considers utilization parameters and environmental persistence characteristics of the relevant Program alternative chemicals in the environment for the less-than-significant impacts for alternatives that could contribute incrementally to a cumulative significant impact (Table 12-11).

Table 12-11 Comparison of Impacts of Alternatives from Hazardous Materials Use on Ecological Health*

	No Program Alternative				Mating Disruption Alternative					Male Moth Attractant Alternative					*Bacillus thuringiensis* Alternative	
Significance Criteria	Lambda	Chlorpyrifos (ME)	Chlorpyrifos (4E)	Permethrin	Twist Ties MD-1	SPLAT® LBAM / Pheromone: Ground MD-2	Hercon Disrupt Bio-Flake® LBAM / Pheromone: Ground MD-2	SPLAT® LBAM / Pheromone: Aerial MD-3	Hercon Disrupt Bio-Flake® LBAM / Pheromone: Aerial MD-3	SPLAT® LBAM / Pheromone	Permethrin E-Pro / Permethrin	Permethrin E-Pro / 1,2,4-trimethylbenzene	Permethrin E-Pro / ethylbenzene	Spinosad/ Alternative	DiPel DF	DiPel DF PRO
Cause exceedance of federal or state agency surface or groundwater quality standard or water quality objective for hazardous materials or priority pollutants as recognized in the California Toxics Rule?	N	PS	PS	PS	N	N	N	N	N	N	SM	N	N	N	N	N
Result in an exceedance of a nonregulatory literature-based toxicity reference value for acute or chronic aquatic animal toxicity	PS	PS	PS	PS	N	N	N	N	N	N	N	N	N	N	N	N
Result in an exceedance of a literature-based toxicity reference value for acute or chronic ingestion uptake in terrestrial or avian wildlife	LS	PS	PS	LS	N	N	N	N	N	N	N	N	N	N	N	N
Result in an exceedance of a literature-based toxicity reference value for acute or chronic inhalation uptake in terrestrial mammals	LS	LS	LS	LS	N	N	Not modeled, no inhalation TRV	N	N	N	N	N	N	N	N	N
Result in an exceedance of a literature-based toxicity reference value for acute or chronic ingestion uptake in amphibians or reptiles	LS	PS	LS	LS	N	N	N	N	N	N	N	N	N	N	N	N
Result in an exceedance of a literature-based toxicity reference value for plant toxicity	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Result in an exceedance of literature-based toxicity reference value for nontarget invertebrates and pollinators (e.g., bees)	PS	PS	PS	PS	N	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS
Cause a spill or leak that would contaminate the soil or waters to the extent of eradicating the existing vegetation, inhibiting revegetation, or migrating to other areas and affecting soil and/or aquatic ecosystems	LS	LS	LS	LS	N	N	N	N	N	N	N	N	N	N	N	N
Create a potential health hazard or involve the use, production, or disposal of materials in a manner that would be expected to pose a hazard to a wildlife or fish population in the Program Area?	PS	PS	PS	PS	LS	N	N	N	N	LS	LS	LS	LS	N	LS	LS
Create a potential health hazard or involve the use, production, or disposal of materials that pose a hazard to a special-status species population in the Program Area	PS	PS	PS	PS	LS	LS	LS	LS	LS	LS	LS	LS	LS	SM	SM	SM
Increase the likelihood of impact to fish, wildlife or human health in the event of an accidental spill of hazardous materials	PS	PS	PS	PS	N	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS

1: LS = Less-than-significant impact; N = No impact; NA = not applicable; PS = potentially significant impact; SM = potentially significant but mitigable; SU = potentially significant and unavoidable.

2: This table summarizes impacts from those alternatives where chemical effects were modeled only. No hazardous materials impacts were identified for Alternatives MD-1, Bio-P, or SIT and they are not summarized in this table (see text for explanations).

