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Malaysian Fruit Fly Cooperative Eradication Program

Los Angeles County, California

Environmental Assessment
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I. Need for the Proposal

Malaysian fruit fly (*Bactrocera latifrons*) (Hendel) (MALFF) is an economically important insect pest of plants of the nightshade family (Solanaceae). The fly is a native of south and southeast Asia. MALFF has been found in the west African countries of Tanzania and Kenya, and was first detected in Hawaii in 1983. Also known as the Solanum or Solanaceous fruit fly, MALFF is primarily associated with wild and cultivated crops such as peppers, tomatoes, eggplant, poha, and cucurbit species (NAPIS, 2016; UHI, 2016; APHIS, 1993). Prohibited fruit and vegetable material, transported by tourists or sent through the mail, is considered a major pathway for MALFF to enter the mainland United States (CABI, 2016; Kim, 1992; Dekker and Messing, n.d.).

MALFF development from egg to sexually mature adult is temperature-dependent. MALFF life stages are prolonged by cooler temperatures and other restrictive factors (type of food, lack of food, etc.). The current life-cycle model in use by the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) and cooperators posit a threshold temperature of 48.6 °F (9.2 °C) for development from one MALFF life stage to the next (APHIS, 2016a).

This species tends to lay small numbers of eggs over a long time period. One female MALFF can lay up to 587 eggs in her lifetime; females tend to deposit eggs singly rather than in clutches, as with other fruit flies. Generally, one egg is deposited per ovipositional puncture in host fruit. Historically, the MALFF maintains low-level populations with a patchy distribution. In Hawaii it appears to be widespread but not in great numbers (APHIS, 1993).

On January 8, 2016, two female MALFF were collected from a McPhail trap in an avocado tree in the Westchester region of Los Angeles, California (CDFA, 2016a). This is the first detection of MALFF since the July 21, 1998 detection of 1 adult male MALFF about 8 miles to the west, in South Gate, California (pers. comm., Mulally to Shalom, 01/11/2016; CDFA, 1998). When at least two adult MALFF are found within a 3-mile radius within one estimated MALFF life cycle, a regulatory response is required. The MALFF detection triggered Federal participation in a new pest quarantine and eradication program for Los Angeles County.

The California Department of Food and Agriculture (CDFA) and APHIS and are proposing a cooperative program to eradicate the MALFF infestation, and to prevent the spread of MALFF to noninfested areas of

the United States. (See map of the proposed program area[1] in appendix A.) APHIS' authority for cooperation in the program is the Plant Protection Act (Title 4 of the Agricultural Risk Protection Act of 2000), which authorizes the Secretary of Agriculture to carry out operations to eradicate insect pests, and to use emergency measures to prevent the dissemination of plant pests new to, or not widely distributed throughout, the United States.

Working cooperatively with States, APHIS identifies and eradicates MALFF infestations. APHIS has cooperated with the California, Florida, Puerto Rico, and Texas Departments of Agriculture on fruit fly eradication programs since 1984. To date, every pest fruit fly population targeted by APHIS' cooperative programs was successfully eradicated.

The State of California initiates *Bactrocera* spp. delimitation and eradication programs in locations where the types and number of detections are not yet triggering quarantine regulatory actions. The State of California intensifies surveys for *Bactrocera* spp. in the neighborhood of each confirmed detection. Monitoring for *Bactrocera* spp. continues throughout all susceptible counties of California.

Many MALFF-host plant species are grown in Los Angeles County and adjacent regions, which increases the potential environmental impact of the current infestations. The berries, fruits, nuts, and vegetables produced by more than 50 species of concern are vulnerable to MALFF (pers. comm., Stewart to Shalom, 02/01/2016). Numerous residential and community gardens cultivate MALFF-host plants inside the program area. At least 15 retail garden centers and commercial plant nurseries operate within 4 miles of the detection site (Google, 2016). Commercial production of crops in the Solanaceous family begins 35 to 40 miles from the Westchester detection site (APHIS, 2016b).

APHIS and its cooperating partners have discussed and comprehensively analyzed alternatives for exotic fruit fly eradication since 1984. APHIS first evaluated the environmental impacts of fruit fly control technologies in the *Fruit Fly Cooperative Control Program, Final Environmental Impact Statement—2001* (EIS1) (APHIS, 2001). APHIS reexamined its findings and introduced an additional tool for eradication in the *Use of Genetically Engineered Fruit Fly and Pink Bollworm in APHIS Plant Pest Control Programs, Final Environmental Impact Statement—2008* (EIS2) (APHIS, 2008). Both EIS1 and EIS2 consider fruit fly risks and mitigations at the programmatic level. This case-specific environmental assessment (EA) incorporates the findings of EIS1 and EIS2 by reference.

[1] For the purposes of this document, "program area" refers to everywhere inside the quarantine boundary, and includes both eradication treatment and regulatory control zones.

This EA analyzes the environmental consequences of alternatives considered for MALFF eradication and analyzes, from a site-specific perspective, environmental issues relevant to this particular program. The eradication measures being considered for this program were discussed and comprehensively analyzed within APHIS' fruit fly chemical risk appraisals[2] (APHIS, 2016c, 2014, 2003, 1999, 1998a, and 1998b). These documents are incorporated by reference and summarized within this EA. Environmental documentation for APHIS fruit fly control programs may be viewed online via the following links: APHIS fruit fly control program environmental documentation and APHIS GE control applications for plant health.

II. Alternatives

Alternatives considered for this proposed program include (A) no Federal action, and (B) the preferred alternative, eradication using an integrated pest management (IPM) approach. Component techniques of alternative B include the use of regulatory controls, high density trapping, host larval survey, and chemical pesticides to facilitate the timely elimination of the current MALFF infestation. These alternatives and their component techniques were discussed and comprehensively analyzed within EIS1 and EIS2 (APHIS, 2001 and 2008), and are incorporated by reference and summarized within this EA.

A. No Action

Under the no action alternative, there would be no Federal efforts to eradicate MALFF or restrict expansion of the MALFF population from the infested area. In the absence of a Federal effort, quarantine and control would remain with the State and local governments, grower groups, and individuals. Expansion of the infestation would be influenced by any controls exerted over it, by the proximity of host plants, and by climatic conditions.

