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Mexican Fruit Fly Cooperative Eradication Program

Lower Rio Grande Valley, Texas

Environmental Assessment
March 2016

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Lower Rio Grande Valley, Texas

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Table of Contents...

I. Need for the Proposal 1

II. Alternatives 3
- A. No Action 4
- B. Quarantine and Commodity Certification 4
- C. Eradication Using an IPM Approach (Preferred Alternative) 5
  - 1. Delimitation 6
  - 2. Treatments 6

III. Potential Environmental Consequences 7
- A. No Action 7
- B. Quarantine and Commodity Certification 8
- C. Eradication Using and IPM Approach (Preferred Alternative) 8
  - 1. Affected Environment 9
  - 2. Human Health 16
  - 3. Other Aspects of the Human Environment 17
  - 4. Nontarget Species 20
  - 5. Environmental Quality 24
  - 6. Cumulative Impacts 26

IV. Agencies Consulted 29

V. References Cited 30

Appendix A. Overview of Mexfly Program Areas in the Lower Rio Grande Valley as of February 23, 2016

Appendix B. Granjeño Program Area as of February 19, 2016

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

I. Need for the Proposal

The Mexican fruit fly (Mexfly), *Anastrepha ludens* (Loew), is native to central Mexico and is a major pest capable of devastating crops throughout many parts of the Western Hemisphere. Mexfly has been introduced into the United States repeatedly since its first detection in Texas in 1927 (NAPIS, n.d.). Successful eradication programs have prevented Mexfly from becoming an established pest in the conterminous United States.

Adult Mexflies are long lived (up to 11 months), highly fertile, strong fliers, and highly mobile (UFL, 2012). Because Mexfly can damage over 50 species of fruits, a wide range of commercial crops and dooryard production in the United States would suffer if Mexfly populations became established. Fruit infested by Mexfly is unfit to eat because the larvae tunnel through the fleshy part of the fruit, damaging it and subjecting it to decay from bacteria and fungi (CDFA, 2016).

In February 2016, a new Mexfly outbreak was confirmed in the Lower Rio Grande Valley (LRGV) region of the State of Texas (APHIS**,** 2016). Three counties in the southernmost region of Texas comprise the Lower Rio Grande Valley (LRGV): Cameron, Hidalgo and Willacy. An overview of new and ongoing Mexfly program activity in the LRGV is available in appendix A.

On February 8, one adult mated female was collected from a McPhail trap on a citrus host in Granjeño, Texas. Granjeño is a community in Hidalgo County that lies south of the larger cities of McAllen and Hidalgo, Texas. As a result of this evidence of a breeding fly population, the Granjeño Quarantine Area[1] was established: 42 square miles that contain commercial agriculture, undeveloped land, and properties in a mixed residential/urban area encompassing portions of the cities of McAllen, Granjeño, Mission, and Hidalgo (see figure 1). There are 306 acres of commercial citrus inside the proposed quarantine boundary, and there is almost no citrus production within the core area (APHIS, 2016). Delimitation surveys are taking place around the Mexfly detection site. Many Mexfly-host plant species are grown in the LRGV and adjacent regions, which increases the potential environmental impact of the new outbreak.

APHIS and the Texas Department of Agriculture (TDA) are proposing a cooperative program to eradicate the Mexfly infestation and prevent the spread of Mexfly to noninfested areas of the United States. APHIS' authority for cooperation in the program is the Plant Protection Act (Title 4

[1] For the purposes of this document, and unless specified otherwise in the text, the terms "Quarantine Area" and "program area" signify the same place. A "core" area is where program chemical treatments may be applied.

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.