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No Program Alternative

A less-than-significant impact was concluded for No Program impacts through inhalation exposure to wildlife, and for the potential for a spill to contaminate groundwater or other environmental media (Table 12-11). The less-than-significant conclusion for inhalation was based on a data gap for avian inhalation effects; no impact via inhalation exposure was suggested from evaluating mammalian wildlife risk. The foreseeable use of No Program chemicals that would lead to an incremental increase in their use and, hence, inhalation exposure does not support a conclusion of cumulatively considerable impacts, as usage statewide in these chemicals has been generally declining (see Table 12-12 based on pesticide sales data). The use of lambda-cyhalothrin, however, increased significantly in 2007 over previous years. Notwithstanding, the collective use of these chemicals has shown a decline.

Table 12-12 Pesticide Sales of No Program and Organically Approved Pesticides in California, 2002–2007

	Btk [1,2]		Chlorpyrifos		Lambda-Cyhalothrin		Permethrin		Spinosad	
Year	Pounds Sold[3]	Number of Registrants	Pounds Sold[1]	Number of Registrants	Pounds Sold[1]	Number of Registrants	Pounds Sold[1]	Number of Registrants	Pounds Sold[1]	Number of Registrants
2002	19,722	1	1,697,022	53	24,061	7	427,960	165	88,586	5
2003	3,075,300	20	1,951,080	36	27,892	7	478,825	171	82,520	5
2004	2,729,593	15	2,324,085	30	25,689	7	474,761	163	84,336	4
2005	225,871	12	2,374,322	26	37,757	11	484,146	160	97,929	6
2006	257,554	10	2,516,048	27	54,754	13	605,304	167	101,999	6
2007	275,485	11	1,806,445	28	85,771	17	354,808	171	94,207	8

Source: DPR 2002-2007
[1] Btk - includes all Bt kurstaki strains and types.
[2] Btk registrants for Btk may contain duplicate companies.
[3] Data obtained from California Department of Pesticide Regulation website (http://www.cdpr.ca.gov/docs/mill/nopdsold.htm).

Projecting the cumulative impacts in the event of a spill from reasonably foreseeable programs that would use the No Program chemicals is not possible with existing information. Any spill could be assumed to have localized impacts if effective cleanup actions were not implemented. Spill pollution prevention plans are not part of the No Program Alternative, and cannot be assumed except where applications are made by registered pesticide applicators. Qualitatively, an incremental increase in spills from private landowners and homeowners could create cumulative impacts that are cumulatively considerable, but they would be dependent on the nature, location, amount spilled, and response actions exercised.

As conclusions on cumulative impacts typically are not evaluated under CEQA for a No Project Alternative, none is offered here. Consequently, no conclusion regarding the cumulative impacts of the No Program Alternative has been reached, but the qualitative information given above is nonetheless provided for consideration.

Mating Disruption (Alternative MD)

Although Alternatives MD-1, MD-2, and MD-3 use a pheromone treatment, as opposed to broad spectrum insecticides, exceedances for ecological receptors still occurred based on established screening criteria. According to HQ modeling, the only nontarget ecological receptors that would be potentially impacted by application of pheromones are nontarget terrestrial invertebrates.

Honeybee pollination is essential to modern agriculture and the services rendered by bee colonies are estimated to provide $15 billion in value to agricultural crops nationally (USDA 2007). The California almond crop alone uses 1.3 million colonies of bees during pollination, and this use alone represents roughly one-half of all the honeybees used for this purpose. The LBAM Program must be considered for its potential impacts on these important insects, particularly in light of the severe incidence of Colony Collapse Syndrome throughout the U.S. (Upton et al. 2008; USDA 2007). To address this concern, toxicity studies were conducted with the microencapsulated CheckMate formulation of LBAM (Monheit et al. 2008). The exposure study was twofold, involving both contact exposure trials and feeding trials to the honeybee. Contact exposure tested groups of 30 bees with 0.12 mL of either 1x or 10x the field dose of Suterra CheckMate LBAM-F product, with associated wet and dry control groups (10 replicates each). The feeding trials provided two caps (one with 62.6 mL 50 percent sucrose solution and 70.0 grams MegaBee and another with 1.0 percent LBAM-F formulation added) to groups of bees in a side-by-side preference test (10 replicates each). Mortality was calculated for each exposure test. The results indicated that mortality in the controls was not statistically different from mortality in pheromone (active ingredient) or LBAM-F formulation trials. Although it was noted that bees consistently chose (3:1) the MegaBee diet without LBAM-F added, further evidence was provided that bees would be unlikely to collect or ingest CheckMate microcapsules while foraging. The authors commented that, in the contact exposure trials, the bees were exposed to 2,170 times more contamination than would be expected in the field. They indicated that no toxicity to honeybees would be expected from application of pheromone treatments of LBAM-F. In summary, no significant mortality or adverse effects were elicited in the honeybee at environmental concentrations of LBAM pheromone well in excess of what would be administered under Alternative MD options. Notably, this formulation was considered to present the highest potential risk of any of the LBAM formulas initially considered because of the microencapsulated formulation.

