

DRAFT
THE CALIFORNIA DEPARTMENT OF
FOOD AND AGRICULTURE
COMPREHENSIVE PESTICIDE APPLICATION PLAN

for

California Department of Water Resources
NPDES Permit

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1. Overview

California's agricultural abundance includes more than 400 commodities. The state produces nearly half of United States grown fruits, nuts, and vegetables. The California Department of Food and Agriculture (CDFA) is tasked with protecting this food supply from the devastating impact of exotic pests and protecting the environment and natural resources from direct pest impacts and increased pesticide use. It is imperative that CDFA maintain a rapid response capability to quickly and safely protect California agriculture and the environment. The ability to act quickly in the event of an invasive insect, disease introduction, or weed infestation allows for localized eradication programs with minimal pesticide use.

Invasive pests are biological organisms that are introduced into an area beyond their natural range and become pests in the new environment. Most introductions have been unintentional and accidental. Having evolved in a different ecosystem, these non-native species may have few natural enemies in their new locations, which can often lead to population increases that can overwhelm native species by out-competing them for resources (e.g., food, water, light, space). Many invasive species are likely to cause economic (including agricultural) or environmental harm or harm to human health. Common traits of invasive pests and pathogens include rapid reproduction, fast growth, wide dispersal, altering of growth or form to suit a particular habitat, tolerating a wide range of environmental conditions and the ability to feed on a variety of different foods.

The mission of the CDFA's Division of Plant Health and Pest Prevention Services (PHPPS) is to protect California from the damage caused by the introduction or spread of harmful plant pests. The California Food and Agricultural Code (FAC) provides more detailed authority for this mission in Division 4, Plant Quarantine and Pest Control (e.g., FAC Sections 5301, 5302, 5322, and 5761).

Many of the control and eradication programs that CDFA undertakes are considered emergencies and are triggered by established Federal protocols. The control and eradication programs are developed based upon input from CDFA professional staff and recommendations from experts familiar with the pest species. A technical working group (TWG) may be established for new pests and all options (pesticidal and non-pesticidal) are considered prior to treatment. The options selected are based upon minimal public intrusiveness, cost & biological effectiveness, and minimal impacts to the environment. Control options can include manual fruit and foliage removal, pheromone mating disruption, sterile insect release, lures and trapping, and biological and traditional chemical pesticides.

The Secretary of CDFA may under the authority set forth in the Food and Agricultural Code, Division 1, Section 403; Division 4, Sections 5321, 5322, 5761, 5762 & 5763 thoroughly investigate the existence and the probability of the spread of a pest and to abate the pest from the established eradication area.

For the purposes of this document, some pest species were grouped together into broad or general control and eradication programs. Groupings were made based on pest species morphological similarities, similar life cycles, and/or similar treatments, methods, or control techniques.

2. Beet Curly Top Virus Control Program

Beet Curly Top Virus Control Program (BCTVCP) is an overall strategy for the statewide control of the sugar beet leafhopper (BLH), *Circulifer tenellus* (Baker), the only known vector of beet curly top virus (BCTV). BCTV is a viral disease of sugar beets, tomatoes, melons, peppers, beans, cucumbers, squash, pumpkins, spinach, vine seed and ornamentals. On an annual basis, the BCTVCP surveys for and monitors the development and movement of the BLH from historical breeding grounds on the west side of the San Joaquin Valley, and portions of the Salinas, Cuyama, Imperial and Palo Verde Valleys. Potential survey areas are not denoted by rigid boundaries, but represent generalized zones where the rangeland topography and weather conditions have been conducive to historical BLH development. The BCTVCP surveys rangeland, oilfields, roadsides and cultivated fallow ground for the presence of BLH populations.

Sweep net surveys determine the size and location of BLH populations during the winter, spring and fall. Control is a year-round effort linked to disrupting the continuity of the BLH's life cycle. Aerial treatments are employed to control BLH populations in rangeland habitat, oil fields and large cultivated fallow fields. Ground-rigs are utilized to spot treat BLH populations developing on host plants along roadsides and right-of-ways within intensive agriculture adjacent to BCTV susceptible crops.

A majority of the aerial applications are conducted in the San Joaquin Valley. The BCTVCP usually conducts three aerial campaigns annually which closely coincide with the reproductive biology of BLH. The winter, spring and fall control periods in the San Joaquin Valley are performed on the west side and southern end of the Valley and are generally performed within three separate geographical areas.

2.1 Statement of Purpose and Need

The purpose is to control the sugar beet leafhopper, *Circulifer tenellus* (Baker). Without the control of BLH, the BCTV would threaten well over three billion dollars of susceptible crops and home gardens.

With only a 1% loss from BCTV in California, it is estimated that during the period 1974-1976, California suffered annual losses of \$9.75 million in commercial crops alone. A \$2.68 million loss in home gardens can be extrapolated from a 1974 value of \$268,199,643 using a 1 percent infection rate. Without control where required, BLH is capable of an infection rate of 10-40 percent or more. Infection rates as high as 80 percent were observed near Huron, CA in 1977.

Were it not for the Program's effective control of BLH and the support of the affected industries, the state and nation would have the potential to lose a substantial portion of its tomato, sugar beet, pepper, bean, melon, squash, cucumber, pumpkin, and spinach crops valued in excess of \$1.2 billion annually.

In 2007 the BCTVCP experienced extended delays in Section 7 Consultations and the reauthorization of the Programs pesticide use permit. This resulted in the Program's inability to treat any BLH populations in the spring of 2008. The California Tomato

Growers Association estimated 20 million dollars of damages and subsequent losses directly related to beet curly top virus infection in just processing tomatoes. Hardest hit were organic tomato plantings which have fewer pest management options available to growers to control migrating BLH populations.

2.2 Description of Water Body Systems

The water body systems found within or near historical BLH treatment areas include moving water bodies, still water bodies and canals.

2.2.1 Central Valley RWQCB #5F

Moving water bodies: Zapatos Creek, Jacalitos Creek, Warthan Creek, Los Gatos Creek, Salt Creek, Cantua Creek, Big and Little Panoche Creeks, and Ortigalita Creek. These water bodies are fairly small, seasonally ephemeral, streams in western Fresno and Merced Counties. In Kern County near Maricopa, Bitterwater Creek may contain surface water during spring treatments but remains dry most of the time. These water bodies are found within the Program's winter/spring survey and aerial treatment areas and would be the most likely source of potential water sampling sites.

Major Canals: California Aqueduct, Delta Mendota Canal

Still water bodies: Little Panoche Reservoir, Los Banos Reservoir

Ground-rig only survey/treatment area: A ground-rig only area is designated in western San Joaquin, Stanislaus and Merced Counties. Ground-rig spot treatments in this area have not been performed for the past 10 years and only minimal applications were made prior to that. Various water bodies and canals are found within the region. Considering the past treatment record, ground-rig spot treatments in this area would continue to be rare and minimal in scope.

2.2.2 Central Coast RWQCB # 3

Aerial treatments have been performed in Monterey County only twice in 33 years (1977 & 2002). The potential for aerial treatment is very low in any given year. In the recent past, ground-rig spot treatments have been occasional and minimal in scope. In 2006, the BCTVCP requested consultation with NOAA Fisheries for the south-central California coastal steelhead. A one-quarter ($\frac{1}{4}$) mile buffer from the Salinas River and tributaries, including agricultural drains and canals, was adopted through consultation for the potential treatment area in Monterey County.

2.2.3 Los Angeles RWQCB # 4

Ground-rig only treatment area: A ground-rig only treatment area is designated in the Cuyama Valley. The Cuyama River is a potential water body in the area. The River can be described as a major wash or flood channel, and is usually dry during the time of year treatments are performed. Ground-rig spot treatments in the Cuyama Valley have been

consistent but minimal in scope. Survey and treatment activities are confined to controlling BLH populations within the region under agricultural cultivation.

2.2.4 Colorado River RWQCB #7

The potential for aerial treatment is not nearly as common as aerial treatments in the San Joaquin Valley. Infrequent rains and hot, dry weather makes host plant development on the desert inconsistent and sporadic. Aerial treatments in Imperial Valley have not been performed since 1998.

Ground-rig spot treatments are the most common mode of control and are performed nearly annually within the region under agricultural cultivation. The Program has treated nine times during the past sixteen years. The scope of work is dependent on the weather and the extent of roadside weed control and development.

Moving water bodies: Colorado River, San Felipe Creek, Alamo River System, New River System and drains flowing directly into the Salton Sea.

Major Canals: Westside & Central Main Canals, East Highline Canal and All American Canal.

Still Water Bodies: The Salton Sea

Ground-rig only treatment area: A ground-rig only treatment area is designated in the Palo Verde Valley. The Colorado River is the most noticeable water body in the area in addition to canals. The frequency of ground-rig only treatments has been rare and minimal in scope. Survey and treatment activities are confined to controlling BLH populations within the region under agricultural cultivation.

In the event that treatment is triggered in close proximity to a body of water, where application may result in a direct discharge of pesticides to the body of water, CDFA will identify and describe the waters, application and treatment areas, and any representative monitoring location. In addition, CDFA will describe any site specific BMP's for the environmental setting. This information will be posted on the CDFA web page and provided electronically to the SWB.

2.3 Description of Target Species

The BLH is a desert insect introduced from the Middle East, probably in the late 1800's. Years with below normal precipitation provide favorable environmental conditions for the growth and reproduction of BLH populations; which in turn, increases the potential for the spread of BCTV and its devastating effects within the agricultural economy. In 1919, BLH and BCTV nearly destroyed the sugar beet industry. From that experience emerged a concerted effort by private, state and federal researchers to design control methods that would minimize BCTV incidence. After extensive research over a period of several years in California, it was found that BLH populations migrated between the valleys and the foothills. At times they concentrated on particular native and introduced non-crop host plants, mostly in rangeland and situations marginal to agricultural lands. It was apparent

that once breeding grounds and migration patterns were determined, effective control efforts could be economically performed.

The sugar industry in California originally carried out control until the realization arose that a number of other important crops were susceptible to infection. As the other susceptible crops, such as tomatoes, melons, and beans, increased in acreage, sugar beet growers found control work becoming futile. This was because of the migratory nature of BLH and the fact that the main breeding grounds were in uncultivated foothill areas under the jurisdiction of disinterested parties. Private growers and industry could not pursue the insect into these breeding grounds where control was most effective.

In 1943, the State of California, Department of Food and Agriculture, assumed full responsibility for the control of BLH. The Program is presently 100% funded through individual grower assessments.

The BLH prefers habitats and environmental conditions that produce sparse open vegetation. In years with above normal rainfall, BLH populations are generally limited. Lush rangeland vegetation reduces optimum breeding acreage and concentrates BLH populations into smaller areas. In years with below normal precipitation, sparse rangeland vegetation increases optimum breeding acreage and the potential for developing a large BLH population. In periods of drought (successive years of below normal rainfall) a significant reduction in rangeland vegetation leads to a temporary decline in BLH populations and a reduction in treatment activities.

On an annual basis, the BCTVCP surveys for and monitors the development and movement of the BLH from historical breeding grounds on the west side of the San Joaquin Valley, and portions of the Salinas, Cuyama, Imperial and Palo Verde Valleys. Potential survey areas are not denoted by rigid boundaries, but represent generalized zones where the rangeland topography and weather conditions have been conducive to historical BLH development. The BCTVCP surveys rangeland, oilfields, roadsides and cultivated fallow ground for the presence of BLH populations.

2.4 Description of Pesticide/Treatment

The Program uses Fyfanon ULV AG (67760-35) for both aerial broadcast and ground-rig spot applications. The malathion product is diluted with water at a rate of 7.7 ounces of product per gallon of mix. The dilute mix is applied by aircraft, or ground-rig, to BLH host plants at a rate of one gallon mix per acre. The Program also utilizes a spreader-sticker and a buffering agent. On rare occasions spray oil is also incorporated into the mix. Mix is described below:

	7.70 ounces of 96.5% malathion
	+ 120.22 ounces water (water is buffered as needed)
	+ 0.08 ounces spreading agent
Total Mix	= 128.00 ounces of mix applied per acre

The active ingredient (a.i.) application rate is 0.595 lbs. (a.i.) malathion/acre; or 54 mg (a.i.) malathion/sq. meter.

Aerial treatments are employed to control BLH populations in rangeland habitat and large fallow fields. Ground-rigs are used to spot treat migrating BLH populations on weed host plants along roadsides or ditch banks. General ground-rig spot treatments target BLH host weeds in agricultural areas where BCTV susceptible crops are grown adjacent to rangeland breeding grounds.

2.4.1 Aerial Treatment

The majority of acreage selected for pesticide application to control BLH populations is treated using fixed winged aircraft on the Westside of the San Joaquin Valley. To aid in the accuracy and efficiency of the pesticide applications, a global positioning system (GPS) is used to pre-identify swath applications and treatment polygons. Additionally, Program personnel are present on the ground in vehicles to mark, direct and validate the aircraft starting and cut off points.

To assist aerial treatment, BCTVCP personnel on the ground visually verify the starting point and can communicate that position using ground-to-air radio. The treatment “polygons” are pre-set into the aircraft GPS flight recording/guidance system. The pilot sets a starting point into the on-board GPS unit. This starting point can be adjusted while flying. A second point is set, establishing an “A-B” line. The on-board GPS unit then generates 100-125 feet parallel interval treatment swaths, from that “A-B” line, to the end of the polygon. If necessary, BCTVCP ground personnel can direct the final swath by position of a vehicle or visual landmark.

In the rare event of GPS failure or GPS cannot be used, flag-persons are placed at each end of the swath and/or at intervals in the swath line. The flaggers keep the aircraft in line by waving a flag or providing the pilot a bright flash of light from either a signal mirror or powerful spotlight.

When fixed-wing aircraft are utilized, the fuel truck and mixing vehicles are located at a landing strip. Extra personnel on the ground are utilized in areas where constant surveillance is necessary to minimize accidental exposure to people, water sources or to assist in flagging sensitive habitat boundaries. Within 72 hours after application is completed, post-treatment checks are made to assure depopulation of the BLH infestation has been achieved.

2.4.2 Ground-rig Spot Treatments

Ground-rigs are used to spot treat migrating BLH populations on weed host plants along roadsides or ditch banks. General ground-rig spot treatments target BLH host weeds in agricultural areas where BCTV susceptible crops are grown adjacent to rangeland breeding grounds. The size and locations of ground-rig treatments in cultivated areas are related to the size and location of BLH populations migrating from adjacent rangeland habitat.

A ground-rig is typically a four-wheel drive pickup truck with an engine-powered blower mounted in the truck bed. Insecticide mix is injected into the air stream of the blower nozzle. The blower nozzle can rotate up and down 180°. The swath width is adjustable

to the width of the area containing roadside host plants and averages 20 to 25 feet wide. The vehicle typically operates at a speed of approximately 10 mph. The blower is equipped with drip less nozzles and electric cutoff for precise control of spray. All controls are inside the cab where the operator can:

- start and stop the blower engine
- turn the spray nozzle on and of
- control the direction of the blower

The malathion is mixed and applied at the same rate utilized in aerial applications.

2.5 Alternatives

2.5.1 No Action

Under the No Action alternative, CDFA would not control BLH. Without annual control, BLH populations and the spread of BCTV would increase in susceptible crops. There is a potential for millions of dollars in losses each year due to the infection of BCTV in susceptible crops.

Regional control of BLH populations would be replaced by local control performed by private growers in rangeland adjacent to their property. It is expected that pesticide use would increase in crop lands to control BLH populations migrating from uncontrolled rangeland habitat. The production of BCTV susceptible organic crops would be nearly impossible in croplands close to historical BLH breeding grounds.

2.5.2 Increase Ground-rig/ Reduced Aerial

Control the sugar beet leafhopper, *Circulifer tenellus*, using a combination of mostly ground spray rigs and minimal aircraft, and; or ground-rigs only - no aircraft.

This alternative considers the use of malathion with aircraft, in areas inaccessible by wheeled vehicles and the use of spray-rigs using malathion mounted on wheeled vehicles, in areas where they are able to negotiate the terrain.