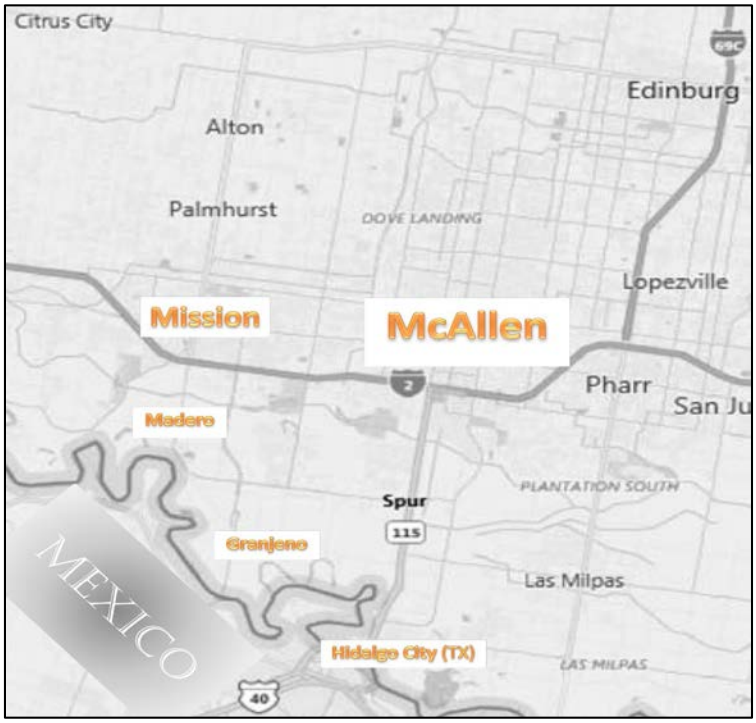

Figure 1. U.S. population centers near the 2/8/2016 Mexfly find.
Source: Bing.com map zoom-in.

Working cooperatively with States and territories, APHIS identifies and eradicates Mexfly 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 fruit fly population targeted by APHIS' cooperative programs was successfully eradicated.

APHIS and the State of Texas initiate *Anastrepha* spp. delimitation and eradication programs in locations where the types and number of detections are not yet triggering quarantine regulatory actions. Delimitation and eradication programs try to eliminate fruit fly infestations before reaching a quarantine threshold and imposing regulatory quarantines. Following Texas program protocols for Mexfly prevention, releases of sterile Mexflies continue year round at an average rate of 500 flies per acre in designated at-risk counties. Monitoring for Mexfly continues throughout all susceptible counties of Texas.

APHIS and its cooperating partners have discussed and comprehensively analyzed alternatives for Mexfly eradication. 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 EA incorporates the findings of EIS1 and EIS2 by reference.

This environmental assessment (EA) analyzes the environmental consequences of alternatives considered for Mexfly 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 assessments (APHIS, 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.

Mexfly outbreaks have occurred repeatedly in southern Texas due to the proximity of the infested areas to Mexico. Two Mexfly quarantines are currently in force in the Harlingen and Brownsville areas of Cameron County (see map in appendix A). Because it is likely that additional Mexfly infestations will be discovered in the LRGV in 2016, the potential environmental impacts of a Mexfly program anywhere in Hidalgo, Willacy, and Cameron Counties—the major citrus-producing areas of the LRGV—will be considered in this EA.

II. Alternatives

Alternatives considered for this proposed program include: (A) no Federal action, (B) quarantine and commodity certification, and (C) the preferred alternative, eradication using an integrated pest management (IPM) approach. Component techniques of alternative C include the use of regulatory controls, high-density trapping, host larval survey, and chemical and biological control (sterile insect technique (SIT)) to facilitate the timely elimination of the current Mexfly 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 Mexfly or restrict expansion of the Mexfly population from the infested area. In the absence of a Federal effort, quarantine and control would be left to State and local government, 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 Texas Department of Agriculture's (TDA) detection trapping program and research. (For details about the Texas State program to control Mexfly, please use the following link: Texas Mexfly program information.)

B. Quarantine and Commodity Certification

This alternative combines a Federal quarantine with commodity treatment and certification, as stipulated under Title 7 of the Code of Federal Regulations (CFR) § 301.32. Regulated commodities harvested within the quarantine area would not be allowed to move unless treated with prescribed applications and certified for movement outside the area. For a large infestation, intensive quarantine enforcement activities could be necessary, including safeguarding of local fruit stands, mandatory baggage inspection at airports, and judicious use of road patrols and regulatory checks. The quarantine actions of this alternative are designed to reduce Mexfly movement outside treated areas, and reduce human-mediated transport of Mexfly in host plant materials to areas outside the quarantined area; however, the infestation could remain established within the quarantine boundaries. Any Mexfly eradication efforts would be managed by, and wholly under the control of, TDA.