Conversely, lepidopterans (moths and butterflies) could be impacted as a result of Program pheromone applications under Alternative MD, based on past trapping data, which resulted in some native moths exhibiting a small level of attraction to LBAM pheromones (Dowell 2007). The species attracted were members of the Pyralidae and Torticidae families, and included *Achyra occidentalis* (Pyralidae), and *Henricus umbrabasanus, Archips argyrospilus, Slepsis peritana, Clepsis fucana*, and *Argyrotaenia franciscana* (Torticidae). One of the components of the LBAM pheromone is used commercially for control of the omnivorous leafroller, *Platynoa stultana*, an exotic leafroller. All of the above moth species have broad distribution throughout the state, with minimum recorded distribution in 12 counties (*Clepsis fucana*) and maximum distribution in 40 counties (*Archips argyrospilus*). Dowell (2007) noted that these distributions are considered generally accurate, but not necessarily complete.

Based on their widespread distribution within the Program Area, native lepidopterans would be present in the treatment areas during application of pheromones under Alternative MD. The impacts on these species would be less than significant because of the short-term nature of the Program action, and the widespread distribution of these species that would afford rapid recolonization even if mating of isolated populations were somewhat disrupted by treatment. Given that the use of the LBAM pheromone under Alternative MD represents a new use of the pesticide within the state (i.e., no historical or existing use outside the Program), that treatments are not expressly toxic but rather function as mating disruptors, and that trapping data captured few individuals of these species, the incremental environmental effects associated with the use of the LBAM pheromone under Alternative MD do not result in cumulatively considerable impacts.

Male Moth Attractant (Alternative MMA)

Although it is primarily a pheromone treatment, Alternative MMA incorporates a low dosage of the pesticide permethrin and other inert ingredients. Moths would be attracted to the pheromone, intoxicated by permethrin through contact exposure, and die. Impacts at the Program level were considered less than significant for nontarget insects and special-status species. Per the discussion under Alternative MD, the use of the LBAM pheromone is limited to the Program proposed by the CDFA, and no incremental increase in LBAM pheromone use is foreseeable from other programs that would lead to an impact regarded as cumulatively significant. Consequently, the incremental impact of the pheromone ingredient is not cumulatively considerable.

The use of permethrin associated with Alternative MMA is extremely limited, and is largely isolated from environmental media and transport by the method of application in a sticky matrix (SPLAT/LBAM) on utility poles at heights of 8 feet above ground. As discussed under the No Program Alternative (Section 2.3.1), permethrin is approved for use for crops and ornamentals, and its use likely would increase under the No Program Alternative. At issue here, however, is whether the additional use of permethrin under Alternative MMA would incrementally contribute to a cumulatively significant impact within the state, resulting in a perceived increase in risk over the "less-than-significant" Program use alone. To this end, the use of permethrin within the state, based on pesticide sales from 2002 to 2007, was fairly constant between 2002 and 2005, ranging from roughly 428,000 to 484,000 pounds purchased per year. Consumption based on sales increased precipitously to approximately 605,000 pounds in 2006, but dropped similarly precipitously to roughly 355,000 pounds in 2007, the last year of records reviewed (Table 12-12). The average use of permethrin over the whole time period reviewed, 470,967 pounds, lies within the range seen between 2002 and 2005. The reduced demand in 2007 may simply reflect oversupply from purchases made in 2006.