Ground-rig treatments would include roadsides, fallow fields and vehicle accessible rangeland. Treatment of rangeland would be performed using the same methods as ground-rig use in fallow fields. Aircraft use would be limited to areas inaccessible by wheeled vehicles, or not used at all.

This would be a very inefficient way to treat the large acreages of BLH breeding grounds. BLH populations would not be controlled in some terrains. The simple act of ground-rigs traversing the terrain would most likely result in an increase in damage to listed species habitat.

There are large tracts of public and state lands with strict restrictions pertaining to the use of cross-country-motorized vehicles. In the desert areas, large tracks of BLM land is designated *Limited and Moderate (L&M)* use in which cross-country travel is prohibited. Within the Carrizo Plain Natural Area and on NPR-#2, motorized vehicle use is limited to designated routes of travel. Lands administered by the State of California including the

Department of Water Resources, Department of Parks and Recreation and the Department of Fish and Game, place restrictions on motorized vehicles use. These types of vehicle restrictions would severely limit ground-rig treatments.

2.5.3 Biological Control

As an alternative to insecticides, the BCTVCP funded research to explore the prospects for utilizing egg parasites to control BLH. From 1989 through 2002, approximately \$830,000 of research was contracted by the BCTVCP to develop a classical biological control strategy. Nine species of BLH egg parasites were initially imported from Turkmenistan and Iran, to be cultured. Eight of the nine parasite species were successfully cultured and mass reared in the University of California at Riverside insectary. A total of 109,100 adult parasites have been released since 1996 in BLH overwintering and spring breeding habitats.

Host Exposure and Vegetation Sampling methods were used to assess parasitism in the field as well as providing a measure of the relative effectiveness of each individual introduced parasite species. While imported parasite species were shown to be established, none demonstrated a classical biological control response on BLH populations in the areas where established. BLH populations were not reduced enough to limit BCTV infections below significant levels of damage. The feasibility of using indigenous parasites in augmentative releases was briefly considered as an alternative control strategy. However, the large costs associated with producing large numbers of native parasites in the laboratory makes augmentative releases of native parasites impractical.

Given the release of over 100,000 imported egg parasites, researchers agree there has been a reasonable opportunity for these imported parasite species to demonstrate a classical biological response by impacting BLH populations where they were established. None have done so to date. In November 2001, the Curly Top Virus Control Board recommended the funding of biological control research be suspended.

2.5.4 Eradication of all BLH Rangeland Hosts Plants

The BLH utilizes many species of host plants for food and/or ova-position sites. The elimination of all host plant species would include native and introduced species, and would have a major impact on the rangeland ecosystem and to grazing animals and wildlife that utilize many BLH host plants. A few host plants are rare and threatened species. The distribution and diversity of host plant species would make the eradication of BLH host plants practically impossible, extremely costly, and environmentally devastating.

2.5.5 The Use of Alternative Pesticides

No other pesticide is currently registered for use in California for control of BLH in rangeland on wild host plants.

3. Fruit Fly Control Program Overview

Exotic subtropical and tropical fruit flies are of concern to the agriculture industry in California. The larval (maggot) stage of fruit flies such as Mediterranean fruit fly (Medfly), Mexican fruit fly and oriental fruit fly can damage most of the fruits and vegetables grown in our state. These and other exotic fruit fly species have not become established in California due to (1) strict federal exterior and state interior quarantines, (2) a pest detection program, and (3) aggressive eradication programs when an infestation is discovered. The lone exception is olive fruit fly, *Bactrocera oleae*, which was first discovered in 1998 and has since spread throughout the State. Fortunately, this fly only affects a single crop, namely olives.

Due to California's moderate climate, availability of host plants, agricultural and residential plantings, international trade patterns and culturally diverse population demographics, the risk of introduction and establishment of exotic fruit flies in the State is very high. The California exotic fruit fly detection program is a cooperative effort between the CDFA, the United States Department of Agriculture (USDA) and the California county agricultural commissioners. The detection program is designed to trap new introductions of target flies as they occur and before they become breeding populations. The trapping program provides assurance to California's trading partners that the State is free from these economically damaging pests.

3.1 Statement of Purpose and Need

Subtropical and tropical fruit flies represent a major threat to California's agriculture. The damage caused by larval feeding makes fruit unfit for human consumption. In addition, the presence of an established population would cause a severe economic impact via restrictions/prohibitions on the export of fresh fruit both domestically and internationally. The crops potentially affected in California are many and comprise a significant portion of the total agricultural output for the state. For example, the combined gross value of major crops in California affected by exotic fruit flies was over \$13.7 billion in 2008 (USDA NASS 2009a), or approximately 30% of the state's total gross agricultural value of \$45.6 billion (USDA NASS 2009b).

In California, a series of federal and state plant quarantine laws and regulations are enforced to restrict the entry and movement of commodities capable of harboring targeted plant pests and to ensure the success of any needed eradication or control efforts. This approach of prohibiting or restricting the movement of plants, plant products, or other commodities capable of harboring exotic plant pests is done in the interest of food security, protection of our natural resource base, and the maintenance of our industry's competitive trade advantage.

The purpose of this program is to suppress and eradicate the targeted fruit flies. In the event of a successful fruit fly introduction, the Secretary of CDFA will adopt regulations establishing an exotic fruit fly eradication area and if needed, will adopt regulations establishing a quarantine area. At that time the CDFA will have certain responsibilities. Generally, CDFA will be responsible for trapping, larval survey, insect identification services, treatment notification, treatment, quarantine enforcement, CDFA administration and public relations. In 2009, there were 84 exotic fruit fly adults representing eight

species captured in 10 California counties. These detections triggered delimitation trapping programs and 11 eradication projects.

3.2 Description of Water Body Systems

The CDFA has statewide responsibility for minimizing the impact of invasive insect pests in California. Treatment locations may vary due to the transient nature of insect pests; therefore it is not possible to forecast when and where treatments will occur.

When a location has been determined, program staff will follow all appropriate best management practices to prevent the application of material directly into water. Staff will maintain a minimum distance of 30 meters from surface water and will adhere to label direction, State and Federal laws and comply with recommendations of Environmental staff. Each program area is examined and evaluated prior to treatment by environmental compliance staff and mitigation measures are implemented as needed.

Water contact is not anticipated for *Bactrocera* MAT treatments in public right of way street trees and utility poles. Due to the precise application practices, e.g., measured spray gel applications from a vehicle window and made only when the vehicle is at full stop, and the treatment area, e.g. applications made in the urban environment and applications not made to; near or over water, it is highly unlikely that the viscous and heavy material will drift. Material does not form droplets.

In the event that treatment is triggered in close proximity to a body of water, where application may result in a direct discharge of pesticides to the body of water, CDFA will identify and describe the waters, application and treatment areas, and any representative monitoring location. In addition, CDFA will describe any site specific BMP's for the environmental setting. As soon as the information becomes available it will be posted on the CDFA web page and provided electronically to the SWB.

3.3 Description of Target species

The fruit flies (family Tephritidae) of most concern are a group of small (1/5" to 1/3") to medium-sized (3/4") flies, with general body coloration that can be in the red, orange, yellow or black ranges. Their wings generally have brownish streaks and may also display scattered dark spots. There are four life stages: adult; egg; larva; and pupa (puparium).

The eggs of these flies are slender, white and have an elliptical shape, and are typically laid in batches of 3 to 40, under the skin of the host fruit. The larvae (the maggots in the fruit) are cylindrical in shape, approximately 1/2" long and creamy white in appearance. The contents of their guts are often visible through their skin, and large numbers can colonize the flesh of individual host fruits. Some species will attack flowers and plant stems as well. The puparium (pupa case) can be colored either dull white, dark brown or black. It is just over an inch long and usually found in the soil from 2" to (rarely) 6" deep.

There are thousands of flies in the Tephritidae and many are of agricultural concern. They are small flies and due to their larval feeding habits can be transported into California without detection. The following is a list of several fruit flies that CDFA is monitoring for, however it is not inclusive of any future infestation. CDFA could potentially be engaged in trapping and eradication if any new or previously unknown fruit fly is introduced into California.

3.3.1 Mediterranean Fruit Fly

The Mediterranean fruit fly, *Ceratitidis capitata*, (Medfly) is a short, squat fly about 1/4 inch in length (Fig. 1). It has a blackish thorax marked with silver; a tan abdomen with darker stripes extending across the abdomen; and clear wings with two light brown bands across the wing, another along the distal front edge, and gray flecks scattered near the base. The immature stages are superficially similar to those of other exotic fruit flies (Fig. 2). Eggs are white, very small, elongate, and somewhat banana-shaped. Larvae are white, legless, and somewhat carrot-shaped. The pupa is contained inside an elongate oval, shiny brown, hard puparium

The life cycle of the Medfly begins when the adult female pierces the skin of fruits and vegetables and lays from one to ten eggs per fruit. The eggs hatch and develop into maggots, which feed on the fruit pulp. Decaying, infested fruit usually falls to the ground and the maggots leave the fruit and burrow into the ground to pupate. Adult Medflies emerge from the ground and mate, completing the cycle. Adults can live up to two months. The total time from egg to adult can vary from five weeks to five months, depending on temperature

The Medfly has the widest host range of any pest fruit fly and is considered the most important agricultural pest in the world. It has been recorded infesting over 300 fruit, nuts and vegetables, making them unfit for human consumption.

A great number of crops in California are threatened by the introduction of this pest: including apple, apricot, avocado, bell pepper, fig, grape, grapefruit, lemon, lime, melon, nectarine, orange, peach, pear, persimmon, plum, pomegranate, tangerine, tomato and walnut.

Establishment of these flies would cause direct economic losses via damaged fruit, increased pesticide use statewide by commercial and residential growers in efforts to lessen this damage, loss of revenue due to export restrictions on fruit both domestically and internationally, and adverse impacts on native plants through the destruction of their fruit. A permanent infestation would result in estimated annual losses of \$1.3 to \$1.8 billion.

3.3.2 Oriental Fruit Fly Complex

Adults of species in the oriental fruit fly complex, *Bactrocera dorsalis* complex, are somewhat larger than a housefly, about 8 mm in length. The body color is variable but generally bright yellow with a dark "T" shaped marking on the abdomen. The wings are clear. The female has a pointed slender ovipositor to deposit eggs under the skin of host fruit. Eggs are minute cylinders laid in batches. The maggots (larvae) are creamy-white, legless, and may attain a length of 10 mm inside host fruit.

Females lay eggs in groups of three to 30 under the skin of host fruits; the female can lay more than 1,000 eggs in her lifetime. Time taken for development depends on the ambient temperature. Maggots tunnel through the fruit feeding on the pulp, shed their skins twice, and emerge through exit holes in approximately 10 days. The larvae drop from the fruit and burrow two to three cm into the soil to pupate. In 10 to 12 days, adults emerge from these puparia. The newly emerged adult females need eight to 12 days to mature sexually prior to egg laying. Breeding is continuous, with several annual generations. Adults live 90 days on the average and feed on honeydew, decaying fruit, plant nectar, bird dung and other substances. The adult is a strong flyer, recorded to travel 30 miles in search of food and sites to lay eggs. This ability allows the fly to infest new areas very quickly.

Oriental fruit fly has been established in Hawaii since 1946 where it is a major pest of agriculture, particularly on mangoes, avocados and papayas. Maggots have been found in over 125 kinds of fruit and vegetables in Hawaii alone. A great number of crops in California are threatened by the introduction of this pest, including pears, plums, cherries, peaches, apricots, figs, citrus, tomatoes and avocados. It has been estimated that the cost of not eradicating Oriental fruit fly in California would range from \$44 to \$176 million in crop losses, additional pesticide use, and quarantine requirements. Oriental fruit fly has been introduced into California a number of times through the movement of infested fruits and vegetables into the state. Although infestations have occasionally been found in California, these have all been successfully eradicated.

In excess of 230 fruits and vegetables have been attacked. Fruit that has been attacked may be unfit to eat as larvae tunnel through the flesh as they feed. Decay organisms enter, leaving the interior of the fruit a rotten mass.

3.3.3 Melon Fly

The adult melon fly, *Bactrocera cucurbitae*, is approximately the size of a house fly, about 6 to 8 mm long. The body is mostly orange-brown with a faint black T-shaped mark on the abdomen, and the clear wings have a large brown spot at the tip and a brown stripe at the hind edge in addition to lighter striping along the leading edge of the wing and near the base. The female has a short tube at the end of its body through which the pointed ovipositor can be extruded. The maggots (larvae) are creamy-white, legless and attain a length of 10 mm.

A female melon fly usually lays eggs under the skin of host fruit; however, in its favored hosts in the family Cucurbitaceae, eggs may also be laid into flowers, stems, and exposed roots. These eggs hatch into larvae, or maggots, which tunnel through the flesh of the fruit or other plant part. Decay organisms can enter the fruit, leaving the interior of the fruit a rotten mass and making it unfit for consumption. The developing larvae go through three instars. At maturity, the larvae drop from the plant and burrow two to three cm beneath the soil to pupate. Adults later emerge from these puparia and dig their way out of the soil. Breeding is continuous, with several generations possible annually. Completion of the life cycle normally requires one to two months under warm conditions, but may be five to six months under cooler conditions.

The melon fly is native to Asia, but has spread to other parts of the world including Africa and the Pacific Islands. The melon fly was first found in California in 1956 and has been captured sporadically over the years, but all infestations have been successfully eradicated.

3.3.4 Peach Fruit Fly

The adult peach fly, *Bactrocera zonata*, is approximately 6 mm long and reddish-brown with yellowish thoracic markings. The transparent wings have a small brown spot on each tip. The white eggs are 1.1 mm long and 0.2 mm wide. The larva of the peach fruit fly is a creamy-white, legless maggot which grows to a length of seven to 10 mm within the fruit. The larva doubles over and jumps about when disturbed. The pupa is encased in a dark-brown cylindrical puparium about 5.0 mm long.

Peach flies are strong fliers, capable of dispersing more than 15 miles in its search for host plants. It is active throughout the year when temperatures exceed 50° F. Adults appear in early spring, feeding on nectar, plant sap, and decaying fruit. The preoviposition period (including sexual maturation of eight to 16 days) is 10 to 23 days. The female lays an average of 137 eggs in batches of two to nine under the rind of the host fruit. A female can lay up to 93 eggs in one day, and as many as 564 in its lifetime. Under favorable conditions, the eggs hatch into larvae within two days. The larvae feed in the fruit for four to 21 days depending upon temperature. They burrow one to six inches in the ground to pupate. The pupal period varies from four days in summer to over six weeks in winter. It can apparently survive winters in temperate climates. There are several generations a year if conditions are favorable.

Bactrocera zonata is known in India and Southeast Asia as a serious pest of tropical and subtropical fruits. It is one of the three most destructive flies in India, causing crop losses of 25 to 100 percent in peach, apricot, guava and figs. In recent years, it has increased its host range, especially on fruit.

Bactrocera zonata attacks early fruit such as jujube, loquat, peach, and then moves to cucurbits, mango, citrus, guava, pomegranate and sapodilla for the rest of the year. The larvae will normally destroy the interior of the fruit as they feed on the pulp. Conspicuous, unsightly holes are made when the larvae exit for pupation. Damage to the fruit is similar to that caused by the Mediterranean fruit fly and the Melon fly. It has been reared from 33 fruits, a number of which are important commercial crops. It lowers the yield and quality of such fruits as mango, guava, citrus, eggplant, tomato, apple, peach and loquat.

3.3.5 White Striped Fruit Fly

The general appearance of white striped fruit fly (WSFF), *Bactrocera albistrigata*, resembles an oriental fruit fly, but *B. albistrigata* differs from it by the wing pattern and the coloration pattern on the thorax and abdomen. The wing has a brown mark along the front edge which becomes faint at mid length, and then reappears as a light spot at the tip; there are two brown stripes going across the wing, one at the base and one at mid length. The thorax has a yellow scutellum which may have a dark triangle mark anteriorly. The abdomen has a dark stripe down the middle, flanked by two broader stripes at the sides.

No information is available on developmental parameters. Therefore, it is recommended that life cycle projections be based on the known degree day values for the most closely related species, namely oriental fruit fly, *Bactrocera dorsalis*.