Interstate movement of regulated commodities would require the issuance of a certificate, or limited permit, contingent upon commodity treatment or the grower or shipper complying with specific conditions designed to minimize pest risk and prevent the spread of Mexfly. Eradication methods that may be used in this alternative include (1) regulatory chemicals, (2) cold treatment, (3) vapor heat treatment, and (4) irradiation treatment. Regulatory chemical treatments may include fumigation with methyl bromide (MB), and bait spray with a mixture of protein hydrolysate (a food

bait) and spinosad. (Refer to EIS1 (APHIS, 2001) for more detailed information about these chemicals and their uses.) Cold treatment, vapor heat treatment, or irradiation treatment of certain produce, as a requirement for certification and shipping, must be done in facilities that are inspected and approved by APHIS.

C. Eradication Using an IPM Approach (Preferred Alternative)

APHIS' preferred alternative for the Granjeño Mexfly 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. TDA describes IPM as offering "the best available pest control tactics, with an emphasis on the least hazardous methods, to effectively and economically reduce pests. IPM relies heavily on information about the pest and its changes in population to devise control strategies that require minimal or no pesticide use" (TDA, 2016a). Successful eradication of a Mexfly infestation in the LRGV, using a similar IPM strategy, was declared in December 2015 (APHIS, 2015).

For many species of exotic fruit flies, effective nonchemical control or eradication techniques do not exist (APHIS, 2001). APHIS and TDA's Mexfly eradication program relies primarily on surveillance, bait sprays and SIT (TDA, 2016a). Eradication efforts may therefore include any or all of the following:

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

Program areas for Mexfly infestations are centered on Mexfly detection sites (see map in appendix A). Program surveillance, quarantine, and treatment boundaries may be expanded to include other properties if additional adult flies or life stages are found.

APHIS' cooperative programs to eradicate Mexfly infestations in Texas use established procedures and treatments designed with the species' life stages in mind:

1. Delimitation

Mutlilure traps are used to delimit the infestation and to determine the efficacy of treatments. All monitoring traps will be serviced for a period equal to three Mexfly life cycles beyond the date of the last fly detection. Fruit of host plants will be sampled for the presence of eggs and larvae in a 200-meter radius around each detection site.

2. Treatment

Should evidence of a breeding Mexfly population be confirmed, a targeted, ground-based foliar bait treatment 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 a formulation of either malathion or spinosad (pesticides) and protein hydrolysate, a food bait. Spinosad is relatively nontoxic to mammals and beneficial arthropods; it is certified organic and has approved uses for the control of certain pests of agriculture, livestock, pets and humans (DeAngelis, 2004). Malathion has not been used for APHIS fruit fly programs in Texas in over 10 years; its use is not planned for the Granjeño program (Nash, pers. comm., 02/23/2016). Spray treatments are repeated every 1 to 2 weeks for one life cycle of the fly (typically 2 to 3 months, dependent on temperature).

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 Mexfly, or multiple adult captures within a certain distance and time-frame) will result in removal of host fruit from each detection site and from all properties within a 100-meter radius of each detection site.

SIT will be used to limit expansion of the Mexfly infestation—the eradication area will receive a periodic release of sterilized male Mexflies in order to disrupt the reproduction cycle and control the wild population. The release area currently proposed covers a 3.5-mile radius around each find site. Releases will be repeated twice a week to achieve a minimum weekly release rate of 250,000 sterile Mexflies per square mile, and will continue for two life cycles beyond the last Mexfly detection date (typically 4 to 6 months, dependant on temperature).