"No treatment" might be the only reasonable alternative for some sensitive sites. In such cases, lack of treatment could lead to a continuing and expanding infestation. An expansion of the infestation would likely result in substantial economic losses to growers in the United States, as well as the loss of U.S. export agricultural markets.

Under the no action alternative, APHIS would continue cooperative practices to support the CDFA detection trapping program and research.

[2] The word "appraisal" is used in this EA when referring to risk assessments and risk evaluations as a group.

(For details about the California State program to control *Bactrocera* spp. and other exotic fruit flies please use the following link: https://www.cdfa.ca.gov/plant/PDEP/treatment/index.html.)

B. Eradication Using an IPM Approach (Preferred Alternative)

APHIS' preferred alternative for the Westchester MALFF program is eradication using an IPM approach. This alternative combines quarantine and commodity certification with eradication treatments, and is designed to be biologically effective while minimizing impacts to the environment, public intrusiveness, and program operating costs. Successful eradication of other *Bactrocera* spp. in Los Angeles County, using a similar IPM strategy, was declared as recently as November 2015 (APHIS, 2015).

CDFA (2016b) determined there are no cultural or biological control methods available that effectively eradicate MALFF while allowing CDFA to meet its statutory obligations. APHIS concurs with its assessment. Eradication efforts may therefore employ any or a combination of the following:

- no action,
- regulatory quarantine treatment and control of host materials and regulated articles,
- host survey for evidence of breeding MALFF,
- host removal,
- eradication chemical applications, and
- mass trapping to delimit the infestation and monitor post-treatment MALFF populations.

The quarantine area for the MALFF infestation includes those portions of Los Angeles County which fall within 4.5 miles around each property on which a MALFF has been detected (see map in appendix A). The current boundary may be expanded to include other properties if additional adult flies or life stages are found.

Bactrocera spp. can produce many generations in 1 year (Weeks et al., 2012). The MALFF progresses through a four-stage life cycle: egg, larva, pupa, and adult. APHIS' cooperative programs to eradicate exotic fruit fly infestations in California use established procedures and treatments designed with the species' life stages in mind.

1. Delimitation

The program will deploy McPhail glass traps with yeast as a food bait, and Jackson sticky traps with a pheromone lure that targets male MALFF(see figure 1). These are placed in varying densities throughout the program area to delimit the infestation and to monitor post-treatment fly populations. These traps are serviced on a regular schedule for a period equal to three generations beyond the date of the last fly find (McQuate, 2016; APHIS, 1993).

Figure 1. McPhail trap, above left; Jackson trap in an orange tree, above right. (Sources: https://pigeonchess.files.wordpress.com/2015/05/mcphail.jpg and https://www.sccgov.org/sites/ag/inspections/PublishingImages/Jackson_trap[1].gif)

Jackson traps consist of a triangle-shaped paper board with a sticky inner liner. The adhesive in the liner is a non-toxic compound that captures and holds insects attracted to the pheromone lure. The lure combines two attractants including alpha-ionol and cade oil. Alpha-ionol is a flavoring compound used in food, but is also a component of a pheromone produced by male MALFF (Nishida et al, 2009). Cade oil, also known as juniper tar oil, is a synergist that increases the attractiveness of alpha-ionol to SFF. Alpha-ionol is applied to one wick in the trap (2 milliliters (mL)), while cade oil is applied to a separate wick (1 mL). The wicks are placed in separate plastic baskets inside a Jackson trap. After about 8 weeks, the wicks are about 50 percent as attractive and should be replaced (McQuate, 2016).

Jackson traps will be placed within the healthy foliage of host plants, with preference to host plants with ripe or near-ripe fruits in locations not generally accessible by the public. Traps are typically monitored weekly to check for flies, and replace the sticky liner which may become contaminated with trash and other objects. The interior of the trap contains the attractant which consists of a combination of a pheromone lure and a wood distillate, alpha-ionol and cade oil, respectively. Both chemicals volatilize into the atmosphere and serve as an attractant for the MALFF.

2. Treatment

Larval surveys (via fruit sampling) are conducted 200 meters around a site where MALFF is detected and on adjacent properties. Where a MALFF larva or pupa is discovered, fruit from the infested property and up to 100 meters around the find site is removed and taken for disposal

under regulatory compliance (APHIS, 2016b).

Should evidence of a breeding MALFF population be confirmed, a targeted, ground-based foliar bait treatment also will be applied. Host trees and plants within a 200-meter radius of the find site are treated with highly localized spray that consists of an organic formulation of the pesticide spinosad and protein hydrolysate, a food bait (APHIS, 2016b). Protein hydrolysate is a common attractant used in fruit fly treatments, increasing the efficacy of chemical applications, and reducing the area of pesticide treatments needed for control (Prokopy et al., 1992). Pest fruit flies are attracted to the protein hydrolysate, which can be derived from plants or yeast, where they then receive a lethal dose of the pesticide that is mixed with the attractant.

Evidence of a breeding population (immature life stages, mated female MALFF, or multiple adult captures within a certain distance and timeframe) leads to removal of host fruit from all known infested and adjacent properties within a 100-meter radius of each detection site (APHIS, 2016b).

A quarantine boundary will be established to ensure any host material that leaves the program area is free of MALFF. Host material may be treated in enclosed areas or containers by cold treatment, irradiation, vapor heat treatment, or fumigation with methyl bromide (MB) (APHIS, 2001 and 2004). Should the MALFF quarantine spread to federally protected historical sites, wilderness, or tribal lands, program treatments will be restricted to those approved for the type of site in question.

Growers will be able to move their harvested fruit out of the quarantined area, under a limited permit, to enclosed facilities for processing into juice or for packing. Growers of host fruits may also treat their production areas using approved program treatments (field and premise treatment) and, under a compliance agreement, have crops certified for movement to packing sheds.

Before taking action, program officials are to inform the public and impacted industry via press releases, meetings, and other forms of communication appropriate for the recipients. Residents whose property will be treated or whose fruit will be removed are to be notified at least 48 hours in advance. Notification letters will be sent to trading partners as they are identified. Given the potential impacts to commercial production, grove owners, packing sheds, nurseries, vendors, and other industry operations handling MALFF-host material will be notified of the MALFF quarantine location and treatment schedule.