The use of permethrin with Alternative MMA represents a selective use of permethrin that is not anticipated to be engaged by other programs. Based on projected applications under Alternative MMA, where 12 crews would be working 240 days per year, using application rates as identified in Table 2-5 of Appendix C, Alternative MMA offers limited potential for incremental increase in permethrin use that could be cumulatively considerable. The CDFA estimates the incremental usage of permethrin to be 2,970 pounds (Dowell 2008a). This increase in use is well within the variation of sales under the environmental baseline, as a projection of use as identified in Table 12-12. The use of this pesticide:pheromone combination in California is limited to the LBAM Program, and no other uses are known at this time. The alternative is selective to the LBAM species, and the method of application is highly localized to minimize potential exposure to nontarget insects and special-status insects. The impacts of the short-term use of permethrin associated with Alternative MMA were, therefore, considered less than significant for nontarget insects and special-status (insect) species. Because the increase in permethrin use under Alternative MMA is well within the summary of projections of use by other programs and private users, the Program's incremental contribution to the cumulative condition is not significant. Therefore, the Program does not have any cumulatively considerable impacts.

In addition to the No Program Alternative pesticide use, a potentially significant but mitigable impact was identified from the use of permethrin in Alternative MMA, with the potential for exceeding water quality goals associated with the spraying of this formulation, and the assumption of localized drift and dilution into nearby water. Given that the mitigation would preclude use near water, the significance of the impact was reduced to less than significant. In any case, the use of permethrin under Alternative MMA is predicated on its combination with SPLAT-LBAM to target the LBAM specifically. The use of this pesticide:pheromone combination in California is, therefore, limited to the LBAM Program, and no other uses are known at this time. The impacts of the pesticide associated with the Program are less than significant after mitigation. Because no other uses of the pesticide would contribute to cumulative impacts on water quality goals, the Program impacts are not significant and the Program's incremental contribution to the cumulative condition is not significant. Therefore, the Program does not have any cumulatively considerable impacts.

Organically Approved Insecticides (Alternatives Btk and S)

The Organically Approved Insecticides Alternative considers the ground application use of Btk and/or spinosad to control isolated LBAM populations where aerial treatment under Alternative MD is not possible or approved. Twist ties (Alternative MD-1) may be used in conjunction with Alternatives Btk and/or S if needed.

As discussed under Potentially Significant Impacts below, the use of both Btk and spinosad would be expected to increase under the No Program Alternative. Under Alternatives Btk and S, however, cumulative impacts must be evaluated relative to those associated with the baseline use of these insecticides to determine whether the incremental environmental impacts resulting from the Program could be considered cumulatively considerable. The baseline for Btk and spinosad use is reflected, to some degree, in the sales of these agents, as summarized in Table 12-12. This baseline would be considered to apply to the estimated incremental increase in use of Btk or spinosad under the assumption that Program alternatives would be implemented to eradicate LBAM. Sales for Btk peaked in 2003 and 2004, exceeding 2.7 million pounds, and have remained somewhat constant over the final 3 years of monitoring reflected in Table 12-12 (225,871 to 275,485 pounds). Sales for spinosad have been more regular, ranging from 82,520 to 101,999 pounds between the years of 2003 to 2007 (Table 12-12). Spinosad sales over the final 3 years of record were over 10,000 pounds greater on average than the preceding 3 years.

At the Program level, impacts from the use of Btk and spinosad were considered less than significant for nontarget insects. HQs exceeded 1.0 to nontarget insects, but impacts were considered less than significant because long-term impacts were not considered to be significant based on the short-term length of the Program, the rapid potency degradation of these compounds in the environment, and the presumption of rapid recolonization from the infrequent applications. Although total use of Btk or spinosad for all potential application scenarios cannot be ascertained from readily available data, use of these organically approved pesticides is assumed under other programs (e.g., gypsy moth and mosquito control).