A quarantine boundary will be established to ensure any host material that leaves the program area is free of Mexfly. Host material may be treated in enclosed areas or containers by cold treatment, vapor heat treatment, irradiation, or fumigation with MB. Should the Mexfly 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 after the fruit receives APHIS-approved MB treatment in the field or at the packing shed. Growers of host fruits may also treat their production areas using approved program treatments (field and/or premise treatment) and, under 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 Mexfly-host material will be notified of the Mexfly quarantine location and treatment schedule.

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

III. Potential Environmental Consequences

This EA analyzes the potential environmental consequences of alternatives considered for Mexfly control. The site-specific characteristics of the Mexfly 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 Mexfly 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 Texas. It is reasonable to expect that Mexfly populations would continue to expand in number 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.

B. Quarantine and Commodity Certification

The quarantine actions of this alternative are designed to reduce the human-mediated movement of Mexfly by preventing the transportation of host-plant materials beyond the quarantine boundary. A resident Mexfly population would be expected to remain within the quarantine boundary. Any failure in quarantine actions could lead to Mexfly establishment outside the program area. The commodity certification requirement would create a necessary but new layer of ongoing governmental presence in the marketplace. This situation could create inspection jobs, however, would restrict trade until the produce was inspected and certified for sale. Host plants would likely cease being grown for domestic use as landowners shifted to non-Mexfly host plants.

C. Eradication Using an IPM Approach (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 measures:

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

Pheromone lures present little or no risk to human health or to the general environment, based on their low toxicity in animal testing, high target specificity, and low exposure to humans and the environment (Reilly, 2003). Review of the treatment protocols by APHIS indicates the chemical formulations used as pheromone lures in Mexfly program traps are unlikely to result in adverse environmental or human health risks (APHIS, 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

The LRGV here denotes three Texas counties: Willacy, Cameron, and Hidalgo. The proposed Granjeño Quarantine Area and the two ongoing quarantines in Harlingen and Brownsville extend over portions of Hidalgo and Cameron Counties. The mated female Mexfly in Granjeño was detected on residential property in a dooryard host and in proximity to commercial citrus groves. The citrus harvest of 2016 is continuing in the LRGV (APHIS, 2016).

The LRGV is considered part of the South Texas Plains which features a mixture of native grasses and scrub vegetation, mesquite, live oaks, and chaparral. The Texas citrus industry is almost totally located in the LRGV; about 85 percent of the acreage is in Hidalgo County, and the remainder in Willacy and Cameron Counties (Sauls, 2008). There are numerous potentially sensitive sites located within 15 miles of the Mexfly detections. (For examples of such sites see table 1.)

The LRGV contains good quality agricultural land, the region being a true delta and the soils alluvial, varying from sandy and silty loam through loam to clay (Vigness and Odintz, n.d.). The local climate ranges from subtropical to semi-arid, tending to hot summers and mild winters. Willacy and Cameron Counties border the Gulf of Mexico where many different types of coastal natural hazards can occur, such as high winds, flooding, tornadoes, subsidence, coastal erosion, and relative sea-level rise (Davis et al., 2013). Precipitation in the LRGV can average 26 inches per year; the growing season lasts 320 days, from late January until mid-December (Garza, n.d. (1) and (2); Garza and Long, n.d.; TSHA, n.d.(1), (2), and (3)).

Hidalgo County has a land area of over 1,570 square miles. It is located in the Rio Grande Delta in southern Texas with an estimated a population of 831,073 (91.2% self-identify as Hispanic or Latino) (USCB, 2016a). It is bordered on the north by Brooks and Kenedy Counties, on the west by Starr County, on the east by Willacy and Cameron Counties, and on the south by the Rio Grande and Mexico. The county seat, Edinburg, is located about 10 miles from McAllen, the city with the county's highest recorded population. Over a third of county residents live below the poverty level; many are less than fluent in English (USCB, 2016a). There are at least 943 recorded colonias[2] in Hidalgo County, of the more than 2,294 colonias in Texas (TSOS, 2016).