For more detailed information regarding the alternatives considered for MALFF control and their component methods, refer to the previously mentioned fruit fly risk appraisals (APHIS, 2016c, 2014, 2003, 1999, 1998a, and 1998b).

III. Potential Environmental Consequences

This EA analyzes the potential environmental consequences of alternatives considered for MALFF control. The site-specific characteristics of the MALFF program area were considered with respect to the preferred alternative's potential to affect human health, nontarget species (including threatened and endangered species), and environmental quality. Potentially sensitive sites were identified, considered, and accommodated through special selection of eradication methods and use of specific mitigation measures. APHIS will conduct any necessary additional environmental analyses if MALFF detections lead to an expansion of the program boundary.

A. No Action

Lack of Federal action would place the burden of eradication on the State of California. It is reasonable to expect that MALFF populations not controlled by programs targeting MALFF or other *Bactrocera* spp. would continue to expand in size and area, leading to increased quarantine efforts. Any failure of those efforts could lead to the establishment of this pest within the conterminous United States. If eradication attempts are unsuccessful, APHIS expects substantial economic losses to growers in the United States. Crop loss is likely to lead to commodity scarcity, higher costs for U.S. consumers, and the temporary or permanent loss of valuable U.S. export markets.

The current MALFF infestation is located inside an active quarantine for oriental fruit fly (OFF), another species of *Bactrocera*. Traps and chemical treatments employed to eradicate OFF and other *Bactrocera* spp. in Los Angeles County may be of limited help to control expansion of the MALFF population; MALFF is attracted to similar food baits but is attracted to different pheromone lures than those employed for programs targeting other *Bactrocera* spp. (McQuate and Peck, 2001; Dekker and Messing, n.d.).

B. Preferred Alternative

This section considers to what extent implementation of the preferred alternative might affect the human environment. It begins with a brief description of the physical aspects of the region and its residents, both within and near the proposed program area. The preferred alternative, eradication using an IPM approach, may employ any or a combination of the following:

- no action,
- regulatory quarantine treatment and movement control of host materials and regulated articles,
- host survey for evidence of breeding MALFF,
- host removal,
- eradication chemical applications (foliar spray spot treatment), and
- mass trapping using pheromone lure or food bait as an attractant.

Alpha-ionol has been identified as a male lure for MALFF. By attracting adult males to field traps or baits, the lure can provide a means for detecting, surveying, monitoring, and controlling MALFF. Cade oil, an essential oil produced by destructive distillation of juniper (*Juniperus oxycedrus* L.) twigs, synergizes the attraction of alpha-ionol to male MALFF, tripling the catch rate compared to traps baited with alpha-ionol alone. Research has shown that male MALFF are equally attracted to eugenol, methyl eugenol, and cade oil when each is presented alone. However, synergistic enhancement of alpha-ionol's attraction occurs with the addition of eugenol or cade oil, and not with the addition of methyl eugenol. Based on the selective nature and targeted application of the lure, adverse impacts are expected to be localized and transient for sensitive taxa populations (APHIS, 2016c; McQuate et al., 2006; McQuate and Peck, 2001; ARS, 2000).

Pheromone lures, such as alpha-ionol and cade oil, are expected to present little or no risk to human health or to the general environment, based on their high target specificity and low exposure to humans and the environment (APHIS, 2016c). Review of the treatment protocols by CDFA and APHIS indicates the Jackson traps and MALFF lure formulation are not likely to cause adverse environmental or human health risks (APHIS, 2016c, 2014, 2003, 1999, 1998a, and 1998b). Therefore, the discussion in this section will focus on the other eradication measures of the preferred alternative.

1. Affected Environment

a. Land Characteristics and Demographics

Los Angeles County is located in southwestern California. The county is bordered by the Pacific Ocean and by Ventura, Kern, San Bernardino, and Orange Counties. Los Angeles County covers over 4,084 square miles, and includes two offshore islands (LA County, 2016a). A 2012 census of the county reported 91,689 acres in agricultural production, and crop sales of more than $174 million. MALFF-host commodities produced include fruits, vegetables, and nursery stock (NASS, 2014).

At present, the MALFF program area covers about 74 square miles of residential land in the greater Los Angeles metropolitan area (CDFA, 2016c; APHIS, 2016b). Los Angeles County is highly developed, and has the highest recorded population of any county in the United States—over 10 million residents. Tourism is the county's third largest industry, attracting millions of visitors annually (LA County, 2016b). The county forms part of the Los Angeles–Long Beach–Anaheim, California Metro Area. Westchester is a neighborhood in the city of Los Angeles that adjoins the city of Inglewood. Both are in the South Bay region of Los Angeles County (LA Times, 2016). Westchester occupies over 10 square miles—much of which belongs to Los Angeles International Airport—and estimated a population of 43,005 in 2008. Inglewood occupies over 9 square miles, and reported a population of 109,673 in 2010 (USCB, 2016a).

The State of California continues to experience adverse impacts from multiple years of exceptional drought broken, to a limited extent, by storms bearing snow and unusually heavy rainfall (Fuchs, 2016). Los Angeles County normally enjoys a temperate climate with summer weather that is moderate to hot, and mild winters. The average annual temperature for the region is 70 °F, and its average annual rainfall is normally 10 to 14 inches.

Major roadways in the immediate program area include Interstate Routes 10, 405, 105 and 110, and California Highways 1 and 90. The MALFF infestation currently is concentrated in a residential neighborhood. Schools, municipal parks, biking and hiking trails, golf courses, and other public and private recreational facilities also occur within or near the program area. MALFF-host vegetation in the proposed program area occurs on both private and public property. Table 1 shows distances from the center of the program area to sites of potential concern.