Based on the typical use of Btk and spinosad over the past 6 years of sales records available (Table 12-12), it is unlikely that usage of these insecticides under Alternatives Btk and S would yield an incremental increase in use over the environmental baseline use of these compounds. Based on projected applications under the Organically Approved Insecticide Alternative, where 12 crews would be working 240 days per year, using application rates as identified in Table 2.5 of Appendix C, approximately 3,300 pounds of Btk and 128 pounds of spinosad are anticipated to be used under the LBAM Program. This increase in use is well within the variation of sales under the environmental baseline (as a projection of use) identified in Table 12-12. Furthermore, these compounds readily degrade and have not been recognized as a concern in environmental sampling. It is concluded that the use of Btk and/or spinosad under Alternatives Btk and S is not anticipated to result in impacts that would be considered cumulatively considerable for nontarget insects and pollinators.

Under Alternatives Btk and S a significant but mitigable impact was also identified for the “potential to involve the use, production, or disposal of materials that pose a hazard to special-status species population(s) in the Program Area” criterion (Table 12-11). The highest potential Program impacts from Alternatives Btk and S are related to nontarget terrestrial invertebrates (especially the Kern primrose sphinx moth). Because special-status species habitats or “hotspots” will be avoided, the Program impacts after this mitigation were considered less than significant. Under the presumption that other reasonably foreseeable programs would assert similar protection methods for these species, that the mitigation proposed under Alternatives Btk and S is fully implemented, and that usage patterns would not result in an incremental increase in Btk or spinosad above the variation documented in the environmental baseline of sales from the most recent years for all uses (Table 12-12), a reasonably foreseeable incremental increase in the use of Btk or spinosad that could affect special-status insect species is not anticipated to result in impacts that would be considered cumulatively significant.

12.2.9.3 Potentially Significant Impacts

This section addresses the potential for cumulatively considerable impacts under the No Program Alternative. Impacts at the No Program scale were generally identified as “potentially significant” if toxicity reference value exceedances occurred for ecological receptors from anticipated exposure, and life-history characteristics of the ecological receptor(s) yielded uncertainty with respect to the long-term effects from exposure (e.g., through environmental persistence), or if projected environmental concentrations exceeded established criteria for the media. Except in one instance under Alternative MMA, all scenarios that would result in a "potentially significant" impact occurred under the No Program Alternative (Table 12-11).

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Both commercial and residential utilization of No Program chemicals was identified as a potential outcome for LBAM control, should none of the Program alternatives be implemented. The use of these chemicals individually and collectively was considered to represent potentially significant impacts because HQs exceeded 1.0 for one or more species modeled within a guild, by exposure pathway (Table 12-12). Further, under the No Program scenario, eradication would be extremely unlikely and repeated (long-term) use was considered likely. No Program pesticide use has the potential to increase with crop damage caused by LBAM over time, in the absence of other use restrictions that might be placed on currently approved chemicals. Only three of the several conventional pesticides approved for use in nurseries and host crops were evaluated in this PEIR to be representative of other approved pesticides. The use of other pesticides that would also be effective for LBAM control (e.g., carbaryl, dimethoate, methoxyfenozide, phosmet, etc.) could increase as well. Under this scenario, the two organically approved pesticides (Btk and spinosad), which are also considered under the Organically Approved Insecticides Alternative, would likely increase.

The selection of which approved pesticide might be used is up to the consumer, and identifying use predictions at a statewide scale is not possible. Furthermore, a cumulative effects analysis of the No Program Alternative is not required under law because the lead agency (CDFA) would not have control over nonagency-administered control programs. However, some prediction of effects is provided for consideration.