[2] "Colonias" are communities the Texas government defines as residential areas along the Texas-Mexico border that may lack some of the most basic living necessities, such as potable water and sewer systems, electricity, paved roads, and safe and sanitary housing (TX Secretary of State, 2016)

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Table 1. Distance from the Center of Detections to Certain Land Sites.*

Designated Land Use	Description (distance rounded off to nearest tenth of a mile)
Conservation Lands	• Santa Ana National Wildlife Refuge, 10.0 • Within the proposed quarantine o Lower Rio Grande National Wildlife Refuge

Historic Sites	• Within the three Counties (Cameron, Hidalgo, and Willacy)
	  o 49 locations listed on the National Register of Historic Places
	  o 33 Historic Texas Cemeteries
	  o 5 Historic Battlefields

Mexico	• Nearest border, 1.6

Nearest International Land and Sea Ports	• McAllen Miller International Airport, 4.9
	• Port Isabel, 75.0
	• Within quarantine
	  o Anzalduas International Bridge
	  o McAllen-Hidalgo International Bridge

Nearest Native American Lands	• Kickapoo Reservation, 230.0 • There are no ceded lands within the Granjeño program area

Organic Production, Nurseries and Farmers Markets	• Within quarantine
	  o 7 organic farms
	• Within treatment area
	  o 7 plant nurseries
	  o 5 farmers markets

Recreational Property	• Within quarantine
	  o Club at Cimmaron (golf, tennis, swimming)
	  o Palm View Golf Course

Schools and Academic Institutions	• 53 within quarantine

Unincorporated and Unregulated Settlements along the U.S.-Mexico Border	• 5 within quarantine
	  o Meadow Creek Country Club Colonia
	  o Leslie Colonia
	  o Mata Colonia
	  o Valle Alto No. 2 Colonia
	  o Sanchez Ranch Colonia

* See appendix B for data sources. State historic sites: (TSHA, 2010)

The Hidalgo County Historical Corridor spans the southern portion of the county. There are local parks, such as Estero Llano Grande State Park, and units of conservations areas, such as the Santa Ana National Wildlife Refuge and the Las Palomas Wildlife Management Area (Garza, n.d. (1); TSHA, n.d. (1)).

Local land use in the core of the proposed Granjeño Quarantine Area is primarily agricultural with some residential neighborhoods. There are scattered business and light industrial districts inside the Mexfly program area, as well as schools, recreational lands, and water resources. The largest population centers in the Granjeño Quarantine Area are the cities of McAllen and Mission, Texas. McAllen has an estimated population of 138,596, and a land area of 48.34 square miles. Hidalgo City has a land area of 6.55 square miles, and an estimated population of 13, 497 (USCB, 2016a). Madero's demographic information is counted with the data for Mission, Texas: Mission has an estimated population of 82,431, and a land area of about 34 square miles (USCB, 2015b).

Granjeño itself has an estimated population of 299 (USCB, 2016c) and a land area of less than half a square mile. The city is located on the banks of the Rio Grande in southern Hidalgo County, off the junction of Farm Road 494 and the Old Military Telegraph Road, four miles southwest of McAllen (TSHA, 2010). Major roads crossing the Granjeño Quarantine Area include Interstates 2 and 69C, and State Highways 396, 494 and 1016. Granjeño is part of the McAllen–Edinburg–Mission and Reynosa–McAllen metropolitan areas.

Granjeño was founded around 1767, incorporated in 1993, and has a Board of Commissioners consisting of a mayor and two commissioners. Granjeño is adjacent to the Anzalduas County Park, known for its moss covered trees and is located on a loop of the Rio Grande such that visitors can see Mexico to the north. Entrance to the park requires driving over a levy and over a bridge along a floodway (GMCC, 2014; MissionTexas.net, 2016). The Anzalduas International Bridge and the McAllen-Hidalgo International Bridge cross the Rio Grande near the Granjeño Quarantine Area. Both bridges connect the LRGV to interncontinental trucking routes, and facilitate traffic between Hidalgo County and Mexican cities, such as Monterrey and Mexico City (City of McAllen, 2016). El Granjeño Cemetery (established 1872) is a Texas historical landmark and contains burials from families on both sides of the Rio Grande (TSHA, 2010).