WSFF occurs on Christmas Island (a territory of Australia), the Andaman and Nicobar Islands (India), Indonesia (Java, Lombok, Sulawesi, Sumatra), peninsular Malaysia, southern Thailand, and probably northern and western Irian Jaya (Indonesia) (based on misidentifications as *B. frauenfeldi*).

3.3.6 Guava Fruit Fly

The guava fruit fly, *Bactrocera correcta*, is a brightly-colored brown and yellow fly approximately six millimeters (mm) in length. The wings are clear with a yellow spot. The top of the body of both sexes are entirely yellow and the legs mostly yellow. The ovipositor of the female is red and rather short, measuring approximately 3.0 mm when fully extended. Immature stages of *B. correcta* have not been described in the literature.

There is no developmental information on *B. correcta*, but it is probably similar to *B. zonata*. *Bactrocera correcta* lives in the company of *B. zonata* and *B. tuberculata*, feeding on the same fruits.

This fruit fly is strongly attracted to methyl eugenol and is detected in oriental fruit fly detection traps baited with methyl eugenol. *B. correcta* has the potential to become a major pest of citrus, peach, and several kinds of tropical and subtropical fruit hosts.

B. correcta occurs in India, Pakistan, Nepal, Sri Lanka and Thailand.

3.3.7 Mexican Fruit Fly

The adult Mexican fruit fly, *Anastrepha ludens*, is larger than a housefly, about 1.0 cm (0.38 inch) long. The body color is a pale orange-yellow with two to three whitish stripes along the thorax. The wings are clear except for several yellow and brown stripes. The female is distinguished by a long and slender ovipositor which is used to deposit eggs beneath the skin of the host fruit. The maggots (larvae) are legless, and range in color from white to yellowish-white, and grow to a length of 1.0 cm within the host fruit.

Eggs are laid singly or in groups of up to 18, and a female may lay several thousand eggs in her lifetime. Larvae go through three instars and may require from 11 days to over a month to complete development, depending on temperature. At maturity, the larvae exit the fruit and burrow into the soil to pupate. Adults emerge from 12 to 100 days later depending on temperature. Newly-emerged adults usually require from eight to 34 days to mature prior to egg laying. Breeding is continuous with four to six generations a year under optimum conditions.

The Mexican fruit fly was first described in 1863 Central Mexico. In 1927, the Mexican fruit fly was first discovered infesting the Rio Grande Valley of Texas, and by the early 1950s, flies were found along the California-Mexico border. The Mexican fruit fly is an important agricultural pest in Mexico and parts of Central America where it readily attacks citrus, mango, avocado and a wide variety of other fruits. A large number of commercially grown crops in California would be threatened by the introduction of this pest, including peach, avocado, orange, grapefruit and pear. Mexican fruit fly adults have been trapped a

number of times in California and several infestations have been eradicated from the state.

3.3.8 Caribbean Fruit Fly

The Caribbean fruit fly, *Anastrepha suspensa*, is about 1/3 inch long. It has a yellow tan body with a black spot on the top of the thorax at the scutellum, and clear wings with a typical brown *Anastrepha*-type wing pattern with an "S" across the wing (Fig. 1). The female ovipositor is about as long as the abdomen. The immature stages are superficially similar to those of other exotic fruit flies. Eggs are white, very small, elongate, and somewhat banana-shaped. Larvae are white, legless, and somewhat carrot-shaped. The pupa is contained inside an elongate oval, shiny brown, hard puparium.

Females lay eggs singly under the skin of mature to overripe host fruits. Time taken for development depends on the ambient temperature. Maggots tunnel through the fruit feeding on the pulp, shed their skins twice, and emerge through exit holes in 10-14 days. The larvae drop from the fruit and burrow into the soil to pupate. In 10 to 14 days, adults emerge from these puparia. Breeding is continuous, with several generations possible each year.

The Caribbean fruit fly is widespread throughout the West Indies, being reported from the Bahamas, Cuba, Dominican Republic, Haiti, Jamaica, and Puerto Rico. It was present in Florida during the 1930's, but apparently died out. It was rediscovered in south Florida in 1965, and quickly spread throughout much of the state. Its present United States distribution is restricted to central and southern Florida. Adults have been trapped in California six times since 1983.

The Caribbean fruit fly has been recorded infesting a number of cultivated and wild fruit including apple, avocado, bell pepper, carambola, citrus, date palm, guava, kumquat, loquat, mango, papaya, peach, pear, pomegranate, and tropical almond. In California, the combined 2005 gross value of the above hosts was over \$2.7 billion (USDA NASS 2006).

3.4 Description of Pesticide Treatment

Responding to a new pest or disease is similar to responding to a fire in that if the response is immediate, it is more effective, less damaging and substantially less costly. This treatment program has been reviewed by CDFA and by the USDA. Both studies determined that the treatment program does not cause any adverse environmental or health risks.

3.4.1 Triggers

The CDFA begins treatment when it determines that an exotic fruit fly infestation exists within the state. For the purposes of this Pesticide Action Plan, an infestation is defined as the discovery of an exotic pest in sufficient numbers such that a breeding population could become established within the state. The criteria below meet this definition. The CDFA may take up to 10 days after a criterion is met to further investigate the presence and location of the infestation in order to more accurately formulate and target response activities. The following are the triggers for all fly species.

- 1) Two flies within three miles (4.8 km) of each other and within a time period equal to one life cycle of the fly.
- 2) One mated female (known or suspected to have been mated to a wild male). A single mated female captured during and within an existing preventive release program, in the absence of evidence to the contrary, is treated as if it has mated with a sterile male, and therefore is not an eradication trigger in and of itself.
- 3) One or multiple eggs, larvae or pupae. Attempts should be made to determine the viability of eggs found within a preventive release area, such as looking for evidence of hatching.

3.4.2 Life Cycle Projections

PD/EP uses computerized weather stations to calculate life cycle projections. These stations may be preexisting ones maintained by another entity (e.g., University of California) or they may be placed by the CDFA for a specific project. These projections are used to time the length of delimitations, eradication treatments, and quarantines. Daily high and low temperatures are taken from the soil and air in the area of interest using a thermograph (data pod) housed in a weather shelter. These data are collected and analyzed on a biweekly basis. The collected temperatures and historical data from several years are entered into a formula to calculate the length of each life cycle based on threshold temperatures and degree day values developed for each species. In the absence of values for a particular species, values for the most closely related species are used. Data pods are often located at the initial fly find site and each additional wild fly site that represents a significantly different environment or core area.

3.4.3 Male Attractant Technique (MAT)

The eradication treatment known as the male attractant technique (MAT) is conducted in an area defined by a 1.5 mile radius from each fly find site, for a minimum of 9 square miles. For methyl eugenol responding flies, approximately 600 small gel-like “bait stations” per square mile are applied to the sides of individual utility poles and street trees on public right-of-ways. These bait stations contain a small amount of a male fruit fly attractant (methyl eugenol), a pesticide, Dibrom® Concentrate Insecticide, and a thickening agent (powdered clay), to lure the sexually mature male flies in the population to bait stations. The bait station will attract and kill male fruit flies before they can breed. In the absence of males, the females go unmated and no offspring are produced, effectively causing the extinction of the population within two life cycles. The attractant is very specific for this group of flies, so much so that other insects such as bees or butterflies will not be harmed because they are not attracted to the lure.

The following treatment specific best management practices are used during MAT applications to mitigate environmental and human health hazards:

1. Crews are equipped with meter-jet guns, these are calibrated prior to use to apply a consistent amount of material.
2. Tally counters are used by applicators to ensure required number of bait stations applied does not exceed 600 per square mile.

3. Products are applied from a closed system.
4. Assignment maps are clearly marked to show buffer areas and water bodies.
5. Applications are made to front yard street trees/utility poles.
6. Crews are supervised for quality control during applications.

The Dibrom® Concentrate is mixed with an approved attractant, methyl eugenol, and after dilution a sufficient amount of Min-u-gel is added to render the mixture adequately viscous to minimize running or dripping when applied.

Bait mixture = 19 oz. Of Dibrom® Concentrate (87.4% A.I. Naled), 1 gallon of Methyl Eugenol and 2 to 3 pounds of Min-u-gel® 400). The finished product is applied by fixed dosage spray gun to allow 5 ml of material at each bait station.

For cue lure responding flies, traps baited with cotton wicks containing cue lure and Dibrom are placed at a rate of 1000 per square mile.

3.4.4 Foliar Treatment – Ground Bait Sprays

Ground bait sprays target the adult flies, in particular females and sexually immature males. The foliage of all shrubs and trees within a 200 meter (656 foot) radius of each infested property is treated with insecticide/bait sprays. Insecticide/bait sprays will be applied at intervals in accordance with efficacy data for the particular chemical used.

The insecticide/bait formulation currently used is: GF-120®NF Naturalyte Fruit Fly Bait, active ingredient spinosad (a mixture of spinosyn A and spinosyn D) 0.02%.

The bait should be applied every 7-10 days. Ground bait sprays are normally conducted so as to result in a minimum of six weeks of active material in the field. Sprays may continue for up to two life cycles at the discretion of project management. Significant rainfall (0.1 inch or more) will justify re-treatment at a shorter interval. Following treatment, completion notices are left with the homeowners detailing precautions to take and post-harvest intervals applicable to any fruit on the property.

3.4.5 Host Removal

If larvae are found, host removal (fruit stripping) may be used in conjunction with other elements of this program. All host fruit from the infested and adjacent properties will be removed and taken to a landfill for burial. If surveys warrant it necessary, fruit removal may be extended up to a 200-meter radius around the infested properties. Affected properties will be notified in writing at least 24 hours prior to removal of the fruit.

3.4.6 Sterile Insect Technique

The purpose of the Mediterranean Fruit Fly Exclusion Program is to prevent the establishment of Medfly colonization by the continuous release of sterile Medflies into the environment. The Mediterranean Fruit Fly Exclusion Program covers a 2,500 square mile area that includes the Los Angeles basin, and portions of Riverside, San Bernardino, and Orange counties. The number of square miles covered in each county is as follows: Los Angeles (1,188), Orange (642), Riverside (270), and San Bernardino (400).

The Mediterranean Fruit Fly Exclusion Program consists of five major components that operate year round: the sterile release of Medflies at the rate of 62,500 flies per square mile over the 2,500 square miles, trapping for detection of wild Medflies at the rate of five Jackson traps and five McPhail traps per square mile with inspections at weekly intervals, larval survey of Medfly host fruits, fly identification by a trained biosystematist, and data management and review to monitor the quality and effectiveness of the Program. The Mediterranean Fruit Fly Exclusion Program is a proactive approach to the control and eradication of Medflies in the United States.

Sterile Medflies for the Mediterranean Fruit Fly Exclusion Program are supplied by the CDFA Medfly rearing facility located in Hawaii and from a USDA rearing facility located in Guatemala. The Mediterranean Fruit Fly Exclusion Program incubates and emerges over 450 million sterile Medfly pupae per week for aerial release. The density of release is no less than 62,500 sterile Medflies per square mile per week, using twice weekly releases of a minimum of 31,250 sterile flies per square mile. The sterile Medflies are released seven days a week by private aircraft and pilots under contract to the USDA. Releases are made along predetermined flight lines using the Global Positioning System (GPS), a satellite navigation guidance and recording system.

The Mediterranean Fruit Fly Exclusion Program efficaciousness is reviewed annually by the Mediterranean Fruit Fly Science Advisory Panel (MedSAP), which is an international group of scientists with extensive knowledge in Medfly exclusion, detection and eradication methods.

3.5 Alternatives

3.5.1 No Action

Under the No Action alternative CDFA would not control fruit flies. Without control, fruit flies would spread to all areas of the state capable of supporting a population. Tropical fruit flies represent a major threat to California's agriculture. They infest a large variety of plants and breed and spread rapidly. Establishment of these flies would cause direct economic losses via damaged fruit, increased pesticide use statewide by commercial and residential growers in efforts to lessen this damage, loss of revenue due to export restrictions on fruit both domestically and internationally and adverse impacts on native plants through the destruction of their fruit. Because of these traits, a rapid response is critical to containing an infestation.

3.5.2 Biological control

Biological control is not effective in Eradication programs. No effective bio-control option is available for this pest that can control the infestation on its own. Biological control, when used in an integrated pest management program can successfully hold pest populations down below economically damaging numbers. In the case of pests that are unacceptable at any level, state or federal agencies must use eradication programs.

3.5.3 Mechanical and Cultural Control

An important way to control pests is by excluding, altering pest life cycles or changing the environment so that it is not suitable for pest survival. CDFA will use these measures when available or justified such as sterile insects, host removal (fruit, flower, foliage) and quarantine.

Initiation of state pest quarantines will limit the un-natural spread of pests, but will not eradicate pests.

Sterile insect release will augment an eradication program, however, colonies for each pest would need to be maintained and made available on short notice to be effective. The *Bactrocera* fruit flies would require years of development and millions of dollars to produce a viable sterile release option for each individual species. There are over 60 species in the oriental fruit fly complex alone.

3.5.4 The Use of Alternative Pesticides

At this time, the pesticides listed above are the only ones registered to control fruit flies. Should additional insecticides become available which meet the program's needs, these will be used in a manner that results in the least amount of material being applied while still achieving the goal of control and containment.

4. Moth Control Program Overview

The Moth Eradication Program is an Emergency Program to eradicate invasive lepidopteran moths. Eradication is based on the realistic evaluation that it may be possible to eliminate the pest threat while populations are still low enough.

CDFA's moth control and eradication programs may use foliar and mating disruption treatment methods. For foliar treatment, it uses spinosad products such as Naturalyte® or Entrust for control or suppression of many foliage feeding pests. *Bacillus thuringiensis kurstaki* (Btk) products such as DiPel®Pro DF and DiPel® DF are used specifically for control of larvae of many species of moths. They do not have significant risk to healthy humans, wildlife, and the environment. Ground sprays will be applied to all host foliage on all infected properties using hydraulic spray or hand spray equipment. Host plant fruit, flower, and foliage removal is also a method considered for moth control and eradication.

Affected properties will be notified in writing at least 24 hours prior to treatment. Following treatment, completion notices are left with the homeowners detailing precautions to take and preharvest intervals applicable to any fruit or vegetables on the property.

4.1 Statement of Purpose and Need

The purpose of this program is to control and eradicate damaging, invasive moths. The moths involved in this program are known to cause significant damage to many agricultural commodities and the native environment. Backyard fruit and landscape plantings are at risk and may be used as a reservoir for incipient populations, thereby re-infesting commercial crop producing and/or native forest areas. Eradication, not control, is the overall strategy. Control of populations below the economic threshold will result in

outbreaks, and an overall increased use of pesticides in home, commercial crop producing, forested areas. Additionally, fresh fruit will likely face restrictions imposed by some trading partners if eradication protocols are not strictly adhered to.

Invasive moths pose a substantial threat to many California crops. Several of the moths that CDFA is currently monitoring for or actively controlling are among the most devastating invasive moths known and can potentially cause over a billion dollars in cumulative damage

The European grapevine moth (EGVM) is a serious pest in warm vine-growing countries. Grapes are ranked second among agricultural commodities in California. Establishment of this pest can be catastrophic to our vineyards. California's 844,000 acres of grapes (526,000 acres of wine grape, 93,000 acres of table grape and 225,000 acres of raisin-type grapes) leads the nation in grape production with 89 percent of the total. Losses in Israel due to the EGVM sometimes reach 40 to 50 percent among table grapes and up to 80 percent for wine grapes. Further loss may be caused by the time and labor spent in cleaning the grape bunches.

The light brown apple moth (LBAM) could significantly impact production costs for host plants, by over \$100 million. It was estimated for Australia that LBAM causes AU\$21.1 million annually in lost production and control costs, or about 1.3% of gross fruit value: for apples, pears, oranges and grapes. Applying this percentage to the 2005 gross value of these same crops in California of \$5.4 billion, the estimated annual production costs would be \$70.2 million. This estimate does not include economic costs to the nursery industry nor to other significant host crops in California, such as apricots, avocados, kiwifruit, peaches and strawberries. If the same level of costs were incurred by these as for the previous four crops, the additional costs would be \$63.1 million, based on their 2005 gross value of \$4.8 billion. Therefore, the total lost production and control costs in California could be \$133 million for all of the crops mentioned above.