Using permethrin as a surrogate for all insecticides that could be used, Dowell (2008b) estimated that homeowner use in 9 of the currently infested Northern California counties could increase between 281 and 2,353 pounds. When considering the full 16-county area where trapping or eradication efforts were initiated, an increase between 20,364 and 74,305 pounds of permethrin was considered possible. These estimates were based on (1) an estimate of single-family dwellings in the overall treatment area from Census Bureau statistics, (2) an estimate of the number of these houses that might apply insecticide (3 to 7 percent), and (3) and an assumption that those houses that treat would only do so once a year. These input variables were applied to yield the estimates of increased use (i.e., increase use [pounds] = # residences x 1 gallon spray/residence/year x 0.0106 or 0.024 pound permethrin per spray event). Similarly, Dowell (2008a) estimates an annual increase in use from 600 to 4,800 pounds. of Bt (1.4 to 10.5 percent), and 1,900 to 3,800 pounds of spinosad, in the *absence* of the implementation of Program alternatives.

In addition to the projected increase in use, as discussed above, all of the nonorganic, conventional No Program pesticides evaluated in the PEIR have been identified in environmental monitoring programs in the state of California. Organophosphate use, such as chlorpyrifos, has been decreasing. However, seven waters of California have been placed on the Section 303d list by the USEPA due to chlorpyrifos as part of the final 1998 Section 303(d) (Clean Water Act) list of impaired water bodies in California. As a result of the Section 303(d) listings and other legal actions, four Total Maximum Daily Loads for chlorpyrifos have been initiated in California.

Overall, the trend is towards reduced pesticide use in California. One way to observe pesticide utilization trends in California is through DPR annual sales reports. DPR tracks the pesticides sold throughout the state on an annual basis. In 2006, 190 million pounds of pesticide and herbicide were used, including organically approved pesticides. This usage represented a reduction of nearly 6 million pounds over what was used in 2005. Most of this reduction was attributed to a 24 percent decrease in the use of sulphur, an organically approved fungicide. Statewide, in 2006 insecticide use decreased by 10 percent in pounds of active ingredient and by 3 percent in acres treated, compared to 2005. This decrease was accompanied by the 5 percent increase of acres harvested. The decrease in acres treated with insecticides was mainly associated with the decreased uses of chlorpyrifos (-19 percent), methomyl (-42 percent), and carbofuran (-35 percent) (DPR 2005, 2006b, 2007b). In 2007, 1,806,444 pounds of chlorpyrifos, 85,771.34 pounds of lambda-cyhalothrin, and 354,808.08 pounds of permethrin were sold (DPR 2007b). By comparison, in 2006, 2,516,047.67 pounds of chlorpyrifos, 54,754.22 pounds of lambda-cyhalothrin, and 605,304.35 pounds of permethrin were sold (DPR 2006b). While amounts sold do not translate directly to the amounts used, these data suggest reductions in use of chlorpyrifos may be occurring statewide. While organophosphate sales appear to be declining most recently (Table 12-12), the use of pyrethroid-based insecticides appears to be holding relatively steady when considering a longer period of record. For some members of this class of compounds (lambda-cyhalothrin), use is increasing.

Environmental monitoring provides additional information about the potential for cumulative impacts from pesticide use. Where detections of specific pesticides are common, the potential for cumulatively considerable impacts from incremental uses may be considered more likely if the analyte detected has associated toxicity. In a relatively recent study, Bacey et al. (2004) sampled for permethrin and related pyrethroids (e.g., lambda-cyhalothrin) and organophosphates in water and sediment samples from the Sacramento and San Joaquin watersheds collected after storm events. Permethrin and/or esfenvalerate were detected in 7 of 40 whole water samples, with concentrations measured up to 0.094 ppb. Review of these data showed that permethrin was only detected in one sample, and the majority of pyrethroid detections were for esfenvalerate. Lambda-cyhalothrin was apparently not analyzed in water samples, but was analyzed in sediment and was not detected. In contrast, trace amounts of chlorpyrifos were identified most consistently among the three No Program pesticides evaluated. Significant toxicity was also identified in the water flea (*Ceriodaphnia dubia*) when exposed to the water samples collected that contained detectable pyrethroids. The authors noted, however, that the same samples also contained other pesticides from the storm runoff, and the concentrations of some of these constituents (e.g., diazinon) by themselves were sufficient enough to account for the observed toxicity in five of the seven samples. The effects of additive or synergistic toxicity could not be resolved. Only one sediment sample contained detectable pyrethroid (bifenthrin).