According to 2015 cropland statistics (see appendix B for data sources), at least 21 varieties of fruit, vegetables, grains, and feed were cultivated inside the proposed boundary for the Granjeño Quarantine Area. Citrus crops accounted for nearly 306 acres in the program area (including about 1.8 acres in the treatment area). Mango, avocado, peach and pear—commercially-raised crops that can serve as hosts for Mexfly infestation in addition to citrus (CDFA, 2016)—were not listed for 2015 in the program area.

Portions of Cameron County have been affected by Mexfly infestations in the past; at present there are 2 Mexfly quarantines ongoing in the Harlingen and Brownsville regions. Cameron County is bordered by the Gulf of

Mexico on the east, by Hidalgo County on the west, by Willacy County on the north, and by the Rio Grande and Mexico on the south. It has a land area of about 891 square miles and a reported population of 420,392 in 2014 (88.7% self-identify as Hispanic or Latino) (USCB, 2016d). Brownsville is the county seat and its largest city. Over a third of county residents live below the poverty level; many lack fluency in English (USCB, 2016d). There are 196 listed colonias in the county (TSOS, 2016).

Protected areas in Cameron County include Palo Alto Battlefield National Historic Site, Resaca de la Palma Site State Park, Port Isabel Lighthouse State Historic Structure, Brazos Island State Scenic Park, as well as other cultural and conservation sites. Hunting and fishing, both recreational and commercial, are possible throughout the year (Garza and Long, n.d.; TSHA, n.d. (2)). There are also portions of the Lower Rio Grande National Wildlife Refuge located in the county.

Willacy County has a land area of slightly over 590 square miles, and a resident population estimated in 2014 to be 21,903 (87.7% self-identify as Hispanic or Latino) (USCB, 2016e). It is bounded on the north by Kenedy County, on the west by Hidalgo County, on the south by Cameron County, and on the east by the Gulf of Mexico.

Willacy County consists of flat coastal prairie sloping toward the Gulf of Mexico; the Padre Island National Seashore and a portion of the Texas Tropical Trail are protected areas, as are the county's salt lake and various parks and conservation areas, such as the Laguna Atascosa National Wildlife Refuge (Garza, n.d. (2); TSHA, n.d. (3)). Over a third of county residents live below the poverty level; many are less than fluent in English (USCB, 2016e). There are 16 listed colonias in the county (TSOS, 2016).

Economic drivers in the LRGV include agriculture, trade, services, manufacturing, and hydrocarbon production (Combs, n.d. (1)). Texas is the nation's fourth-largest producer of sugarcane, and all of it is grown in the South Texas region, primarily in Hidalgo, Willacy, and Cameron Counties (Combs, n.d. (2)). Major sources of income near the LRGV program areas are farming, ranching, and tourism, including nature tourism, recreational hunting, and freshwater and marine fishing. The area's mineral and oil deposits have led to the development of related commercial enterprises. Coastal and inland aquaculture of shellfish and finfish are also important industries (Garza, n.d. (1) and (2); Garza and Long, n.d.; TSHA, n.d. (1), (2) and (3)). To date, agribusiness is the mainstay of the economy in Mexfly program areas; Cameron, Hidalgo, and Willacy Counties historically form the center of Texas' commercial citrus production (Vigness and Odintz, n.d.). Citrus and other potential Mexfly hosts are also widely grown by residents in all three counties.

a. Water Resources

Although located in a floodplain, until recently the LRGV experienced surface water losses from severe drought; parts of the region have recovered, but abnormally dry to moderate-drought conditions continue over most of Hidalgo County and part of Willacy County (see figure 2). All three counties contain "economically distressed areas" lacking sufficient water resources, as determined by the Texas Water Development Board (TWDB, 2015). The LRGV relies on ground and surface water for most drinking and irrigation needs. Although drought conditions are not affecting surface water in the three counties, water use is limited in several public water systems in Cameron and Hidalgo Counties to avoid water shortages (TCEQ, 2016).