Gypsy moths represent a major threat to California's agriculture and environment. The larvae are capable of completely defoliating trees when populations are high. This defoliation not only kills and weakens trees, but also alters forest composition and destroys habitat for other animals. Gypsy moth infestations affect recreational use of forests, parks, and backyards. Swarms of caterpillars discourage tourism and many other outdoor activities. In urban areas, the economic impact includes clean-up costs, tree replacement costs and loss of property values. The combined gross value of timber and other forestry products in California was over \$350 million in 2008 (USDA NASS 2009a, 2009b).

The false codling moth (FCM), if established in California would result in significant economic losses. FCM would likely be a significant production and quarantine issue for numerous agricultural commodities. In California alone, the annual combined gross value of the top ten agricultural commodities which would be directly impacted by this pest is over \$7.1 billion, which amounts to 22 percent of the total agricultural value for the State (USDA NASS 2007).

4.2 Description of Surface Waters

The CDFA has statewide responsibility for minimizing the impact of invasive insect pests in California. Treatment locations may vary due to the transient nature of insect pests; therefore it is not possible to forecast when and where treatments will occur.

When a location has been determined, program staff will follow all appropriate best management practices to prevent the application of material directly into water. Staff will maintain a minimum distance of 30 meters from surface water and will adhere to label direction, State and Federal laws and comply with recommendations of Environmental staff. Each program area is examined and evaluated prior to treatment by environmental compliance staff and mitigation measures are implemented as needed.

In the event that treatment is triggered in close proximity to a body of water, where application may result in a direct discharge of pesticides to the body of water, CDFA will identify and describe the waters, application and treatment areas, and any representative monitoring location. In addition, CDFA will describe any site specific BMP's for the environmental setting. As soon as the information becomes available it will be posted on the CDFA web page and provided electronically to the SWB.

4.3 Description of Target Species

The order Lepidoptera is comprised of the butterflies, skippers, and moths; adults are characterized by two pairs of scaly membranous wings and sucking mouthparts. Larval stages have chewing moth parts and can cause significant crop damage.

The following is a list of several moth species that CDFA is currently monitoring for, however it is not inclusive of any future infestation. CDFA could potentially be engaged in trapping and eradication if any new or previously unknown moth is introduced into California.

4.3.1 European Grapevine Moth (EGVM)

The EGVM, *Lobesia botrana*, is a serious pest of grapes, causing significant damage to the flowers and berries of grapevines. It will also occasionally feed on the flowers and/or fruit of other crops such as blackberry, cherry, currant, gooseberry, kiwi, olive, nectarine, persimmon, plum, and pomegranate. Additionally, EGVM is known to feed on close relatives of plants listed as threatened or endangered in the United States and presents a potential threat to perhaps 24 species, some of which are known to occur only in California.

The EGVM was recently discovered in the Napa Valley region of California, the first ever recorded detection in the United States. The EVGM larvae, not the adult moths, are responsible for the damage to grapes. Larvae that emerge early in the spring feed on grape bud clusters or flowers and spin webbing around them before pupating inside the web or inside a rolled leaf. If heavy flower damage occurs during this first generation, the affected flowers will fail to develop and yield will be reduced. Second-generation larvae feed on developing grapes, and may penetrate the berry and hollow them out, leaving the

skin and seeds. Larvae of the third generation — the most damaging — feed on multiple ripening grapes and expose them to further damage from a number of fungal rots, most prominently *Botrytis cinerea*. These infections cause the berries to turn brown and rot, and can cause the loss of the entire grape cluster.

4.3.2 Light Brown Apple Moth (LBAM)

Adult light brown apple moths, *Epiphyas postvittana*, are light brown, yellowish moths with varying amounts of darker brown, with a wingspan of 16–25 mm. Females are larger than males, and usually have less distinct markings, but often have a distinct spot in the middle when the wings are closed. Eggs are pale white and deposited slightly overlapping each other in groups of 20–50. Larvae are green, about 18 mm long at maturity. They are superficially similar to other native tortricid larvae and DNA analysis is necessary to confirm their identity. Pupae are brown, about 11 mm long.

Development is continuous, with no true dormancy. In Australia, this moth typically has three generations per year and over-winters as a larva. Life cycle projections for the areas of California where it has been found indicate that four to five generations are possible. Females deposit egg masses containing 20–50 eggs on the upper leaf surface or on fruit. Fecundity varies considerably and females are capable of laying up to 1496 eggs in their lifetime, but the average has been recorded variously as 118 to 462. Larvae disperse and construct silken shelters on the underside of leaves, usually near a midrib or large vein. Older larvae roll together leaves and buds or fruit with webbing. Damage to fruit occurs as surface feeding by the larvae. Larvae will occasionally enter the fruit to feed. Pupation takes place within the larval nests.

LBAM has been associated with many plants representing 290 genera. These genera contain over 2000 species and many of these species that are not already known to be hosts could prove to be hosts as LBAM becomes exposed to them. Some notable trees recorded as hosts are apple, pear, peach, apricot, nectarine, citrus, persimmon, cherry, almond, avocado, oak, willow, walnut, poplar, cottonwood, Monterey pine and eucalyptus. Some common shrub and herbaceous hosts are grape, kiwifruit, strawberry, berries (blackberry, blueberry, boysenberry, and raspberry), corn, pepper, tomato, pumpkin, beans, cabbage, carrot, alfalfa, rose, camellia, pittosporum, jasmine, chrysanthemum, clover, lupine and plantain.

4.3.3 Gypsy Moth

The adult, female gypsy moth, *Lymantria dispar*, is a large, white, flightless moth with a two inch wing span and dark saw-toothed patterns on the wings. The male is smaller (one and a half inch wingspan), has smaller markings on brown wings and is a strong flier. The larva stage is the most destructive. Later stages of the larvae develop a distinctive color pattern of five pairs of blue dots followed by six pairs of red dots along their backs. The eggs are laid in masses of 100 to 1,000 and are covered with hair, forming a soft tan patch about the size of a quarter. The Asian gypsy moth is the same species as that from Europe, but differs in some key biological aspects; namely: 1) female Asian gypsy moths can fly up to 20 miles and 2) the larvae do well on conifers.

Adults emerge between June and August. The female emits a sex attractant that allows the male to find her. After mating, the female lays a single egg mass on any available surface including trees, rocks, fences and other manmade outdoor articles. Adults do not feed and die shortly after mating and egg-laying. Gypsy moth spends the winter in the egg stage. Eggs hatch in late February through April. Emerging larvae move to the tops of trees and are carried many miles on wind currents; wind-aided dispersal is the primary dispersal mechanism for the gypsy moth.

Gypsy moth first became established in the United States in 1869, in Massachusetts. It spread rapidly throughout the Northeast and has become the destructive pest of hardwood forest and shade trees in the United States. When populations are high, the gypsy moth defoliates millions of acres of forest and urban trees. This defoliation not only kills and weakens trees, but also alters forest composition and destroys habitat for mammals and birds. Gypsy moth infestations affect recreational use of forests, parks and backyards. Swarms of caterpillars discourage tourism and many other outdoor activities. In urban areas, the economic impact includes clean-up costs, tree replacement costs and loss of property values.

Gypsy moth is a native to Europe, southern Asia and northern Africa. The current distribution in the United States includes the northeast states (i.e., Pennsylvania, New Jersey, New York, Delaware, etc.) expanding southward into West Virginia, North Carolina and Tennessee, and westward into Michigan, Ohio and Illinois. Isolated

Gypsy moth has over 150 primary hosts, but can feed on over 500 plants. Both hardwoods and conifers are defoliated. Young larvae feed primarily on oaks, aspen, birch, willows and alder. Older larvae feed on a broader range of trees including cedar, pine, spruce and fir. Recent tests on western plants have shown that native and common California species such as manzanita, western hemlock, Douglas fir and live oaks are also good hosts.

4.3.4 False Codling Moth (FCM)

The false codling moth, *Thaumatotibia leucotreta*, is originally from sub-Saharan Africa, and has become established on nearby islands and in Israel. FCM is known to occur in the following countries: Angola, Benin, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Congo Democratic Republic, Cote d'Ivoire, Eritrea, Ethiopia, Gambia, Ghana, Israel, Kenya, Madagascar, Malawi, Mali, Mauritius, Mozambique, Niger, Nigeria, Réunion, Rwanda, Saint Helena, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia, and Zimbabwe. Increased international trade and tourism between the United States and many African countries in recent years has increased the risk of introduction of this pest. Since 1984, FCM has been intercepted over 1500 times on 99 plant taxa at 34 U.S. ports of entry. In June 2005, live FCM caterpillars were found at California's border stations inside previously cold treated Clementine citrus from South Africa. A single male FCM was trapped in Ventura County in 2008; its discovery in California is a new record for the Americas.

This moth is multivoltine with up to six generations a year in South Africa. Its generation time is 45-100 days, and the larvae are internal feeders. Females lay 100-250 individual eggs during their lifetime on fruit or foliage. Eggs are usually laid singly on the surface of

fruit. Newly emerged caterpillars may wander on the surface of the fruit before entering. Caterpillars bore into fruit, thereby rendering it undesirable for consumption and allowing for the introduction and growth of bacteria and other microorganisms. Infested fruit generally drops before harvest; however, infestations that occur near fruit harvest may not be detected and infested fruit may be subsequently packaged for export. When emerging on cotton bolls, caterpillars first mine the walls and later move into the cavity and feed on seeds. Mature caterpillars leave the fruit and spin cocoons in the soil or in bark crevasses.

Adults are small, brownish-gray, nocturnal moths with an average wingspan of 16 mm (2/3"). Eggs are whitish, flat and oval in outline. Young caterpillars are whitish and spotted, while mature ones are pinkish with red above and 15 mm in length. Pupation occurs in the soil or in bark crevasses within a cocoon made of silk and debris particles.

Many fruit trees, field crops, and other plants have been reported as hosts for FCM. In Africa, it is a major pest of citrus and cotton. Other commonly grown agricultural hosts in California include grapes, peach, plum, cherry, beans, tomato, pepper, persimmon, apricot, olive, pomegranate, English walnut, and corn. It has been reported to damage avocados, but apparently can not complete development within the fruit. Other hosts include Surinam cherry, mangosteen, cacao, guava, okra, sorghum, cowpea, mango, litchi, oak, wild fig, banana, pineapple, macadamia nuts, carambola, tea, coffee, cola nuts, sodom apple, sour sop, custard apple, and many indigenous African plants.

4.4 Description of Pesticide Treatment

Moth eradication options are dependent upon the size of the infestation, its location(s) and which materials may be registered for use and have adequate efficacy. Generally, the treatment area is within 500 meters of detection sites in an infested County. Treatments take place primarily in rural/urban residential yard settings.

In order for the greatest chance of success, a suite of options are available. Homeowners may select host fruit, flower and foliage removal or a foliar application of a biological insecticide. Mating disruption may be used in areas that are unsuitable for the above options, such as difficult to access host plants growing in riparian areas.

4.4.1 Foliar Treatment Options

Some residents do not wish to lose their present season crop with fruit removal, therefore, *Bacillus thuringiensis* (Bt) applications are offered as a means of maintaining the lepidopteron moth eradication. Several naturally-occurring varieties of Bt have been isolated and characterized. The variety that is currently registered for use against in California is *Bacillus thuringiensis* variety *Kurstaki*, strain ABTS-351. This variety was selected because of its high virulence to target Lepidoptera.

DiPel® DF, (*Bacillus thuringiensis*, subsp., *kurstaki*) may be applied to all host plants on the selected property. DiPel® DF is safe to beneficial insects and compatible with monitoring and disruption pheromones and other integrated pest management (IPM) practices. Treatment commences about 10 days after peak moth flight or at the black

head stage. Treatments will be applied three times per generation. In order for Bt to become active, larvae must ingest the spores and crystals by feeding on leaves treated with Bt.

Following ingestion the crystals dissolve in the gut, releasing the toxic protein. This protein breaks down the epithelial lining of the stomach which causes a cessation of feeding activity. Following destruction of the stomach lining, the bacterium invades the internal tissues and reproduces vegetatively causing organ disintegration. Death usually occurs seven to 10 days following ingestion and results from a combination of infection and starvation.

Treatment continues for at least two life cycles, based upon trap catch and degree day models.

Another insecticide which may be used is: Entrust, active ingredient spinosad (a mixture of spinosyn A and spinosyn D) for the control of foliage feeding pests.

4.4.2 Mating Disruption

Mating disruption (pheromone dispensers) is used statewide as needed. Placement occurs once per season based upon pest population detections. Selection of mating disruption will occur for; isolated areas, areas with low populations and location that are further than 5 miles from an infested area. Additionally, mating disruption cannot be used in areas where commercial growers intend to export crops out of state or internationally. Mating disruption interferes with required detection trapping protocols for commercial growers.

Pheromones are used in a double tube dispenser composed of a plastic tube filled with the pheromone solution parallel to a plastic tube filled with an aluminum wire. The dispenser is applied by hand directly on the plant or trellis wires. A mechanical device does not randomly distribute this product nor is it sprayed into the air.

The pheromone dispenser is similar in size and appearance to a common pipe cleaner. The pheromone solution is within the hollow tube of the dispenser and is not directly put on the crop. Each dispenser slowly releases tiny amounts of pheromone into the atmosphere. The pheromone migrates slowly by diffusion from the inside of the tube to the surface where it volatilizes in microgram amounts.

Rate of application is 200 to 240 dispensers per acre, treatment area is usually 200 to 500 meters around detection site and dispensers are applied to front/back yard plants, fences or grapevines.

Treatment continues for at least two life cycles, based upon trap catch and degree day models.

4.4.3 Host Fruit and Flower Removal

A non-pesticidal treatment option is removal of flowers, fruit and/or foliage depending on the target moth to deny the pest hosts reproduction sites. Host (fruit) removal can

eliminate reproductive harborage of the pest but may disperse adults causing further spread. Flowers/fruit are hand-picked using pruning/clippers. Fruit is double bagged and transported to a facility offsite where they are subject to a deep burial within 24 hrs. Flower, fruit and foliage are transported under special permit.

4.5 Alternatives

4.5.1 No Action

Under the No Action alternative CDFA would not eradicate invasive moths. Initiation of a State Quarantine may limit spread of pest, however, does not eradicate it. Homeowners may also utilize chemicals readily available at retail outlets and increase the use of pesticides in heavily infested areas. Domestic and foreign trade restrictions may increase with the “No Action” alternative.

4.5.2 Biological Control

No effective bio-control option is available for this pest that can eradicate the infestation on its own. Biological control, when used in an IPM program can successfully hold pest populations down below economically damaging numbers. No effective predator or parasite is available at this time.

4.5.3 Mechanical and Cultural Control

An important way to control pests is by excluding, altering pest life cycles or changing the environment so that it is not suitable for pest survival. CDFA will use these measures when available or justified such as sterile insects, host removal (fruit, flower, foliage) and quarantine.

4.5.4 The Use of Alternative Pesticides

At this time, the pesticides listed above are the ones registered for moth control. Should additional insecticides become available which meet the program’s needs, these will be used in a manner that results in the least amount of material being applied while still achieving the goal of eradication.

5. Leaf and Shoot Piercing/Sucking Insect Control Program Overview

The Leaf and Shoot Piercing/Sucking Insect Control Program is an Emergency Program to control and eradicate the insects that feed on plants by piercing the tissue and feeding on the liquid nutrients. In sufficient numbers, piercing/sucking insects can starve a plant by depleting it of the carbohydrates produced from photosynthesis. If infestations last for prolonged periods, plant death can result. In addition, many piercing/sucking insects carry pathogens that can also cause plant death or decline.

Detection of these insects can be difficult as many are too small to be observed directly; or they may be overlooked because of their sedentary nature and the lack of obvious

physical damage to plant tissues. The use of a magnifying lens will often reveal the presence of piercing/sucking insects. The overall decline in plant health; or abnormal coloring or thinning foliage maybe signs of insect presence.