Table 1. Distance from Core of Detection to Certain Land Sites.*

Designated Land Use	Distance Rounded to Nearest Tenth of a Mile
Airports	• Los Angeles International, 2.8 • Jack Northrup Field/Hawthorne Municipal, 4.3 • Santa Monica Municipal, 5.1
Local, State and Federal Lands	• 5 within proposed treatment area • Seal Beach National Wildlife Refuge, 27.0
Nearest Historic Sites	• 1 registered site within proposed treatment area • 22 registered sites within proposed quarantine
Nearest International Seaports	• Marina Del Rey Harbor, 3.0 • Los Angeles Harbor, 18.0
Nearest Native American Reservation	• San Manual Reservation, 77.0
Organic Production and Farmers Markets	• 3 organic farms within proposed treatment area • 2 farmers markets within proposed treatment area • 8 farmers markets within proposed quarantine boundary
Schools and Academic Institutions	• 16 within proposed treatment area • 258 within proposed quarantine
U.S./Mexico Border	• 130.0

* See appendix B for data sources.

b. Water Resources

Los Angeles County obtains electric power, irrigation, and drinking water from various local and imported resources. The regional water supply is furnished by local streams and reservoirs, ground water, the Colorado River, and State Water Project reservoirs (WEF, 2014). Water located beneath the proposed treatment area for the MALFF program, or surface water that drains off of it, may enter the Ballona Creek Watershed. Three additional watersheds underlie the program area, including the Upper Dominguez Channel, Lower Dominguez Channel, and Santa Monica Beach-Frontal Santa Monica Bay. Open water, woody wetland, and herbaceous wetland occupy about 112 acres of the proposed program area. (See appendix B for data sources.) Table 2 shows the distance between the current MALFF program and other water resources.

Table 2. Distance from Core of Detection to Certain Water Resources.*

Type of Resource	Distance Rounded to Nearest Tenth of a Mile
Water Bodies	• Ballona Creek, 2.1 • Baldwin Hills Reservoir, 2.4 • Flood Control Channel, 3.7 • Marina del Rey, 3.7 • Del Rey Lagoon, 4.3 • Pacific Ocean, 4.3 • Grand Canal, 4.5
Impaired Waterbodies Within 5 Miles	• CAB4051700019990921120356 • CAR4051200019980918161017 • CAR4051300019980918142302 • CAR4051300019980918144753 • CAR4051300019990203132149 • CAT4051700020000301101951

* See appendix B for data sources.

Severe drought conditions between 2012 and 2016 led to unusual surface and ground water loss in California. Both short-term (i.e., less than 6 months' duration) and long-term adverse impacts are predicted for California's agriculture, ecology, and hydrology (Fuchs, 2016). The State implemented water conservation programs, and continues to seek additional ways to reduce water use.

The Governor of California declared a drought state of emergency in January 2014. On April 1, 2015, the State Water Resource Control Board (SWB) was ordered to implement mandatory water reductions in cities and towns across California to reduce potable urban water usage by 25 percent statewide. Cities with higher per capita use are facing mandatory water use reductions of up to 36 percent, based on their usage in 2013. The SWB required these areas to achieve proportionally greater reductions than those with lower use to help reduce statewide water consumption by 25 percent (LA County, 2016c).

In 1985, California enacted legislation to protect the potability of its ground water; potential contaminants are identified and pesticide use restrictions are implemented for vulnerable areas (State of California, 2013). Ongoing surveys of California's waters continue to show

substantial pollutant and toxicity levels; the percentage increases, however, may reflect more thorough site assessment rather than increasing pesticide discharge and runoff (EPA, 2012).

The MALFF eradication program calls for highly localized chemical applications in designated properties, and no-spray buffers around all sensitive areas, including all water bodies. This method of application is designed to minimize the potential for introduction of program chemicals to local water resources.

2. Human Health

Human health risks associated with chemical use include the fate of the chemicals in the environment, their toxicity to humans, and their exposure to humans. The principal concerns for human health, arising from implementation of the preferred alternative, are related to the program use of chemicals including a MALFF pheromone attractant, food baits, spinosad, and MB.

Exposure to program pesticides can vary, depending on the pesticide and the use pattern. The MALFF eradication program will initially employ food-bait traps and pheromone-lure sticky traps, and ground-based targeted applications of spinosad bait.

Alpha-ionol is a food additive that has low toxicity to mammals, and is recognized as safe by regulatory agencies in the United States and Europe. Mammalian toxicity studies show that alpha-ionol is considered practically nontoxic, with the acute oral median lethal dose (LD50) in rats exceeding 5,000 milligrams per kilogram (mg/kg) and the acute dermal LD50 in rabbits exceeding 5,000 mg/kg. The safety data sheet for alpha-ionol states that direct contact with eyes and prolonged skin contact may cause temporary irritation. The product is not expected to have adverse effects from inhalation and skin contact, to be a respiratory sensitizer, or to cause skin sensitization. Alpha-ionol is not considered a carcinogen, mutagen, or a reproductive or developmental toxicant at relevant doses (APHIS, 2016c).

Cade oil, which acts as the synergist for alpha-ionol, has a variety of uses including as a fragrance and in some botanical medicines. Mammalian toxicity studies show that cade oil is considered practically nontoxic with acute oral LD50 values in rats of 8,014 mg/kg. The acute dermal toxicity is also practically nontoxic with LD50 values in rabbits exceeding 5,000 mg/kg. Juniper tar oil is not listed as a carcinogen. No data is available for mutagenicity, reproductive, or development effects. Cade oil potential health effects include respiratory tract irritation (inhalation), skin and eye irritation (dermal and eye contact), gastrointestinal irritation and renal damage (ingestion). These effects have been shown to occur at doses, or through exposure pathways, that

would not be expected to occur in the MALFF monitoring program (APHIS, 2016c).

The potential for exposure to the attractants in the traps will be greatest for workers who assemble, place, and service the Jackson traps. Exposure can occur through dermal contact, incidental ingestion, and inhalation. Dermal contact and incidental ingestion exposure and risk can be minimized by use of personal protective equipment (such as gloves and eye protection), combined with good hygiene practices (such as washing hands before eating). Because the traps are in well-ventilated outdoor environments, the potential for inhalation exposure of the concentrated volatile lures is minimal for workers and, in particular, the general public (APHIS, 2016c).

The general public is unlikely to touch the traps because of their placement. Further, the risks to humans from the use of alpha-ionol and cade oil as lures in the fruit fly eradication program are expected to be low, based on the volatility of both compounds, their low acute mammalian toxicities, and low potential for exposure (APHIS, 2016c).