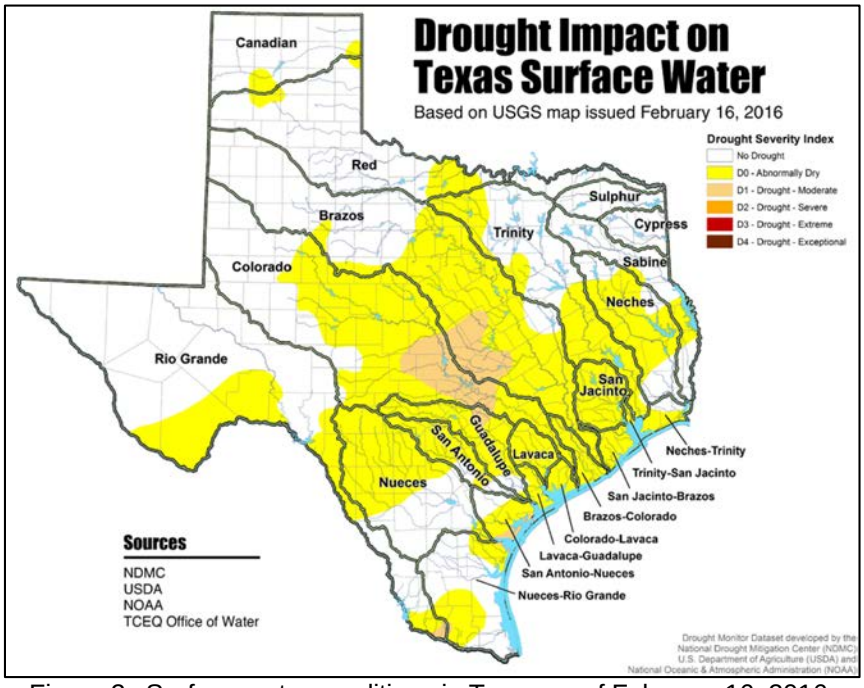

Figure 2. Surface water conditions in Texas as of February 16, 2016. (TCEQ, 2016.)

There are two major natural waterways in the region—the Rio Grande, which defines much of the international border between the United States and Mexico, and the Arroyo Colorado. Both river systems border or run through Mexfly quarantine areas. The Arroyo Colorado is an ancient channel of the Rio Grande River, extending from southern Hidalgo County across Cameron County and into Willacy County, Texas; portions of it are impaired, as defined under section 303(d) of the Clean Water Act. The U.S. Environmental Protection Agency (EPA) defines impaired waters as a "waterbody (i.e., stream reaches, lakes, waterbody segments) with chronic or recurring monitored violations of the applicable numeric and/or narrative water quality criteria" (EPA, 2016a). The tidal segment of the Arroyo Colorado that connects to the Gulf of Mexico is defined as a

coastal natural resource area and a coastal wetland under the Coastal Coordination Act (TAMU, 2011).

The Rio Grande Regional Water Planning Area (Region M) consists of eight counties along the middle and lower Rio Grande nearest the river's mouth at the Gulf of Mexico. From the earliest settlement, these counties have depended on Rio Grande water for domestic and agricultural uses. The tropical or sub-tropical climate allows for a long growing season most years. Thunderstorms in the spring and occasional hurricanes in the late summer and fall can generate tremendous amounts of rainfall over a short period of time, causing extensive flooding due to the region's relatively flat terrain (RGRWPG, 2016).

Willacy, Cameron, and Hidalgo Counties are part of the Nueces-Rio Grande Basin, one of eight designated river and coastal basins in Texas (see figure 3). The Nueces-Rio Grande Basin is bounded on the north by the Nueces River Basin, on the south by the Rio Grande Basin, and by bays or other outlets to the Gulf of Mexico (TWDB, n.d.). The southwestern corner of Hidalgo County lies in the extreme tip of the Rio Grande Basin.