This control program includes both foliar and systemic insecticides. It is imperative that pest populations are controlled or eradicated based on the realistic evaluation that it may be possible to eliminate the pest threat while populations are still low enough.

Affected properties will be notified in writing at least 24 hours prior to treatment. Following treatment, completion notices are left with the homeowners detailing precautions to take and preharvest intervals applicable to any fruit or vegetables on the property.

5.1 Statement of Purpose and Need

The purpose of this program is to suppress and contain invasive piercing/sucking insects which can direct damage to host plant species and can vector plant diseases that will also kill host plants. With the containment, there would be a reduced direct threat of spreading damage and disease. Based on survey data, many of these pests have a continuous life cycle with no true dormancy. Without control, spread of the disease and severe economic losses would be imminent.

Several of the piercing/sucking pests that CDFA is currently monitoring are the Asian citrus psyllid and the glassy-winged sharpshooter. These insects pose a significant threat to California's agricultural industry, both by direct insect damage and by vectoring plant diseases that can devastate the citrus and grape industries.

For example, Establishment of the Asian citrus psyllid and the disease it vectors, Huanglongbing would cause economic losses to California's a \$1.88 billion citrus industry. California's citrus industry ranks first in the U.S. in terms of value and second (after Florida) in terms of production. California's total citrus production has averaged 3.2 million tons per season over the past three seasons, about 24 percent of the nation's total. California is the nation's main source of fresh market oranges and also supplies 87 percent of the nation's lemons (source: USDA Economic Research Service).

If the Asian citrus psyllid begins to transmit the disease, the entire industry could be at risk. In one recent study in Florida, the presence of this disease increased citrus production costs by 40 percent.

The establishment of the glassy-winged sharpshooter and the Pierce's Disease which it vectors, has the potential to destroy California's billion dollar grape industry. The exponential spread of Pierce's Disease since 1997 indicates the glassy-winged sharpshooter is a serious threat, having upset the tight control over spread of the disease by other native vectors and caused \$12-14 million of damage between the years of 1997 and 2002 in grapevines in Temecula alone. This pest remains a significant threat to the wine, raisin, and table grape region in central California. There is historical precedence that this disease can wipe out entire agricultural industries. The California grape industry was decimated in the 1940s, with acres of cropland remaining unplatable today due to presence of the bacteria.

5.2 Description of Surface Waters

The CDFA has statewide responsibility for minimizing the impact of invasive insect pests in California. Treatment locations may vary due to the transient nature of insect pests; therefore it is not possible to forecast when and where treatments will occur.

When a location has been determined, program staff will follow all appropriate best management practices to prevent the application of material directly into water. Staff will maintain a minimum distance of 30 meters from surface water and will adhere to label direction, State and Federal laws and comply with recommendations of Environmental staff. Each program area is examined and evaluated prior to treatment by environmental compliance staff and mitigation measures are implemented as needed.

In the event that treatment is triggered in close proximity to a body of water, where application may result in a direct discharge of pesticides to the body of water, CDFA will identify and describe the waters, application and treatment areas, and any representative monitoring location. In addition, CDFA will describe any site specific BMP's for the environmental setting. As soon as the information becomes available it will be posted on the CDFA web page and provided electronically to the SWB.

5.3 Description of Target Species

The mouth parts of sucking insects are modified to allow for easy piercing of plant tissue, much like a hypodermic needle, and the drawing out or sucking of plant liquid nutrients. Often these insects are soft body and some may secrete waxy strands of material to conceal and protect themselves from desiccation or predators. Injury caused by sucking insects usually appears as a stippling of leaf tissue and loss of green color. Another symptom of presence of piercing and sucking insects is the appearance of honeydew, a sugary substance often excreted by the insects. Leaf surfaces may often be blackened as a dark sooty mold grows in the honeydew. Well-known insects with piercing-sucking mouthparts include aphids, scales, leafhoppers, squash bugs and plant bugs

Plants infested by piercing and sucking insects suffer damage not only by direct injury to plant tissue but many of these insects are vectors for plant diseases.

The following is a list of several piercing/sucking insects that CDFA is currently monitoring; however it is not inclusive of any future infestation. CDFA could potentially be engaged in trapping and eradication if any new or previously unknown insect pest is introduced into California.

5.3.1 Asian Citrus Psyllid

The Asian citrus psyllid, *Diaphorina citri*, is 3 to 4 mm long with a brown mottled body. The head is light brown. The wings are broadest in the apical half, mottled and with a dark brown band extending around the periphery of the outer half of the wing. The insect is covered with a whitish waxy secretion, making it appear dusty. Nymphs are generally

yellowish orange in color, with large filaments confined to an apical plate of the abdomen. The eggs are approximately 0.3 mm long, elongate and almond-shaped. Fresh eggs are pale in color, but then turn yellow and finally orange at the time of hatching. Eggs are placed on plant tissue with the long axis vertical to the surface of the plant.

Eggs are laid on tips of growing shoots on and between unfurling leaves. Females lay 300 to 800 eggs during their lifetime. Nymphs pass through five instars. The total life cycle requires from 15 to 47 days, depending on environmental factors such as temperature and season. The adults may live for more than a month. There is no diapause, but populations are typically low in the winter or during dry periods. There are nine to 10 generations a year, with up to 16 observed under observation in field cages.

Asian citrus psyllid was first found in the United States in Palm Beach County, Florida, in June 1998, in backyard plantings of orange jasmine. By 2001, it had spread to 31 counties in Florida, with much of the spread due to movement of infested nursery plants. In the spring of 2001, ACP was accidentally introduced into the Rio Grande Valley on potted nursery stock from Florida. It was subsequently found in Hawaii in 2006 and in Alabama, Georgia, Louisiana, Mississippi and South Carolina in 2008. It was first found in California on August 27, 2008, in San Diego County. Subsequently, it was found on October 13, 2008, in Imperial County; on August 18, 2009, in Orange County; on August 25, 2009, in Los Angeles County; and on October 15, 2010, in San Bernardino County. Control and quarantine activities are underway in those counties.

The Asian citrus psyllid is found in tropical and subtropical Asia, Afghanistan, Saudi Arabia, Reunion, Mauritius, parts of South and Central America, Mexico, the Caribbean and the United States (Alabama, Florida, Georgia, Hawaii, Louisiana, Mississippi, South Carolina, and Texas). In California, it is present in Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura Counties, where it is under official control and quarantine actions.

The Asian citrus psyllid feeds mainly on *Citrus spp.*, at least two species of *Murraya* and several other genera all in the family of Rutaceae. Direct injury caused by ACP results from the withdrawal of large amounts of sap from the plant as they feed and produce copious amounts of honeydew. The honeydew coats the leaves of the tree, encouraging sooty mold to grow. However, the most serious damage caused by ACP is due to its ability to effectively vector the phloem-inhabiting bacterium *Candidatus Liberibacter asiaticus* that causes Huanglongbing (HLB) disease. HLB is the most devastating disease of citrus in the world. Symptoms of HLB include yellow shoots, with mottling and chlorosis of the leaves. The juice of the infected fruit has a bitter taste and the fruit's skin may retain some green coloration even though it is ripe. Infected trees eventually die of the disease. The once flourishing citrus industry in India is slowly being wiped out by dieback. This dieback has multiple causes, but the major cause is due to HLB disease.

5.3.2 Glassy-winged Sharpshooter

The glassy-winged sharpshooter (GWSS), *Homalodisca vitripennis*, is a large insect compared to other leafhoppers. Adults are about 1/2 inch long and are generally dark brown to black when viewed from the top or side. Wings are clear with red venation, but appear dark brown due to the body coloration beneath them. Before laying eggs, the

female secretes a chalky white substance that she transfers to the upper wings forming white spots. After laying the eggs, she covers them with this chalky material by transferring it from the wings. Thus, the white spots on the wings are only visible on females shortly before laying a batch of eggs and are not present on males. The abdomen is whitish or yellow. The head is brown to black and covered with numerous ivory to yellowish spots. In profile, the immature stages (nymphs) of the glassy-winged sharpshooter look similar to that of the adult, except they are smaller, wingless, uniform olive-gray in color, and have prominent bulging eyes.

Females lay their eggs in masses of about 10 to 12 under the lower leaf surface of young, fully developed leaves. The eggs lay side-by-side in a single layer. When it is first laid, each individual egg appears as a greenish blister beneath the epidermis of the leaf. The female covers the egg mass with the white chalky material making it more visible. Shortly after the eggs hatch, the leaf tissue begins to turn brown. The dead leaf tissue remains as a permanent brown scar.

The GWSS ranges over many habitats, including agricultural crops, urban landscapes, native woodlands, and riparian vegetation. It is reported to feed on hundreds of plant species. Hosts for the glassy-winged sharpshooter vary widely and include woody plants and annual and perennial herbaceous plants. It occurs in unusually high numbers on citrus. Common landscape and garden host plants include bird of paradise, eucalyptus, euonymus, citrus, crepe myrtle, pittosporum, sunflower, hibiscus, xylosma, and cottonwood, among many others. Host preference changes according to availability and nutritional value of the host plant at any given time. Well-irrigated and well-fertilized plants may become a host when in other situations they would not.

The GWSS is an aggressive, exotic insect that was accidentally introduced into southern California in the late 1980s and has since spread to 11 California counties, mostly in the southern part of the state. GWSS presents a severe threat to grapevines and other important agricultural crops because of its ability to spread the bacterium which causes Pierce's disease and other related damaging plant diseases. Ornamental and native plants are also vulnerable to diseases spread by GWSS.

California's first indication of the severe threat posed by this new disease and vector combination occurred in Temecula, Riverside County, in August of 1999, when over 300 acres of grapevines infested with the GWSS were destroyed by Pierce's disease. Losses continued to mount in Temecula and other infested areas in following years, eventually exceeding 1,100 acres statewide by 2002.

The GWSS clearly has the potential to increase both the incidence and severity of Pierce's disease in California. As observed in the Temecula infestation, the sharpshooter builds to high populations that substantially increase the number of insects vectoring the destructive *Xylella fastidiosa* bacteria to crops; and transmits the bacteria from vine to vine, resulting in an exponential increase in disease incidence in vineyards.

5.4 Description of Pesticide Treatment

Treatment is warranted on the detection of one or more insect, depending on species. At a minimum, treatment will occur on all properties with detections and the immediately

adjacent properties. In most cases, treatment will be extended to all properties within a determined radius of a detection property. If additional life stages are detected in the survey area, the treatment area may expand to include additional properties.

Both foliar and systemic insecticides will be applied. Foliar insecticides are useful for immediate reduction of the adult population in order to eliminate dispersal, while systemic insecticides are necessary to kill the sedentary nymphs. The frequency of the treatments is dependent on the insecticide applied and severity of the infestation. Residents of affected properties will be notified in writing at least 24 hours prior to treatment. Following treatment, completion notices are left with the residents detailing precautions to take and post-harvest intervals applicable to any fruit on the property.

5.4.1 Foliar Treatment Options

PyGanic®, an organic formulation of a pyrethrin, may be applied to all host plants using hydraulic spray or hand spray equipment. Treatments are repeated weekly. This option is only used in special situations where an organic material is needed.

Tempo® SC Ultra, a synthetic pyrethroid insecticide containing cyfluthrin, may be applied a minimum of one time to the foliage of host plants at designated residential properties. Tempo® may be applied to all host plants using hydraulic spray or hand spray equipment.

Sevin® SL, a carbamate insecticide containing carbaryl, may be applied to all host plants using hydraulic spray or hand spray equipment. Treatments are repeated every 10 to 14 days. This option would be used under special conditions such as detection of additional ACP after the maximum use rate for Tempo had been applied to the target.

Tristar® 30 SG, a neonicotinoid containing acetamiprid, may be applied to the foliage of host plants. Materials would be applied by ground to the host plants of GWSS using truck-mounted or handheld equipment. Properties often need to be treated only once to achieve eradication.

Merit® 2F, Merit® 75 WP, and Merit® 75WSP, neonicotinoid insecticides containing imidacloprid, may be applied to the foliage of host plants. Materials would be applied by ground to the host plants of GWSS using truck-mounted or handheld equipment.

5.4.2 Soil Treatment Options

Merit® 2F, Merit® 75 WP, and Merit® 75WSP, neonicotinoid insecticides containing imidacloprid, may be applied to all host plants using hydraulic spray or hand spray equipment. The material is applied to soil beneath the drip line of host plants to kill developing nymphs and adult insects. This material will be applied a minimum of one time to the soil of host plants at designated residential properties.

5.4.3 Treatment Length

Treatments will be applied as per label instructions, generally as a one-time application. If additional insects are detected in the survey area, the treatment may be repeated.

5.5 Alternatives

5.5.1 No Action

Under the No Action alternative CDFA would not control invasive piercing/sucking insects. Without control, insects will spread throughout the state, resulting in large quantities of conventional pesticides being used to produce crops statewide. The insect threat would become imminent because several of these insects are disease vectors and provide pathways for the spread of disease.

5.5.2 Biological control

No effective bio-control option is available for these pests that can control an infestation on its own. Biological control, when used in an integrated pest management program can successfully hold pest populations down below economically damaging numbers. With the potential ability to vector pathogens, even low pest numbers are considered economically damaging.

5.5.3 Mechanical and Cultural Control

An important way to control pests is by excluding, altering pest life cycles or changing the environment so that it is not suitable for pest survival. CDFA will use these measures when available or justified such as sterile insects, host removal (fruit, flower) and quarantine.

5.5.4 The Use of Alternative Pesticides

At this time, the pesticides listed above are the ones registered to control these pests. Should additional insecticides become available which meet the program's needs, these will be used in a manner that results in the least amount of material being applied while still achieving the goal of control and containment.

6. Foliage and Root Chewing Insect Control Program Overview

The purpose of the Foliage and Root Chewing Insect Control Program is to detect and eradicate non-moth insects that feed on plants by chewing on roots and/or foliage. In sufficient numbers, these insects can defoliate a plant or severely damage its roots, potentially resulting in plant death. This control program includes both foliar and systemic insecticides.

Affected properties will be notified in writing at least 24 hours prior to treatment. Following treatment, completion notices are left with the homeowners detailing precautions to take and preharvest intervals applicable to any fruit or vegetables on the property.

6.1 Statement of Purpose and Need

The purpose of this program is to suppress and contain invasive root and/or foliage chewing insects which can direct damage to host plant species. With the containment, there would be a reduced direct threat of spreading damage. Without control, spread of the disease and severe economic losses would be imminent.

6.2 Description of Surface Waters

The CDFA has statewide responsibility for minimizing the impact of invasive insect pests in California. Treatment locations may vary due to the transient nature of insect pests; therefore it is not possible to forecast when and where treatments will occur.

When a location has been determined, program staff will follow all appropriate best management practices to prevent the application of material directly into water. Staff will maintain a minimum distance of 30 meters from surface water and will adhere to label direction, State and Federal laws and comply with recommendations of Environmental staff. Each program area is examined and evaluated prior to treatment by environmental compliance staff and mitigation measures are implemented as needed.

In the event that treatment is triggered in close proximity to a body of water, where application may result in a direct discharge of pesticides to the body of water, CDFA will identify and describe the waters, application and treatment areas, and any representative monitoring location. In addition, CDFA will describe any site specific BMP's for the environmental setting. As soon as the information becomes available it will be posted on the CDFA web page and provided electronically to the SWB.

6.3 Description of Target Species

The mouth parts of chewing insects are designed to tear off and chew plant tissue. Well-known insects (other than Lepidoptera) with chewing mouthparts include beetles, grasshoppers, etc. The following is the only chewing insect that CDFA is currently conducting a detection program.

6.3.1 Japanese Beetle

The Japanese beetle, *Popillia japonica*, is native to the main island of Japan. It was first found in the United States in 1916 in a nursery near Riverton, New Jersey. The beetle is currently found in coastal and adjacent states from eastern Canada to Alabama, with small infestations westward to beyond the Mississippi River.