Spinosad is toxic to specific invertebrate species, but is considered to be nontoxic to humans and other animals. If spinosad bait application is restricted to target surfaces and made in accordance with the Environmental Protection Agency's (EPA) label instructions, effects to human health and the environment are expected to be incrementally negligible.

Limited data exists regarding the toxicity of food baits such as yeast and protein hydrolysate; the available data suggests low acute toxicity to human health. Based on their targeted methods of application, the use of yeast or protein hydrolysate as bait in the MALFF program is expected to present a low probability of exposure and, therefore, a low health risk to workers and the general public.

Should treatment by MB fumigation be indicated, adherence to EPA label restrictions and application in enclosed areas or containers will protect applicators and the general public from risk of exposure to the fumigant (APHIS, 2007 and 2002).

The analyses and data of EIS1 and EIS2 and the associated human health risk appraisals indicate exposures to pesticides from normal program operations are not likely to result in substantial adverse human health effects. (Refer to EIS1 and EIS2 (APHIS, 2001 and 2008) and the human health risk assessments (APHIS, 2014, 1999 and 1998a) for more detailed information relative to human health risks.)

Another mitigation measure designed to minimize exposure of humans to program pesticides is the requirement for public notification. Information concerning the MALFF eradication project will be shared via press releases and media announcements to the general public. Either the county agricultural commissioner or public information officer will serve as the primary contact to the media. Any resident with property to be treated will be notified in writing at least 48 hours prior to treatment. Following the treatment, notices will be left with homeowners detailing precautions to take, and safe intervals of time that should elapse before harvesting fruit on the property. Treatments are repeated at 7- to 14-day intervals for two life cycles of the fly.

APHIS recognizes a small portion of the population may have greater than usual sensitivity to certain chemicals, and program treatments may pose higher risk for these individuals. Special communication strategies to mitigate this risk are discussed in detail in appendix C of EIS1 (APHIS, 2001).

Trap placement and chemical applications may be rescheduled if strong winds or rainfall is forecast for the program area. Site inspections will continue to ensure existing program treatments are not likely to affect humans. The destruction or relocation of traps and treatments due to weather events is unlikely to result in adverse impacts to the human environment because the potential pesticide toxicity is reduced by dilution during the storm's water and air movement.

Of the two alternatives considered, a well-coordinated eradication program using IPM technologies results in the least use of chemical pesticides, and minimizes their potential to adversely affect human health. The no action alternative is not expected to eliminate MALFF as readily or as effectively as the preferred alternative. Over a protracted period of no action, there would likely be broader and more widespread use of pesticides by homeowners and commercial growers, with correspondingly greater potential for adverse impacts to human health.

3. Other Aspects of the Human Environment

In this section APHIS summarizes its findings on potential environmental impacts of implementing the action alternatives on historic sites and minority and/or low-income communities in the proposed quarantine program area, and tribal interactions.

In the proposed MALFF program, APHIS intends to use bait treatments and fruit stripping by hand. Workers will deploy McPhail and Jackson traps in the foliage of MALFF-host species in the program area where few people are likely to notice them. APHIS will inspect produce at farmer's markets; confiscation and destruction of infested fruit may occur. APHIS will reduce pesticide release to areas frequented by the public through modifications of

normal program activities. APHIS will not conduct aerial chemical applications; spraying will be ground-based to directly target foliage. This process will include hand spraying with a backpack sprayer.

The National Historic Preservation Act of 1966, as amended (16 U.S. Code § 470 et seq.), requires Federal agencies to consider the impact on properties included in, or eligible for inclusion in, the National Register of Historic Places (36 CFR §§ 63 and 800). APHIS determined its fruit fly eradication programs are undertakings with no potential to affect historic properties. When the historic place includes landscape plants that may be hosts, program activities are likely to enhance the quality of the site even though they do not address any historic aspects. There are more than 500 registered historic sites in Los Angeles County, and only one is reported within the treatment area (Centinela Adobe) (State of California, 2016). There are 22 other sites within the quarantine area, including 6 branches of the Los Angeles public library system. All of these historic sites are either publically or privately owned properties consisting of buildings with associated landscaping (State of California, 2016). The vast majority of MALFF hosts are in the Solanaceae plant family (CABI, 2016), but aside from ornamental peppers, relatively few members of this family are routinely used as landscape ornamentals.

In general, APHIS' fruit fly eradication programs are compatible with the preservation of historic sites because control activities are inconspicuously integrated into the site, do not disturb the ground, do not affect human-made structures, and APHIS restricts program treatments and activities to an as-needed basis. APHIS is consulting with the California State Historic Preservation Office on the no-effect determination for this MALFF eradication program in Los Angeles County. APHIS will notify the appropriate individuals if it discovers any archaeological resources.

Federal agencies identify and address disproportionately high and adverse human health or environmental effects of its proposed activities, as described in Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. Using 2010 U.S. Census Bureau estimates, approximately 44 percent of the population in the county identified themselves as speaking a language other than English at home; the high school graduation rate exceeded 81 percent (USCB, 2016b). In Los Angeles County, the population reporting their race as Hispanic was about 38 percent, Asian as about 13 percent, and Black as about 6 percent. The median household income in the county from 2010-2014 was reported as $61,489 (adjusted for inflation to 2014 dollars) (USCB, 2016b). Using data from 2008-2012 from an area 6.0 miles in radius from the location of the initial MALFF detection, the population in this area was approximately 41 percent white, 41 percent Hispanic, 28 percent black, and 6 percent Asian. In this area, 78 percent of the population reported they spoke either only English, or speak English "very well" when it is not the language spoken in

their home. Approximately 77 percent of the population graduated high school and/or completed some college studies, and more than one-third of the households reported income exceeding $75,000 each year (USCB, 2016c). The educational level and English fluency associated with this area does not suggest providing advance notice of program activities, and potential exposure hazards in a variety of languages will reach substantially more members of the local population. For these reasons, the treatments or their methods of application are not likely to disproportionately adversely affect minority segments of the population.