As conclusions on cumulative impacts typically are not evaluated under CEQA for a No Program Alternative, none is offered here. Consequently, no conclusion regarding the cumulative impacts of the No Project Alternative has been reached, but the qualitative information given above is nonetheless provided for consideration.

12.2.10 Environmental Impacts Summary

This section summarizes the relative impacts of the Program alternatives based specifically on the potential role of hazardous materials use under consideration in the Program Area. Table 12-12 presents a summary of the impacts by alternative, and abbreviations used in the table are listed at the end.

Table 12-13 Summary Comparison of Impacts of Alternatives

Criteria or Concern	No Program	MD-1	MD-2	MD-3	MMA	Btk and S	Bio-P	SIT
Ecological Health								
Cause exceedance of federal or state agency surface or groundwater quality standard or water quality objective for hazardous materials or priority pollutants as recognized in the California Toxics Rule	PS	N	N	N	SM	N	N	N
Result in an exceedance of a nonregulatory literature-based toxicity reference value for acute or chronic aquatic animal toxicity	PS	N	N	N	N	N	N	N
Result in an exceedance of a literature-based toxicity reference value for acute or chronic ingestion uptake in terrestrial or avian wildlife	PS	N	N	N	N	N	N	N
Result in an exceedance of a literature-based toxicity reference value for acute or chronic inhalation uptake in terrestrial wildlife	LS	N	N	N	N	N	N	N
Result in an exceedance of a literature-based toxicity reference value for acute or chronic ingestion uptake in amphibians or reptiles	PS	N	N	N	N	N	N	N
Result in an exceedance of a literature-based toxicity reference value for plant toxicity	N	N	N	N	N	N	N	N
Result in an exceedance of literature-based toxicity reference value for nontarget invertebrates and pollinators (e.g., bees)	PS	N	LS	LS	LS	LS	N	N
Cause a spill or leak that would contaminate the soil or waters to the extent of eradicating the existing vegetation, inhibiting revegetation, or migrating to other areas and affecting soil and/or aquatic ecosystems	LS	N	N	N	N	N	N	N
Create a potential health hazard or involve the use, production, or disposal of materials in a manner that would be expected to pose a hazard to a wildlife or fish population in the Program Area?	PS	LS	N	N	LS	LS, N	N	N
Create a potential health hazard or involve the use, production, or disposal of materials that pose a hazard to a special-status species population in the Program Area	PS	LS	LS	LS	LS	SM	N	N
Increase the likelihood of impact to fish, wildlife, or human health in the event of an accidental spill of hazardous materials	PS	N	LS	LS	LS	LS	N	N

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

12.2.11 Mitigation and Monitoring

Impact ECO-34: Alternative MMA could result in the exceedance of a surface water quality standard from the use of permethrin. Impacts are considered potentially significant but mitigable.

Mitigation Measure ECO-34: The CDFA will maintain 25-foot buffer areas from bodies of water, and spraying shall not occur on days with wind speeds exceeding 10 miles per hour. Additional mitigation, wherein spraying is avoided near open water when wind direction is towards nearby water, should be implemented.

Location: All treatment areas near water bodies (defined by CDFG)
Monitoring/Reporting Action: Concurrence with CDFG
Effectiveness Criteria: CDFG to establish and may conduct selected site visits during treatment
Responsible Agency: CDFA
Timing: Prior to and during treatment

Impact ECO-54: Alternatives Btk and S may cause significant but mitigable impacts to special-status insects, and mitigation would be required.

Mitigation Measure ECO-54: Avoid spraying areas with Btk and spinosad in localized areas known to harbor special-status insects. The CDFA will identify habitat for special-status insects prior to treatment. No Btk or spinosad treatments will be conducted within 1 mile of known populations of special-status insects.

Location: All treatment areas with habitat for special-status insects
Monitoring/Reporting Action: Concurrence with CDFG
Effectiveness Criteria: CDFG to establish habitat areas to be avoided
Responsible Agency: CDFA
Timing: Prior to treatment