The adult beetle is a broadly oval insect about 1/2 inch long (14 mm) and about 1/4 inch wide (7 mm). The body is a bright metallic green, the legs are a darker green, and the wing covers are a coppery brown and do not quite extend to the end of the abdomen. There are two small tufts of white hairs just behind the wing covers and five patches along each side. The small white oval eggs are laid in the soil. The larva is C-shaped with three pairs of legs, white, and grows to 1 1/4 inch in length (32 mm). Pupae are light reddish-brown and 1/2 inch long (14 mm). There is usually one generation per year,

although larvae can take up to two years to develop in wet, damp soils. The adults emerge from mid-May to September.

A wide range of plants are attacked by the adult beetles. Hosts include small fruits, tree fruits, truck and garden crops, ornamental shrubs, vines, and trees. Feeding studies show a host range in excess of 300 plants, although only about 50 are preferred. Preferred plants are grape, early apples, cherry, peach, plum, raspberry, rose, zinnia, linden, and corn. They injure corn seriously by eating the silk which interferes with formation of kernels. Soft fruits such as grapes, berries, and stone fruits may be completely consumed. Larvae feed on the roots of a number of plants, but grasses are particularly favored. Medium to high densities of larvae will cause grass to die off. In California, the combined 2005 gross value of nurseries and the above crops was over \$8.65 billion.

6.4 Description of Pesticide Treatment

Treatment is warranted on the detection of one or more than one insect, depending on species. At a minimum, treatment will occur on all properties with detections and the immediately adjacent properties. In most cases, treatment will be extended to all properties within a determined radius of a detection property. If additional life stages are detected in the survey area, the treatment area may expand to include additional properties.

Both foliar and soil insecticides may be applied. Foliar insecticides are useful for immediate reduction of the adult population in order to eliminate dispersal, while soil insecticides are necessary to kill the immature stages in the soil. The frequency of the treatments is dependent on the insecticide applied and severity of the infestation. Residents of affected properties will be notified in writing at least 24 hours prior to treatment. Following treatment, completion notices are left with the residents detailing precautions to take and post-harvest intervals applicable to any fruit on the property.

6.4.1 Foliar Treatment Options

Tempo® SC Ultra, a synthetic pyrethroid insecticide containing cyfluthrin, may be applied a minimum of one time to the foliage of host plants at designated residential properties. Tempo® may be applied to all host plants using hydraulic spray or hand spray equipment.

Sevin® SL, a carbamate insecticide containing carbaryl, may be applied to all host plants using hydraulic spray or hand spray equipment. Treatments are repeated every 10 to 14 days.

6.4.2 Soil Treatment Options

Merit® 2F, a neonicotinoid insecticide containing imidacloprid, may be applied to all host plants using hydraulic spray or hand spray equipment. The material is applied to soil beneath the drip line of host plants to kill developing nymphs and adult insects. This material will be applied a minimum of one time to the soil of host plants at designated residential properties.

Merit® 0.5G, a neonicotinoid insecticide containing imidacloprid, may be applied to the soil of all host plants by spreading. The material is applied to soil beneath the drip line of host plants to kill developing larvae. This material will be applied a minimum of one time to the soil of host plants at designated residential properties.

6.4.3 Treatment Length

Treatments will be applied as per label instructions, generally as a one-time application. If additional insects are detected in the survey area, the treatment may be repeated.

6.5 Alternatives

6.5.1 No Action

Under the No Action alternative CDFA would not control invasive chewing insects. Without control, insects will spread throughout the state, resulting in large quantities of conventional pesticides being used to produce crops statewide.

6.5.2 Biological control

No effective bio-control option is available for these pests that can control an infestation on its own. Biological control, when used in an integrated pest management program can successfully hold pest populations down below economically damaging numbers.

6.5.3 Mechanical and Cultural Control

An important way to control pests is by excluding, altering pest life cycles or changing the environment so that it is not suitable for pest survival. CDFA will use these measures when available or justified such as sterile insects, host removal (fruit, flower) and quarantine.

6.5.4 The Use of Alternative Pesticides

At this time, the pesticides listed above are the ones registered to control these pests. Should additional insecticides become available which meet the program's needs, these will be used in a manner that results in the least amount of material being applied while still achieving the goal of control and containment.

7. Trunk and Stem Boring Insect Control Program Overview

The purpose of the Trunk and Stem Borer Eradication Program is to detect and eradicate invasive boring insects. The primary eradication tools include both foliar and systemic insecticides. Eradication is based on the realistic evaluation that it may be possible to eliminate the pest threat while populations are still low enough.

Borers are insects that bore into the tissues of plants to feed or reproduce. These insects harm plants by destroying the tissues beneath the surface that transports carbohydrates and nutrients throughout the tree.

Trees that become weakened by severe borer infestations may fall and cause material damage to residential and commercial properties and also poses a significant threat to human health and safety.

7.1 Statement of Purpose and Need

Borers are among the most damaging pests in our forests, agricultural lands, and urban landscapes; they bore into plant tissues and lay their eggs. When the eggs hatch, larvae feed on the nutrient rich phloem tissue before molting into adults and emerging to attack more plants. Healthy plants are normally capable of preventing borers from entering the tissues. However, populations can become so large in 'outbreak' years that even healthy plants succumb to attack. Once borers overcome plant defenses and bore into the tissues to lay eggs, there is little hope a plant will survive. Several of the boring insects can be substantial forest pests, for instance the Asian longhorned beetle has the potential to cause severe damage.

In 1986, timber was the most important agricultural crop in the U.S. in terms of dollar value of production, surpassing soybean, corn and hay. The delivered value of 1986 U.S. timber output was \$17.1 billion (in 1996 dollars). Total shipments of wood manufactured products were valued at \$252 billion. If left unchecked the USDA estimated that the Asian longhorned beetle and other boring insects could cause up to \$138 billion dollars to the U.S. economy. The threat to California is equally substantial as the risk would extend not only to timber production, but fruit and nut trees as well.

The purpose of this program is to suppress and contain invasive boring insects which can direct damage to host plant species. With the eradication of localized infestations, there would be a reduced direct threat of spreading damage and disease. Based on survey data, many of these pests have a continuous life cycle with no true dormancy. Without control, severe economic losses would be imminent.

The potential exists for many boring insects to damage crops throughout the State. An infestation would potentially lead to millions of dollars in losses to California's agriculture.

7.2 Description of Surface Waters

The CDFA has statewide responsibility for minimizing the impact of invasive insect pests in California. Treatment locations may vary due to the transient nature of insect pests; therefore it is not possible to forecast when and where treatments will occur.

When a location has been determined, program staff will follow all appropriate best management practices to prevent the application of material directly into water. Staff will maintain a minimum distance of 30 meters from surface water and will adhere to label direction, State and Federal laws and comply with recommendations of Environmental

staff. Each program area is examined and evaluated prior to treatment by environmental compliance staff and mitigation measures are implemented as needed.

In the event that treatment is triggered in close proximity to a body of water, where application may result in a direct discharge of pesticides to the body of water, CDFA will identify and describe the waters, application and treatment areas, and any representative monitoring location. In addition, CDFA will describe any site specific BMP's for the environmental setting. As soon as the information becomes available it will be posted on the CDFA web page and provided electronically to the SWB.

7.3 Description of Target Species

Typically, borers must be controlled with preventative insecticide treatments, because, once the insects are within the plant tissue, they are difficult to control. Particular attention should be taken to plants showing signs of stress such as wilting, disease infection or injury. Borers of one species or another will successfully attack such plants usually during the summer months

The following is a list of several boring insect species that CDFA is currently monitoring; however it is not inclusive of any future infestation. CDFA could potentially be engaged in trapping and eradication if any new or previously unknown borer is introduced into California.

7.3.1 Asian Longhorned Beetle

Adult Asian longhorn beetles (ALB), *Anoplophora glabripennis*, are 20-35 mm in length and 7-12 mm in width. Their color is jet-black with a luster. The antennae have 11 segments. The base of the antennae is whitish with a blue-black color. The antennae of the males are 2.5 times their body length; the antennae of the females are 1.3 times their body length. The base of the elytra does not have a granular structure. Each elytron has about 20 white dots.

A typical life cycle for this pest is:

- Egg stage: The off-white, oblong eggs are 5-7 mm in length. Both ends of the eggs are slightly concave.
- Larval Stage: Mature larvae are 50 mm in length. The prothorax has a brown mark. The front of the mark does not have a brown margin.
- Pupal Stage: The off-white pupae are 30-33 mm in length, width of 11 mm. The eighth segment of the abdomen has a protruding structure.
- Adult Stage: Adults are 20-35 mm in length and 7-12 mm in width. Their color is jet-black with a luster.

The ALB attacks maple, horse chestnut, poplar, and other hardwood trees. Timber, nursery stock, shade tree and maple syrup production are all at risk. According to the

Empire State Forest Products Association, these industries employ more than 60,000 people. As an exotic, the beetle is expected to encounter few natural enemies. This factor will influence a rapid expansion of populations by natural means.

The ALB is a native of Northeast Asia. The ALB alters the appearance of hardwood trees, especially maple and horse chestnut. Infested trees become unsightly, drop dead branches, and eventually die.

7.3.2 Palm Weevils

Members of the giant palm weevil genus, *Rhynchophorus*, are major pest of palm trees, many of which are highly valued as landscaping plants, generating approximately \$70 million in nursery plant sales in California annually. Palm trees are also used for producing crops and marketable agricultural commodities including coconuts, dates and oils. In California, date palm growers harvest an annual crop worth approximately \$30 million. The vast majority of these farms are in the Coachella Valley region.

Female palm weevils bore into a palm tree to form a hole into which they lay eggs. Each female may lay an average of 250 eggs, which take about three days to hatch. Larvae emerge and tunnel toward the interior of the tree, inhibiting the tree's ability to transport water and nutrients upward to the crown. After about two months of feeding, larvae pupate inside the tree for an average of three weeks before the adults emerge. Adults live for two to three months, during which time they feed on palms, mate multiple times and lay eggs.

Adult weevils are considered strong fliers, venturing more than a half-mile in search of host trees. With repeated flights over three to five days, weevils are reportedly capable of traveling nearly four-and-a-half miles from their hatch site. They are attracted to dying or damaged palms, but can also attack undamaged host trees. Symptoms of the weevil and the larval entry holes are often difficult to detect because the entry sites can be covered with offshoots and tree fibers. Careful inspection of infested palms may show holes in the crown or trunk, possibly along with oozing brown liquid and chewed fibers. In heavily infested trees, fallen pupal cases and dead adult weevils may be found around the base of the tree.

7.4 Description of Pesticide Treatment

Treatment is warranted on the detection of one or more insect, depending on the species. At a minimum, treatment will occur on all properties with detections and the immediately adjacent properties.

Both foliar and systemic insecticides may be applied. Foliar insecticides are useful for immediate reduction of the adult population in order to eliminate dispersal, while systemic insecticides are necessary to kill the larvae. The frequency of the treatments is dependent on the insecticide applied and severity of the infestation. Residents of affected properties will be notified in writing at least 24 hours prior to treatment. Following treatment, completion notices are left with the residents detailing precautions to take and post-harvest intervals applicable to any fruit on the property.

7.4.1 Foliar Treatment Options

Sevin® SL, a carbamate insecticide containing carbaryl, may be applied to all host plants using hydraulic spray or hand spray equipment. Treatments are repeated every 10 to 14 days. This option would be used under special conditions as a drench if emerging adult borers are detected.

7.4.2 Soil Treatment Options

Merit® 2F, a neonicotinoid insecticide containing imidacloprid, may be applied to all host plants using hydraulic spray or hand spray equipment. The material is applied to soil beneath the drip line of host plants to kill developing nymphs and adult insects. This material will be applied a minimum of one time to the soil of host plants at designated residential properties.

Safari® 20SG, a systemic insecticide containing dinotefuran, may be applied as a trunk spray to palm trees to control larval stages of the palm weevil. The active ingredient will be absorbed through the trunk into the tree's vascular system which will distribute the toxicant throughout the tree. Borers feeding internally will be controlled by this insecticide.

7.4.3 Host Plant Removal

If larvae are found, host plant removal may be used in conjunction with other elements of this program. All host plants removed from the infested properties will be removed, placed in a chipper and taken to a landfill for burial. If surveys warrant it necessary, plant removal may be extended to adjacent properties. Affected properties will be notified in writing at least 24 hours prior to removal of an infested plant.

7.4.4 Treatment Length

Treatments will be applied as per label instructions, generally as a one-time application. If additional insects are detected in the survey area, the treatment may be repeated.

7.5 Alternatives

7.5.1 No Action

Under the No Action alternative CDFA would not control invasive boring insects. Without control, insects will spread throughout the state, resulting in large quantities of conventional pesticides being used to produce crops statewide.

7.5.2 Biological control

No effective bio-control option is available for these pests that can control the infestation on its own. Biological control, when used in an integrated pest management program can successfully hold pest populations down below economically damaging numbers.

7.5.3 Mechanical and Cultural Control

An important way to control pests is by excluding, altering pest life cycles or changing the environment so that it is not suitable for pest survival. CDFA will use these measures when available or justified such as sterile insects, host removal (fruit, flower, foliage) and quarantine.

7.5.4 The Use of Alternative Pesticides

At this time, the pesticides listed above are the ones registered to control these pests. Should additional insecticides become available which meet the program's needs, these will be used in a manner that results in the least amount of material being applied while still achieving the goal of control and containment.

8. Terrestrial Weed Control Program Overview

The Terrestrial Plant Eradication Program (Program) was established within the California Department of Food and Agriculture (Department) for the statewide control of invasive and noxious plants (weeds). Noxious plants are defined by inclusion in the California Department of Food and Agriculture's noxious weed list in the California Code of Regulations Section 4500. An invasive weed is generally thought to be a species that 1) Was introduced into an environment that they are not natural to; 2) Cause significant economic or ecological damage and, 3) Lack natural enemies which may limit their spread. Many weeds are considered both noxious and invasive.

Each year and throughout the year, Program staff monitors primary and secondary public roadways statewide, and other locations in the state which historically have shown a propensity for supporting the development of weeds. Survey areas are not denoted by rigid boundaries, but represent points of entrance into the state that are likely to be conducive to the establishment of weeds. When high priority weeds are located field staff has the option of either spraying with a labeled pesticide, removal with a shovel or hand pulling.

Surveys determine the size, extent and location of populations during the spring, summer and fall. Control activities normally occur when weed populations are initially detected, occur throughout the growing season and, are long-term commitments due to the presence of a viable seed bank.

8.1 Statement of Purpose and Need

The purpose of this program is to control invasive and noxious plants statewide. Without this program the spread of weeds threaten susceptible agricultural, horticultural and high value resources such as parks, riparian areas, and other natural areas.

A 2004 estimate placed nationwide environmental and damage losses due to invasive terrestrial weeds at \$120 billion annually. In California the estimate for managing just the yellow starthistle (YST) which has infested approximately 15 million acres in the state is approaching \$12 million. It is estimated that over 3,000 invasive/noxious plant species have been introduced into California.

The California Department of Food and Agriculture is designated the state's lead agency in noxious and invasive weed control. CDFA has several roles—the department (1) maintains a list of officially designated noxious weeds, and regulates the movement and commerce for these weeds, (2) implements the “Pest Prevention System,” (3) coordinates eradication efforts for high priority noxious weeds, and (4) provides funding, oversight and guidance to county-based weed management programs.

For weeds that are not designated noxious, there is no clear lead agency or entity. California is rich in coordination groups, which provide leadership, education and advocacy on many different facets of weed control in California.

8.2 Description of Water Body Systems

There is an infinite quantity of water body systems found within the state which may or may not be in close proximity to program treatment activities. In most if not all instances where treatment activities occur spraying does not occur near moving water bodies, still water bodies, ditches or irrigation canals. The majority of the treatment occurs along primary and secondary highways, and other corridors that lead into the state. It is this method by which weeds are often introduced into the state and which is the focus of the program.

Aerial treatment for weeds occurs rarely in the state and only in the county of Modoc. In 2009 Modoc County surveyed 50,000 acres by air and treated 0.004 percent or two hundred acres. None of the treated acreage was remotely near any body of water. The potential for aerial treatment is an extremely rare event in any year and in most cases, is not the preferred method of treatment.