Federal agencies comply with Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. The preferred alternative does not pose disproportionate adverse effects to children because trap maintenance and pesticide applications will not occur when students are in the immediate area. There are approximately 15 schools within the treatment core (EPA, 2016a). Exposure to applied products by children is negligible based on the program's application methods and the product formulations.

The Executive Order 13175, *Consultation and Coordination with Indian Tribal Governments*, calls for agency communication and collaboration with tribal officials when proposed Federal actions have potential tribal implications. Using the Native American Graves Protection and Repatriation Act Online Databases, APHIS finds the nearest Federal Indian Reservation is more than 77 miles from the treatment area, and there are no federally registered Native American Tribes residing in Los Angeles County (NPS, 2016; 25 U.S. Code § 3001 et seq.). Ceded lands near the area are not from federally recognized tribes; only federally recognized tribes are able to participate in Section 106 consultation. Individual tribal members living within the quarantine zone will not be disproportionately affected in comparison to other individuals in the area because workers place traps beyond the unassisted reach of most humans, and conducts highly targeted spraying of foliar canopy. The proposed action will not disturb the ground, so it is unlikely to affect Native American sites or artifacts. For these reasons, APHIS does not expect program activities to directly affect tribal members. If fruit fly detections warrant expansion of the program area onto tribal lands, program officials will initiate consultation.

A lack of Federal action could result in adverse economic and health impacts on affected producers and consumers. Adverse impacts may include decreased harvests; higher consumer prices; loss of property, market share, or local employment; reduced nutritional options; or compromised mental and physical health. APHIS expects these indirect impacts to occur to a lesser extent under the quarantine and commodity certification alternative. APHIS does not anticipate adverse impacts as a result of carrying out the preferred alternative's surveillance activities, trapping, or program chemical applications.

4. Nontarget Species

The principal concerns for nontarget species, including threatened and endangered species, relate to potential harm from the use of spinosad to eradicate MALFF populations. Paralleling human health risk, the risk to nontarget species is related to the spinosad's fate in the environment, its toxicity, and exposure to nontarget species. APHIS' MALFF program is designed to prevent the introduction of spinosad into nontarget areas. Spinosad toxicity to terrestrial invertebrates is variable based on the available toxicity data for pests, pollinators, and biocontrol agents (APHIS, 2014).

In general, a well-coordinated MALFF eradication program using IPM technologies would result in the least use of chemical pesticides, overall, with minimal adverse impacts to nontarget species. The no action alternative is less likely to be effective at eliminating MALFF, and would be expected to result in broader and more widespread use of pesticides by homeowners and commercial growers, with a correspondingly greater potential for adverse impacts.

Trap placement and chemical applications may be rescheduled if strong winds and rainstorms are forecast for the program area. Site inspections will continue to ensure existing program treatments are not likely to affect nontarget organisms. The destruction or relocation of traps and treatments due to weather events is unlikely to result in adverse impacts to animal species and their habitats, as the potential toxicity should be greatly reduced by dilution of the program materials in water and air.

The eradication program applies a targeted, ground-based foliar bait treatment when evidence of a breeding MALFF population is detected. For this, host trees and plants within a 200-meter radius of the OFF find site are treated with a highly localized spray that consists of an organic formulation of the pesticide spinosad combined with protein hydrolysate bait.

The pesticide spinosad has low to moderate toxicity to wild mammals and birds. Spinosad toxicity to fish is moderate, while aquatic invertebrates are more sensitive in acute and chronic exposures. Toxicity to terrestrial invertebrates is variable; however, spinosad is considered highly toxic to honey bees (APHIS, 2014). Risks to nontarget fish and wildlife are anticipated to be negligible based on the proposed use pattern that would result in a low potential for exposure to most taxa. A favorable environmental fate profile and low toxicity to most nontarget organisms further reduces the risk to terrestrial and aquatic animals (APHIS, 2014).

Protein hydrolysate is a common attractant used in fruit fly treatments, increasing the efficacy of chemical applications and reducing the area of pesticide treatments needed for control (Prokopy et al., 1992). MALFF

are attracted to the protein hydrolysate where they then receive a lethal dose of the pesticide (spinosad) that is mixed with the attractant. The protein hydrolysate is expected to have minimal impacts to environmental quality based on its use pattern and rapid degradation. The protein is not expected to result in impacts to nontarget species.

Environmental impacts from the use of alpha-ionol or cade oil are expected to be minimal (APHIS 2016b). Mammalian toxicity studies show that both alpha-ionol and cade oil are considered practically nontoxic (EPA, 2016b and 2016c). Due to the low toxicity and the volatility of both compounds, there will be a low potential of exposure and risk to terrestrial wildlife. There may be some incidental trapping of other insects; however, this is expected to have negligible impacts due to the small areas of treatment proposed for trap placement and the specificity of the attractant to the malff. No impacts to aquatic resources would be expected because the traps are not placed over water, and both compounds partition into the atmosphere at very low concentrations and would not be expected to enter water.

Sites near the program area that might require special consideration, should the program area expand, include coastal wetlands. Program chemical applications will not be permitted at these sites or other protected areas. Fruit survey and surveillance trapping will continue, and fruit stripping by hand will be undertaken if MALFF detections occur at these types of locations.

a. Migratory Birds

The Migratory Bird Treaty Act of 1918 (16 U.S.Code §§ 703-712) established a Federal prohibition, unless permitted by regulations, to pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird or any part, nest, or egg of any such bird.

Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, directs Federal agencies taking actions with a measurable negative effect on migratory bird populations to develop and implement a memorandum of understanding (MOU) with the U.S. Fish and Wildlife Service (FWS) that promotes the conservation of migratory bird populations. On August 2, 2012, APHIS and FWS signed an MOU to facilitate the implementation of this Executive order.
More than 500 species of birds occur in Los Angeles County (Garrett and San Miguel, 2006). This southern region of California, which is part of

the Pacific Flyway, is an important migration corridor providing suitable habitat for many bird species. APHIS evaluated the proposed MALFF program in terms of potential impact on migratory avian species. Given the extent of urbanization within the treatment area and the methods of application, implementation of the preferred alternative is not expected to have any adverse effect on migratory birds or their flight corridors. The proposed program would not involve removal or disturbance of any trees, shrubs, or other vegetation on the project site that could be used by birds.

b. Endangered Species Act

Section 7 of the Endangered Species Act (ESA) and ESA's implementing regulations require Federal agencies to consult with the FWS and/or the National Marine Fisheries Service to ensure that their actions are not likely to jeopardize the continued existence of threatened or endangered species, or result in the destruction or adverse modification of critical habitat.