When a location has been determined, program staff will follow all appropriate best management practices to prevent the application of material directly into water. Staff will maintain a minimum distance of 30 meters from surface water and will adhere to label direction, State and Federal laws and comply with recommendations of environmental staff. Each program area is examined and evaluated prior to treatment by environmental compliance staff and mitigation measures are implemented as needed.

In the event that treatment is triggered in close proximity to a body of water, where application may result in a direct discharge of pesticides to the body of water, CDFA will identify and describe the waters, application and treatment areas, and any representative monitoring location. In addition, CDFA will describe any site specific BMP's for the environmental setting. As soon as the information becomes available it will be posted on the CDFA web page and provided electronically to the SWB.

8.3 Description of Target Species

The Department is designated the state's lead agency in noxious weed control and has several roles: (1) maintains the list of officially designated noxious weeds, and regulates the movement and commerce for these weeds, (2) implements the “Pest Prevention

System,” (3) coordinates eradication efforts for high priority noxious weeds, and (4) provides funding, oversight and guidance to county-based weed management areas.

Staff is deployed statewide and survey major road ways for the presence/absence of high priority weeds. When these high priority weeds are located treatment normally occurs at that instant by either hand pulling or treating with an appropriate herbicide. As such all water bodies within the state could be listed as being impacted – this is however extremely remote particularly when one considers the location of targeted weeds along roadsides, etc.

8.4 Description of Pesticide/Treatment

The Program uses various ‘Caution’ labeled herbicides (Roundup Pro Concentrate Herbicide, containing the Isopropylamine salt of Glyphosate; Roundup Weathermax Herbicide, containing the Potassium salt of Glyphosate; Arsenal Herbicide, containing Imazapyr; Milestone and Milestone VM, containing aminopyralid; Milestone VM Plus, containing the TIPA salt of aminopyralid and Triclopyr triethylamine salt of 3,5,6-dichloropyridin-2-carboxylic acid; Transline Herbicide, containing clopyralid; Dupont Telar XP and Telar DF, containing chlorsulfuron; and Garlon 4 containing triclopyr butoxyethyl ester). These products are diluted with water at a rate consistent with the product label. The dilute mix is applied by low pressure back-pack sprayer, truck mounted equipment, ATV or in rare instances by air.

The application method and use sites will vary depending on the weed species being treated, the size of the infestation and the accessibility. Only labels registered for use on the target weed species and the application sites will be used as it is imperative that CDFA only use registered pesticides.

8.4.1 Aerial Treatment

The majority of acreage selected for pesticide application to control weed populations is treated using ground application equipment. However there are rare circumstances that application by air in remote areas of the state is more practical. To assist in the accuracy and efficiency of the pesticide application, a global positioning system (GPS) is used to identify treatment sites. In the extremely rare occasion when aerial treatment occurs, Program personnel are present on the ground in vehicles to mark, direct and validate the aircraft starting and cut off points.

To assist aerial treatment, personnel on the ground visually verify the starting point and can communicate that position using ground-to-air radio. The treatment “polygons” are pre-set into the aircraft GPS flight recording/guidance system. The pilot sets a starting point into the on-board GPS unit. This starting point can be adjusted while flying. A second point is set, establishing an “A-B” line. The on-board GPS unit then generates 100-125 feet parallel interval treatment swaths, from that “A-B” line, to the end of the polygon. If necessary, ground personnel can direct the final swath by position of a vehicle or visual landmark.

In the rare event of GPS failure or GPS cannot be used, flag-persons are placed at each end of the swath and/or at intervals in the swath line. The flaggers keep the aircraft in line

by waving a flag or providing the pilot a bright flash of light from either a signal mirror or powerful spotlight.

Extra personnel on the ground are utilized in areas where constant surveillance is necessary to minimize accidental exposure to people, water sources or to assist in flagging sensitive habitat boundaries. Within 72 hours after application is completed, post-treatment checks are made to assure treated areas received the herbicide.

8.4.2 Ground-rig Spot Treatments

Ground-rigs are infrequently used to spot treat 'escapes' or 'skips' in a high-acreage location or as an initial treatment regime. A ground-rig is typically a four-wheel drive pickup truck with a gas powered 50 gallon or larger spray equipment mounted in the truck bed or an all-terrain-vehicle (ATV) which has a 20-gallon spray tank mounted to the vehicle frame. The ATV configuration is normally a short width thirty-six inch boom or hand held wand for making the application. Either vehicle typically operates at a speed of approximately 3-5 miles per hour depending on terrain. The control for starting and stopping the flow of pesticide is in the hand of the applicator.

8.4.3 Low Pressure Backpack Treatments

Application of herbicides by backpack sprayer is the preferred and most used method for applying herbicides to small localized weed infestations. Choice of application equipment depends on the product formulation, the location and the size of areas to be treated. In greenhouses, roadsides, wildland settings or small farm operations, a backpack hand-pump sprayer may be effective. Most backpack low volume sprayers operate with a hand operated piston-pump capable of generating a working pressure up to ninety (90) pounds per square inch and are equipped with a shut-off valve, a four (4) foot spray wand, and a short length high-pressure hose. Most types are supplied with an adjustable hollow cone, flat fan or net-stream spray nozzle which provides for making most types of spray applications. Padded adjustable shoulder straps with pull tabs allow for quick adjustments. Sprayers of this type have a capacity of up to five (5) gallons but the more preferred quantity is 2-3 gallons. A built-in and removable strainer keeps debris from entering the spray nozzle and some units are provided with an adjustable pressure gauge.

8.5 Alternatives

8.5.1 No Action:

Under the No Action alternative, CDFA would not control weeds. Without annual control, weed populations would increase statewide. Almost one-half of all the alien species included on the US endangered species list are the result of the introduction of the introduction of invasive plants, animals and other organisms.

Statewide control efforts of weed populations would be replaced by local control performed by private individuals or groups to sites adjacent to public property with an expected increase in pesticide use.

8.5.2 Increase Ground-rig/ Reduced aerial

Control high priority weeds, using a combination of mostly ground spray rigs and minimal aircraft, and; or ground-rigs only - no aircraft.

This alternative considers the use of labeled herbicides with aircraft, in areas inaccessible by wheeled vehicles or over rangeland in the northeastern portion of the state, and the use of spray-rigs mounted on wheeled vehicles/ATV's, in areas where they are able to negotiate the terrain.

Ground-rig/backpack/ATV treatments would include roadsides and vehicle accessible rangeland. Treatment of rangeland would be performed using the same methods as ground-rig use. Aircraft use would be limited to areas inaccessible by wheeled vehicles, or not used at all.

There are large tracts of federal and state lands with strict restrictions pertaining to the use of motorized vehicles. In the desert areas, large tracks of BLM land is designated *Limited and Moderate (L&M)* use in which vehicle travel is prohibited. Within the Carrizo Plain Natural Area motorized vehicle use is limited to designated routes of travel. Lands administered by the State of California including the Department of Water Resources, Department of Parks and Recreation and the Department of Fish and Game, place restrictions on motorized vehicle use. The national Park Service also restricts or prohibits the use of wheeled vehicles on some of their lands due to the presence of threatened or endangered organisms. These types of vehicle restrictions would severely limit ground-rig treatments or ATV application.

8.5.3 Biological Control

As an alternative to herbicides, the Terrestrial Plant Eradication Program and the Biological Control Program within CDFA fund research to explore the prospects of using biological agents to control several weed species (thistles, knapweeds, and others). The successful agents (target weeds) are as follows: hairy weevil, peacock fly and rust (YST); seed head and gall flies (YST); leaf beetle (purple loosestrife); crown weevil (Mediterranean sage) and seed weevil (spotted knapweed). As required by USDA-APHIS (United States Department of Agriculture, Animal and Plant Health Inspection Service) protocols each of the bioagents undergo host-specificity tests to determine their safety for introduction into the United States. All bioagents that show potential damage to non-target organisms are rejected. For YST the examination of potential bioagents began in the 1960's and is ongoing. Bioagents are screened, cultured and released in various regions of the state. The most successful bioagents for YST are the false peacock fly and hairy weevil.

8.5.4 Eradication of Weeds in Rangeland Habitat

Many species of weeds exist statewide, some of which are historically planted as ornamental plants that can be purchased either online or at a local nursery. The eradication of all weeds is unlikely to occur due to increased worldwide travel and the potential to re-introduce other non-desirable plants. Also, most weeds have a seed bank which can persist several years which will result in continuing treatments.

8.5.5 The Use of Alternative Pesticides

Other pesticides are currently registered for use in California and others are in the development stage for weed control but they each may have an assigned 'Signal Word', (e.g. Warning, Danger) on the label and by definition, are more harmful to people and the environment. Each of the products used in the weed program have a U.S. Environmental Protection Agency signal word 'Caution' on the label. The "Caution" signal word verifies that the product has minimal toxicity to humans and the environment.

9. Sampling and Monitoring Procedures

Considering the precise application practices of ground-rig spot treatments and backpack application equipment, the limited treatment areas and the ability to avoid water bodies, the California Department of Food and Agriculture (CDFA) does not anticipate drift into water bodies. The CDFA does not plan on monitoring ground-rig spot treatments or treatments made with backpack application equipment, unless there is a required treatment with an unavoidably close proximity to a water body or an unintentional drift incident.

The CDFA rarely uses aerial applications; the two main exceptions would be the Beet Curly Top Virus Control Program (BCTVCP) and the terrestrial plant eradication program. Due to the quantity of acres treated and the nature of aerial applications, the CDFA will monitor water bodies during aerial applications. Water bodies will be monitored when aerial applications are performed within a quarter ($\frac{1}{4}$) mile of a water body. Representative sample sites will be chosen according to the number of water bodies encountered during the season.

For the BCTVCP, most of the water bodies, likely to be exposed to treatments when water is present are located in the winter/spring treatment areas, on the west side of the San Joaquin Valley. Sampling of approximately 1-3 representative sites per year may be possible in the winter/spring treatment period. One sampling site per year during the fall aerial treatments may also be chosen.

Aerial applications to control the Beet Leaf Hopper (BLH) populations are directed by the results of BLH population surveys as determined with sweep net methods. The proximity of BLH development to water bodies can not be pre-determined in advance of population surveys. BLH population development is weather dependent and varies in extent and density from year to year. The variations in temperature, quantity and timing of rainfall influence the development of host plants and BLH populations. In any given year, rangeland habitat chosen for treatment may or may not be in close proximity to water bodies. The ephemeral nature of the streams on the west side of the San Joaquin Valley also dictates the quantity and location of appropriate sampling sites in a given year. Sampling sites will be chosen when water is present and there is a maximal likelihood that the pesticide could drift to the water.

For the terrestrial plant eradication program an extremely small quantity of acres are treated by aerial applications in Modoc County only. The Program will not monitor water bodies farther than one quarter (¼) mile of water bodies. Aerial applications to control weed populations are directed by the results of visual flight surveys. The proximity of weed sites to water bodies cannot be pre-determined in advance of visual surveys. Weed populations are weather dependent and vary in extent and density from year to year. Variations in temperature and the quantity and timing of rainfall influence weed development. In any given year, rangeland chosen for treatment will not be in close proximity to water bodies. The ephemeral nature of the drainage sites county-wide also dictates the quantity and location of appropriate sampling sites in a given year. Sampling sites will be chosen when water is present and there is a maximal likelihood that the pesticide could drift to the water.

9.1 Visual Observations of Sampling Site

Visual observations of the water body will be noted on a sampling field data sheet log for each water sampling site chosen. Observations will include:

- Water Body Description-(pond, lake, channel, creek, stream, etc.)
- Appearance of water way-(sheen, color, clarity, etc.)
- Weather Conditions-(rain, wind, fog, etc.)
- Note Flow Conditions

Attention will be given and noted to the presence of:

- Floating or suspended matter
- Discoloration
- Bottom deposits
- Aquatic life
- Visible films, sheens, or coatings
- Fungi, algal slimes or objectionable growths
- Potential nuisance conditions

9.2 Water Quality/Physical Measurements of Sampling Site

Physical measurements will be made during the surface water sampling to provide additional data for characterizing water quality. Measurements will be recorded on a sampling field data sheet. An YSI-650 MDS meter or equivalent will be used to measure pH, conductivity, temperature, turbidity, and dissolved oxygen. The meter will be calibrated prior to use. Physical readings will be made “in-stream” by inserting the probe directly within the flowing water, just down stream from the point where a water sample will be extracted.

9.3 Surface Water Sampling

A total of 3 water samples will be taken at each sampling site for active ingredient analysis. The following table summaries quantity of samples proposed.

Numbers of Samples Per Sample Site		
Type of Sample	Active Ingredient	Toxicity Study*

Background Sample (within 24 hours)	1	0
Event Sample (not exceed 24-hours)	1	0
Post- Event Sample (within one week after)	1	0

*At the time of this writing, the State Water Board has decided to fund a toxicity study of the pesticide products included in the permit and will not require CDFA to conduct toxicity testing until the results of their study become available (not later than 12/31/2012). In the interim CDFA will be required to conduct visual and chemical water monitoring only.

- **Background Monitoring-** Samples will be collected at the application area just prior (up to 24-hours in advance of application) to the application event.
- **Event Monitoring-** Samples will be collected within the application area immediately after the application event but shall not exceed 24-hours after the application event.
- **Post-Event Monitoring-** Samples will be collected within the application area within one week after the application event. *The Discharger is responsible for calculating the distance from the path (or point) of application in which off-target spray drift may occur. Post-Event monitoring shall be conducted accordingly.*

Each water sample will be collected at the surface of the water body using a new, liter size, amber glass bottle. Each bottle will be labeled with the collector's name, date, location, time, monitoring type, (Background/Event/Post-event) and analyses required (active ingredient analysis or toxicity study). All samples will be refrigerated in the field using a mobile 12v refrigeration unit placed in a vehicle, or kept on ice in a cooler. Samples will remain refrigerated while being transported to an indoor refrigeration unit.

Coolers used to transport the samples to the laboratory will be prepared as follows:

- Previous labels will be removed from cooler.
- Drain plugs will be sealed with tape inside and out.
- All ice will be double bagged in resealable plastic bags.

A Chain-of-Custody form will accompany samples and coolers to the laboratory. The coolers will then be delivered to the appropriate laboratory. Upon receipt by the laboratory, the sample custodian will inspect and certify the condition and presence of all samples.

9.4 Field Data Collecting

A water sampling field data sheet will be used to record water sample data, visual observations, and water quality measurements.

9.5 Water Sample Chain-of-Custody

Water sample chain-of-custody procedures ensure the custody and integrity of the samples through transport, delivery to lab, data gathering, and reporting. The following will be documented on the chain of custody form:

1. Quantity and identification by name of samples transported
2. Name and signature of person transporting samples, date, time and purpose
3. Name and signature any subsequent person transporting samples, date, time and purpose
4. Name and address of laboratory performing analysis or toxicity study
5. Name of persons at laboratory receiving samples and Lab receipt date
6. Condition of samples when received at Lab

9.6 Laboratory Facilities

Analysis of active ingredient will be conducted by the:

California Department of Food and Agriculture
Center for Analytical Chemistry
Environmental Science Section
3292 Meadowview Road
Sacramento, CA 95832

10. Applicable Water Quality BMP'S

The Program's Best Management Practices (BMP) have been developed through label requirements, consultation of Federal and State laws and regulations, multiple Section 7 Consultations with U. S. Fish and Wildlife Service (USFWS), consultation with NOAA Fisheries and informal consultations with the California Department of Fish and Game (CDFG).

10.1 General BMP's

The following general Best Management Practices (BMP) guidelines have been developed by CDFA for spray applications. They will facilitate an optimal pesticide application and protect the natural environment by preventing off-site movement. These BMP's will prevent unintentional discharge to waters of the United States.

1. Conduct a site assessment.
 - a. Identify the pest species to be treated. CDFA has compiled EIR's for many pests of concern.
 - b. Take note of site conditions, such as soil texture, slope, irrigation or storm drains.