APHIS reviewed the program area for potential co-occurrence of federally listed species and critical habitat to determine if any proposed program treatments may affect them. No federally listed species, species proposed for listing, critical habitat, or critical habitat proposed for designation occur within the current treatment area. In addition, the targeted nature of the application of the spinosad bait to MALFF host plants within 200 meters of detected infestations would limit exposure of any listed species to the insecticide. Therefore, APHIS has determined that the proposed MALFF program will have no effect in listed species or critical habitat in the program area. Should the program area expand or further outbreaks be detected, APHIS, in cooperation with CDFA, will consult with FWS and other appropriate agencies, as necessary. (Refer to EIS1 and EIS2 (APHIS, 2001 and 2008) and the supporting nontarget risk assessments (APHIS, 2014 and 1998b) for more information on risks to all classes of nontarget species.)

5. Environmental Quality

The principal environmental quality concerns are for the protection of air quality, water quality, and the minimization of the potential for environmental contamination. In relation to preserving environmental quality, program pesticides remain the major concern for the public and the program. Although program pesticide use is limited, especially in comparison to other agricultural pesticide use, the proposed action would result in a controlled release of chemicals into the environment. The fate of those chemicals varies with respect to the environmental component (air, water, or other substrate) and its characteristics (temperature, pH, dilution, etc.).

Attractant ingredients, such as pheromone lures (alpha-ionol or cade oil) and food baits (yeast or protein hydrolysate), are expected to have minimal effect on environmental quality, based on EPA-approved use patterns and the ingredients' rapid degradation. Use of these attractants as prescribed in MALFF program treatments is not expected to result in impacts to environmental quality beyond those described for spinosad and MB (NAFTA, 2003; Prokopy et al., 1992). The environmental fates of spinosad and MB are outlined below. (Refer to EIS1 and EIS2 (APHIS, 2001 and 2008) and the risk assessments (APHIS, 2014, 2003, 1998a and 1998b) for a more detailed consideration of program pesticides' environmental fates.)

- **Spinosad** is not considered mobile in soil; it adsorbs strongly to soil particles and is unlikely to leach to great depths. Dissipation half-lives for spinosad in the field may last 0.3 to 0.5 day. It is photodegraded quickly on soil exposed to sunlight. Spinosad is quickly metabolized by soil micro-organisms under aerobic conditions, and has a half-life of 9.4 to 17.3 days. Spinosad is not sensitive to hydrolysis, but aqueous photolysis is rapid in natural sunlight (half-life of less than 1.0 to 1.6 days), and is the primary route of degradation in aquatic systems exposed to sunlight. Under anaerobic conditions, the degradation rate is slower, between 161 and 250 days. Spinosad has a half-life of 2.0 to 11.7 days on plant surfaces. After initial photodegradation, residues are available for metabolism by plant biochemical processes. Effects from residues of individual treatments are no longer detectable in environmental substrates within a few weeks of application (APHIS, 2014; Kollman, 2003).

- **MB** will not be used as an eradication treatment, but may be employed as a regulatory treatment. MB volatilizes into air from soil and water, and is known to contribute to stratospheric ozone depletion. The volatilization half-life for MB from surface water ranges from 3.1 hours to 5 days. The degradation half-life of MB in water ranges from 20 to 38 days, depending on temperature and pH. Volatilization of MB from surface soil is rapid, with a half-life ranging from 0.2 to 0.5 days. The degradation half-life of MB in soil ranges from 31 to 55 days. MB has a low affinity to bind to soils, but is not considered a major contaminant of ground water (NPIC, 2000). The small quantities used to treat for OFF disperse when fumigation chambers are vented. (See section 6 of this chapter regarding MB's potential cumulative impacts to the environment.)

Urban and agricultural runoff may flow directly into local waters, picking up trash, dirt, chemicals, and other contaminants along the way. If treatment is indicated in close proximity to a body of water where

pesticides might be directly discharged into the water, CDFA will analyze the environmental setting, and establish and follow site-specific best management practices. The prescribed method of spray application directly to host plants is designed to minimize drift and runoff. Mitigation measures will be applied to protect marine and freshwater resources. Personnel applying pesticides will adhere to label directions, State and Federal laws, and recommendations of the environmental compliance staff associated with the program. Water body contact is not anticipated due to the targeted application measures and the environmental fate of the pesticides used in *Bactrocera* spp. cooperative eradication programs.

The alternatives were compared with respect to their potential to affect environmental quality. Risk to environmental quality is considered minimal for the preferred alternative. Again, a well-coordinated eradication program using IPM technologies would result in the least use of chemical pesticides overall, with minimal adverse impacts on environmental quality. The no action alternative would likely result in broader and more widespread use of pesticides by homeowners and commercial growers, with correspondingly greater potential for adverse impacts.

The proposed program area was examined to identify characteristics that would tend to influence the effects of program operations. Potentially sensitive areas were identified, considered, and accommodated, as necessary, through special selection of control methods and use of specific mitigation measures. Allowances were made for the special site-specific characteristics that would require a departure from the standard operating procedures. The approaches used to mitigate for adverse impacts to bodies of water are described in EIS1 (APHIS, 2001).

6. Cumulative Impacts

This section considers the potential of the alternatives to cause cumulative impacts on the human environment. Not taking Federal action is expected to result in the cumulative impacts that arise from tolerating uncontrolled MALFF infestations in the United States. Imposed quarantine and commodity certification would likely place the burden of control efforts and expense on producers already engaged in complying with other quarantine and commodity certification requirements. Federal non-action may increase the time it takes for commodities to reach their intended markets, or may prevent them from reaching consumers at all, which may contribute to negative public perception of the affected industry. APHIS considered implementation of the preferred alternative in the context of, and in conjunction with, other pest insect eradication and quarantine projects in or near the program area (such as light brown apple moth and glassy-winged sharpshooter eradication efforts). These programs use pesticides with different chemistries. They target different

pests, and are applied at different times. The combination of these different pesticide chemistries, targets for application, and application timings suggest limited interacting or multiple exposures that are not likely to create significant cumulative impacts in the human environment.