- c. Identify and avoid streamside management areas and surface water to prevent chemicals not labeled for aquatic use from drifting over open water, or from accidentally being applied directly on the water.
- d. Choose integrated pest management methods designed to minimize the scale and number of pesticide applications: Integrating multiple measures such as quarantines, sterile release, host removal, bait stations or mass trapping. Programs use small quantities of materials
- e. Choose the least persistent and lowest toxicity pesticide that will efficaciously treat the target pest.

2. All equipment must be properly cleaned and calibrated to apply chemicals uniformly and in the correct quantities.

- a. Calibrate spray equipment per manufactures specifications.
- b. Equipment screening tests and tank sampling.
- c. Dedicate specific equipment for specific products.
- d. Clean equipment regularly following the manufactures specifications and the pesticide label directions.
- e. Select the appropriate nozzle to ensure proper coverage.
- f. Maintain and equipment log to track calibration, cleaning and repairs.
- g. Conduct visual inspection of equipment prior to use. Check all equipment for leaking hoses, connections and nozzles.
- h. Monitor the operation of the nozzles during the application.
- i. Request CAC PUE inspections of all programs.
- j. **DO NOT** use any equipment that appears to be damaged.
- k. Discontinue use immediately in the event of an equipment malfunction.
- l. Staff are trained to clean up spills

3. Follow pesticide label directions, regulations, or internal procedures which ever is the most conservative.

- a. Read pesticide label.
- b. Staff is trained to properly apply pesticide.
- c. Be aware of any regulations or internal procedures prior to application.
- d. Ensure that treatment is consistent with Integrated Pest Management for the pest and crop/location.
- e. Use appropriate application methods and rates to minimize over application.
- f. Mix and load chemicals out of streamside areas, mix and load in areas where spills can be contained.
- g. Annual safety & endangered species training for all personnel mixing or applying pesticides.
- h. Annual search for MSDS and Label updates or revisions for materials used.

4. Apply chemicals only under favorable weather conditions.

- a. **DO NOT** make spray applications if wind speeds are less that 3 mile per hour or over 10 miles per hour (limited to 5 miles per hour for CTV program).
- b. Avoid spraying during stable (inversion) conditions (early morning and early evening) when there is little or no vertical mixing of the air (aerial CTV). These conditions generate concentrated drift clouds and increase the chance of drift fallout.

- c. Check weather service prior to application and **DO NOT** make application if rain (40% chance or higher) is forecast 48 hours prior to planned application.
 - d. Monitor wind direction and do not spray when there are sensitive crops/areas immediately downwind.
 - e. Keep records of air temperature, wind speed, and wind direction for aerial applications.
5. Follow integrated pest management and drift reduction techniques.
- a. Use buffer zones to protect sensitive areas, such as bodies of water, T & E “critical habitat” (as prescribed through Section 7 Consultations), and any other sensitive area.
 - b. Use of spotters to avoid accidents and to aide in identifying buffer zones.
 - c. Use low pressure application equipment.
 - d. Use “bait station” application methods when possible over full coverage spray applications to avoid run off and or effects to non-target species.
 - e. Conduct spot treatment when applicable.
 - f. Host plant manual removal.
 - g. Solarization.
 - h. Hold notices (quarantine).
6. Clean equipment and dispose of rinse water per label directions.
- a. Rinse equipment according to manufacturer’s label instructions.
 - b. Discharge rinse water only in areas that are part of the application site o at a certified waste treatment facility.
 - c. Dispose of surplus chemical and containers according to label instructions.
7. Product Storage
- a. All pesticides are stored at CDFA facilities in original containers.
 - b. All pesticides removed from original container for use are sealed within a service container
 - c. All service containers are sealed within a tool box inside the bed of a modified truck.
 - d. Tool boxes are supervised when not locked.

10.2 Aerial Treatment BMP’s

A standard 200 meter buffer zone (656 feet) for aerial treatments around water bodies has been established to greatly reduce the potential for contamination due to drift. Drift models are used to calculate the percent reduction in deposition at various distances from the edge of the treatment swath.

Table 1, extracted from a drift model, shows a reduction between 95.2 percent and 99.3 percent in deposition at 656 feet (200 meters) under treatment parameters utilized by the BCTVCP.

Table 1 from Attachment E- BCTVCP Aerial Drift & Terrestrial Residue Estimates

Chemical	Buffer zone (ft)	Initial Deposition (mg/cm ²)	Average Deposition	Percent Reduction in Deposition
Malathion	0	0.0042	-	-
	108.3	0.0007	83.3	
	328.1	0.0002	95.2	
	984.2	0.00003	99.3	
	2600.0	0.000002	99.9	

1. The prohibiting of direct application to bodies of water.
2. Utilization of drip less nozzles.
3. The BCTVCP utilizes an aerial contractor to perform aerial applications.
4. The BCTVCP verifies the calibration of the contractor’s spray equipment prior to the start of each treatment campaign.
5. The on-board flow control equipment is set to deliver 1 gallon mix per acre regardless of aircraft speed. To assure proper calibration, the size of each field treated is routinely compared to the gallons of mix applied to that field.
6. Aircraft pilot is in constant radio communication with Program personnel on the ground to verify wind speed and direction and location of non-target sites including water bodies, people, vehicles, buildings, etc.
7. Wind speed and direction is constantly monitored. Treatments are halted when average wind speed exceeds 5 mph.
8. Mixing and loading of aircraft is supervised by Program staff.
9. Applications halted with forecast of rain.

10.3 Ground-rig Foliar Treatment BMP’s

1. The prohibiting of direct application to bodies of water.
2. A minimum 30 foot buffer is established for water bodies.
3. Utilization of drip less nozzles or fan type nozzles at low psi.
4. The blower boom is directed to the precise angle needed to treat host plants.

5. The spray boom is equipped with electric on/off switch to treat precise target areas where host plants have developed.
6. Wind speed and direction is constantly monitored. Treatments are halted when average wind speed exceeds 5 mph. Spot treatments are made down wind from water bodies.
7. Ground-rig foliar treatments are operated at a low pressure, reducing the quantity of fine droplet particles.
8. Ground-rig spot treatments are performed by staff or private entities under contract
9. Applications are delayed in the event of rain.

10.4 Low Pressure Backpack Treatment BMP's

1. The prohibiting of direct application to bodies of water.
2. A 30 foot buffer is established for water bodies.
3. Utilization of driplless nozzles.
4. The nozzle is directed at the target to minimize drift
5. Wind speed and direction is constantly monitored. Treatments are halted when average wind speed exceeds 5 mph. Spot treatments are made down wind from water bodies.
6. Backpack sprayers are operated at a low pressure, reducing the quantity of fine droplet particles.
7. Backpack spot treatments are performed by trained staff.
8. Applications halted with forecast of rain.

10.5 Pesticide Training

Personnel are trained in the safe and proper mixing, loading and application of pesticides in compliance with both federal and state pesticide regulations and the product label. Each employee that handles pesticides must be trained to safely handle, transport, store, apply and dispose of the pesticide according to California Code of Regulations Title 3. Each employee attends a documented pesticide training session annually or prior to working with pesticides. In addition, employees that supervise the handling and application of pesticides must maintain a Qualified Applicator Certificate, issued by the California Department of Pesticide Regulation. To maintain a certificate, 20 hours of continuing education courses must be completed every two years.

10.6 Avoidance of Non-target Sites

Program personnel, through extensive field training and experience, become intimately acquainted with all physical characteristics of the terrain within their assigned districts.

This includes familiarity with non-target sites and situations such as human activity, livestock, water sources, endangered species locations and riparian zones.

The close familiarity with treatment areas and delimitation surveys performed during the period prior to the commencement of applications enables Program personnel to predict where non-target sites and situations are likely to occur. Maps provided by private parties, the BLM, National Resource Conservation Service and the U.S. Geological Survey are utilized to record the locations of target pest populations and the position of non-target sites. In addition, computerized field maps, created by the Program using GPS devices, aid field personnel and aerial applicators in identifying non-target areas within or adjacent to delimited treatment areas.

Prior to the treatment of each area, the aerial applicator is briefed and provided a map of non-target sites, treatment restrictions and potential hazards within areas to be treated. Program personnel performing applications, leave buffers around non-target sites within the treatment area.

10.7 Runoff and Drift Prevention

A great deal of time and money is invested in the survey, delimitation and treatments. Treatments are themselves expensive, and it is essential to maximize their effectiveness. Weather conditions within potential treatment areas are important factors in determining the effectiveness of control applications, and therefore weather conditions are carefully monitored and evaluated immediately before deciding whether to proceed with a treatment, and during the course of a treatment.

To reduce the potential for drift and runoff from the influences of weather the Program established the following procedures:

1. Prior to and during treatment activities, the local weather forecasts are consulted on a daily basis to ascertain the likelihood of rain and wind. During control operations, on site wind speed and direction is constantly monitored in the target area to eliminate drift into non-target areas. Aerial and ground-rig applications are curtailed when average wind speeds exceed 5 mph. Constant communication is maintained with aircraft to alert the pilot should weather conditions change. When necessary, buffer zones are enlarged to compensate for wind direction.
2. When plant cover is moist due to recent rain, dew, or frost, the program delays the application of pesticides until the plant cover is nearly dry.
3. When there is a high probability (80%) of local moderate rain, 0.25 inch or less within 24 hours, the Program staff closely monitor any possibility of precipitation within the treatment area with the goal to ensure applied materials sufficient time to dry (at least four hours) before any anticipated rainfall. Light showers of 0.10 inches or less appear to have little effect on the applied insecticide once it has dried on the plant surface.

4. If rainfall of more than a moderate amount (0.25 inch or more) is predicted locally within 48 hours, the Program will discontinue applications until predicted local conditions improve.

10.8 BMP's for T & E Species Habitat

1. California Red-legged Frog (CRLF), California Tiger Salamander (CTS)
 - a. An aerial buffer of at least a quarter (1/4) mile radius will be maintained around occupied CRLF or CTS habitat.
 - b. An aerial buffer of at least 200 meters will remain untreated near aquatic or riparian areas suitable as potential habitat for the CRLF and CTS.
2. Conservancy Fairy Shrimp, Longhorn Fairy Shrimp, Vernal Pool Fairy Shrimp, Vernal Pool Tadpole Shrimp
 - a. The program, with the assistance of federal and state resource agencies, will identify and inventory vernal pools known to be habitat for listed fairy shrimp within potential survey areas.
 - b. A treatment buffer of a ½ mile will be maintained around vernal pools.
 - c. A treatment buffer of 200 meters will be maintained around suspected vernal pools.
3. Giant Garter Snake (GGS)
 - a. An aerial or ground-rig buffer of at least 200 meters will remain untreated near aquatic or riparian areas suitable as potential habitat for the giant garter snake.
4. Valley Elderberry Longhorn Beetle
 - a. An aerial or ground-rig buffer of at least 200 meters will remain untreated near riparian areas suitable as potential habitat for elderberry.
 - b. During the time when adult beetles are active (March 15th through June 15th), a buffer of at least 1/4-mile radius will remain untreated near known occurrence of valley elderberry longhorn beetle as defined by the National Diversity Data Base or other available data base sources.
 - c. Personnel will be trained to recognize elderberry shrubs and potential beetle exit holes.
5. South-central California Coastal Steelhead
 - a. An aerial and ground-rig buffer of at least ¼ mile will remain untreated adjacent to Critical Habitat designated in the Salinas river and tributaries including agricultural drains and canals.
6. Yuma Clapper Rail (YCR) California Black Rail (CBR)
 - a. No aerial applications will be made within 300 yards of potential YCR or CBR habitat. Potential rail habitat is defined as any wetland, including agricultural drains with suitable vegetative cover.
 - b. Areas containing host material that are between 200 meters and 300 meters from potential YCR or CBR habitat will be treated with ground equipment only.
 - c. Areas containing host material that are less than 200 meters from potential YCR or CBR habitat may be treated only with equipment that can deliver the

pesticide specifically to the target plants.

d. Pesticides will not be applied within 5 miles of occupied YCR or CBR habitat if rain is expected within 72 hours of treatment.

7. Desert Pupfish

a. Applications will not be carried out within a ½ mile of occupied desert pupfish habitat.

b. Application within one mile of occupied or designated critical habitat boundaries will not take place when sustained wind velocities exceed 5 mph.

c. Application within five miles of designated critical habitat will be curtailed if weather conditions indicate a moderate to high possibility for precipitation within 72 hours of planned treatment.

10.9 Spill Contingency Plan

The objective of the plan is to:

- Minimize the risk of further pesticide exposure to people, animals, and the environment.
- Provide a list for notifying federal, state, and local government officials of the size and details of the spills.
- Provide clean up of small spills (50 gallons or less) and proper disposal of residual materials.

10.9.1 Emergency Procedures

Use common sense in determining the appropriate action in the event of an accidental crash of a spray rig, tanker, or aircraft.

Spill Involving Injury: If a spill involves personal injury, call an ambulance.

The health and well being of persons in and around the area is the most immediate concern. If someone was exposed to pesticides remove them to a safe location. Remove clothing and wash contaminated skin with soap and water. Do not move a seriously injured person unless it is absolutely essential due to risk of further injury. Do not leave injured or incapacitated persons until proper medical assistance arrives. A pesticide label and/or safety data sheet should accompany exposed people to the hospital.

Spill Involving Fire: If a fire hazard exists, call the fire department and notify them of the presence of pesticides. Eliminate all sources of ignition (electric motors, gasoline engines or smoking) to prevent the threat of fire or explosion.

Spill on Highway: If the spill occurs on the highway, contact the California Highway Patrol through (911).

Spill Off-road: If the spill occurs off-road, call local police or county sheriff.

Punctured Tank: If a tank has a puncture, stop the leak and contain the spill.

10.9.2 Minor Spills, 50 Gallons or Less

1. Wear rubber boots, coveralls, rubber gloves and eye protection.
2. Confine the leak or spill to the smallest area possible by using natural terrain, soil or absorbent material.
3. Shovel contaminated material into a leak proof container.
4. Do not hose down area.
5. Work carefully and safely; do not hurry.
6. Dispose of contaminated material the same manner as with excess pesticides or hazardous wastes.

10.9.3 Major Spills (50 Gallons or More)

1. Follow steps listed under minor spills.
2. If the spill is too big, or uncertainty exists as to the appropriate action notify, the Chemical Transportation Emergency Center at 1-800-424-9300.
3. If the spill occurs on the highway, call the California Highway Patrol through (911).
4. If the spill occurs off-road, call local police or county sheriff.

10.9.4 Notification List

Depending of circumstances, it may be necessary to notify and seek assistance from various agencies.

1. The California Department of Food and Agriculture, Division of Plant Health and Pest Prevention.
2. California Highway Patrol, if accident is on the highway. Contact local police or county sheriff if the accident is not on a State Highway.
3. County Agricultural Commissioner's office.
4. California Emergency Management Agency 1-800-852-7550 or public number (916) 845-8911.
5. State Department of Water Resources and the California Department of Fish and Game; if the spill threatens or contaminates water.
6. The Bureau of Land Management, local resource office, if the spill occurs on BLM administered lands.

7. The Federal Aviation Administration, if the spill involves an aircraft crash.
8. Local county environmental health office.

10.9.5 Safety and Cleanup Materials

The following is a checklist of safety and cleanup materials that accompany mixing-loading vehicles during treatment activities.

1. Safety

- First aid kit
- Fire extinguisher-516, type A-B-C
- Goggles

2. Clean Up

- One shovel
- Large heavy-duty plastic bags
- Rubber boots
- Disposable coveralls
- Water
- Rubber gloves
- Broom and dust pan
- Liquid detergent
- Several bags of "kitty litter" or other absorbent materials.

10.9.6 Decontamination

Surfaces such as paved surfaces should be decontaminated. Contaminated material must be shoveled into a leak-proof metal drum for final disposal.

10.9.7 Disposal

All materials that have been contaminated by spillage, or exposed to large volumes of pesticides including cloth, soil and wood cannot be decontaminated and must be disposed of in the same manner as with excess pesticides. Contaminated absorbent material and materials that cannot be decontaminated will be stored in a leak-proof container and disposed in a Class I dump.

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