Current and future in-State MALFF programs potentially could merge into one larger program area. When MALFF eradication programs are combined with trapping and eradication actions across California counties, APHIS expects a beneficial cumulative impact on the environment from reduced MALFF populations causing damage to fruit combined with overall fewer chemical treatments.

The MALFF program for the Westchester region was examined for potential synergistic and cumulative environmental impacts. Program pesticides approved for use against OFF are also prescribed treatments for other *Bactrocera* spp. programs. As of January 14, 2016, there are other active quarantine and eradication programs in California targeted at *Bactrocera* spp.—the nearest program targets OFF in the Westchester region of Los Angeles County (CDFA, 2016d). At present, the center of the OFF quarantine is about 400 meters from the center of the MALFF quarantine—the current MALFF program area is completely inside the OFF program area. Use of program pesticides in a *Bactrocera* spp. program that overlaps with another active *Bactrocera* spp. program are monitored and adjusted, where necessary, to minimize environmental impacts. Due to the passage of time and the prevailing weather conditions in southern California during 2015 and early 2016, no chemical residues are believed to remain from previous *Bactrocera spp.* programs that could result in additive or synergistic chemical effects with previous program chemical applications.

No significant environmental impacts are expected to result from proper implementation of this MALFF eradication and control program. The differences in pesticide chemistries, targets for application, affected species and resources, and application timing between the MALFF program and other pest control programs in California are not likely to create significant cumulative impacts in the human environment. No synergistic or cumulative impacts from pesticide applications are expected with the following ongoing programs (CDFA, 2016e)—

- Asian citrus psyllid in multiple counties including Los Angeles County;

- glassy-winged sharpshooter in multiple counties including Los Angeles County.

Care should be taken when multiple pest species in the same area are

targeted for treatment using the same chemical. Spinosad, for example, has other labeled food and non-food uses, and is currently used in a variety of pest control efforts, including the control of termites and European grapevine moth (APHIS, 2014). Implementation of a MALFF eradication program could lead to an increase in spinosad use and the possible overlap of APHIS and non-APHIS program treatments. The MALFF treatment schedule will be adjusted in locations where another CDFA or APHIS program may have scheduled similar treatments to avoid additive chemical impacts.

Additional programs in place at the time of preparation of this EA which may employ spinosad treatments (CDFA, 2016d and 2016e) that could combine with MALFF spinosad treatments to have an additive impact have been designed to target the following—

- OFF in Los Angeles County;
- European grapevine moth in 31 California counties, including Los Angeles County;
- light brown apple moth in many California counties, including portions of Los Angeles County near Westchester.

It is uncertain how pesticides may be used by private entities in the MALFF program area. In terms of Federal and California State program activity, there are no significant cumulative impacts anticipated as a consequence of implementing the preferred alternative or its component treatment measures. The preferred alternative is designed for pesticide applications to avoid overlapping treatment areas, and to prevent nontarget exposure until pesticide residues are degraded.

APHIS determined uses of MB for fruit fly quarantine treatments pose negligible potential for cumulative impacts to the environment. For information on potential depletion of the ozone layer related to MB released into the atmosphere, see the *Rule for the Importation of Unmanufactured Wood Articles from Mexico, with Consideration for Cumulative Impact of Methyl Bromide Use, Final Environmental Impact Statement* (APHIS, 2002), and subsequent analyses, such as the *Importation of Solid Wood Packing Material, Supplement to the Final Environmental Impact Statement* (APHIS, 2007).

There were no residual impacts from previous Federal and non-Federal actions targeting fruit fly infestations in the State of California, and there are no reasonably foreseeable future actions that could result in incremental increases in environmental effects. Based on APHIS' review of the context and intensity of the existing, ongoing, and potential future treatments, there

will be no cumulative impacts to the human environment resulting from this MALFF cooperative eradication program.

As discussed previously, additional actions may be implemented in this program, including additional quarantines and regulatory treatments. The anticipated use of these treatments is considered to pose minimal risk to the human environment, as determined in EIS1 and EIS2 (APHIS, 2001 and 2008), and the nontarget species and human health risk appraisals (APHIS, 2016c, 2014, 2003, 1999, 1998a, and 1998b).

IV. Agencies Consulted

California Department of Food and Agriculture
Plant Health and Pest Prevention Services
Environmental Policy and Compliance
1220 N Street, Room 221
Sacramento, CA 95814

California Department of Food and Agriculture
Plant Health and Pest Prevention Services
Pest Detection/Emergency Projects
1220 N Street, Room 315
Sacramento, CA 95814

State Historic Preservation Officer
California State Office of Historic Preservation
1725 23rd Street, Suite 100
Sacramento, CA 95816

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection and Quarantine
Center for Plant Health Science and Technology
1730 Varsity Drive, Suite 400
Raleigh, NC 27606

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Policy and Program Development
Environmental and Risk Analysis Services
4700 River Road, Unit 149
Riverdale, MD 20737

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USCB—See U.S. Census Bureau

USDA—See U.S. Department of Agriculture

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WEF—See Water Education Foundation

Appendix A. Quarantine for MALFF and OFF

Source: USDA-APHIS-PPQ

Appendix B. Outside-APHIS Spatial Data Resources Used to Prepare this Document

The following resources were used by USDA-APHIS-PPD on January 12, 2016.

Web-Based applications for information on—

- **Critical habitat:** http://ecos.fws.gov/crithab/
- **Crop data:** http://nassgeodata.gmu.edu/CropScape/
- **Historic sites:** http://www.nps.gov/nr/research/
- **National wildlife refuges, Native American areas:** http://viewer.nationalmap.gov/
- **Organic farms:** http://www.ams.usda.gov/AMSv1.0/nop
- **Threatened & Endangered Species:** http://www.dfg.ca.gov/biogeodata/cnddb/
- **Waters, superfund sites, historic sites, schools, demographics:** http://nepassisttool.epa.gov/nepassist/entry.aspx