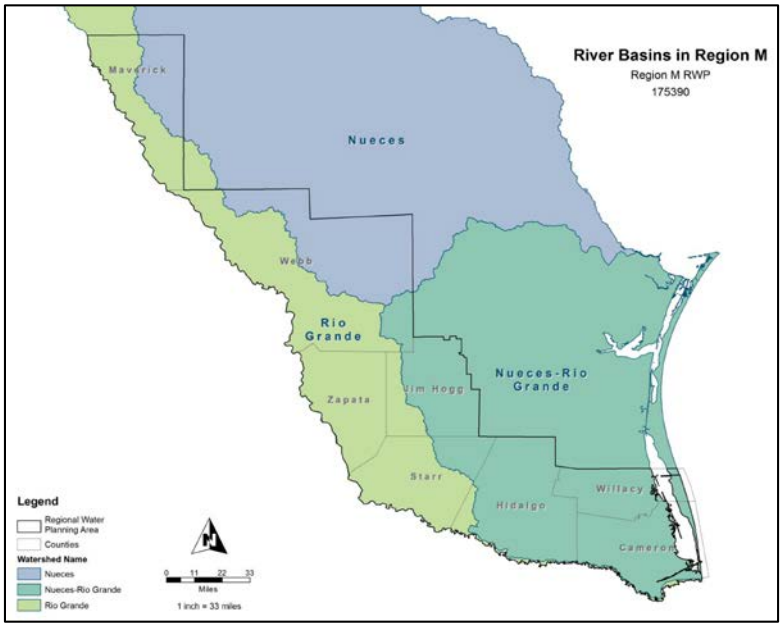

Figure 3. Rio Grande Region Water Planning Area (Region M). (State of Texas, 2016.)

Hidalgo County is located within four Texas watersheds, including Central Laguna Madre, South Laguna Madre, Los Olmos, and the Lower Rio Grande (EPA, 2016b). The Rio Grande forms the county's southern border, and is the county's main source of potable and irrigation water. Water is stored in regional reservoirs, and then sent to local water treatment plants for disinfection and purification (RGRWPG, 2016).

The Llano Grande Lake-Arroyo Colorado watershed and two water reservoirs are located within the Granjeño Quarantine Area. Potable water is supplied to residents in the program area by McAllen and Mission municipal water authorities (Smith, pers. comm., 02/22/2016). Ground water and surface water resources in the region continue to be adversely affected by abnormally dry conditions, water impairment, and/or ongoing residential population expansion (Combs, 2014).

Cameron County is located within two Texas watersheds—South Laguna Madre and Lower Rio Grande (EPA, 2016b). The Rio Grande forms part of the county's southern border and is the county's main source of potable and irrigation water.

Willacy County crosses two Texas watersheds—Central Laguna Madre and South Laguna Madre (EPA, 2016b). Potable water and water for irrigation and recreational purposes in Willacy County are obtained primarily from the Rio Grande via neighboring Cameron County. The water is stored in reservoirs and lakes, and then sent to treatment plants. (See table 2 for information on certain water resources as they relate to the proposed program area.)

Table 2. Distance from Center of Detections to Certain Water Resources.*

Type of Resource	Description of Site
Impaired Waters	• Within treatment area o TX-2302_04 (Rio Grande)
Water Bodies within 6 miles	• Within quarantine o Bensten Lake o Boeye Reservoir o Carlson Settling Basin o City Reservoir o Lake Concepcion o Lake Texano o Lake Tropicana o Pharr San Juan Main Canal o Pharr San Juan Main Canal o Pharr San Juan Main Canal o Rio Grande • Within treatment area o Rio Grande
Watershed	• Within treatment area o Llano Grande Lake-Arroyo Colorado (HUC 12 ID: 121102080100)
Wetlands	• Within treatment area o Freshwater/forested shrub, 37.2 acres o Freshwater pond, 30.4 acres o Lake, 190.5 acres o Riverine, 671.8 acres

* See appendix B for data sources.

2. Human Health

The three major factors influencing the human health risk associated with pesticide use include the fate of the pesticides in the environment, their toxicity to humans, and their exposure to humans. The principal concerns for human health are related to the potential program uses of chemical pesticides, including spinosad or malathion, and MB (as a fumigant). Malathion and MB are known to be toxic to humans; the preferred alternative of the Mexfly program is designed to limit human exposure to program chemicals. Spinosad is toxic to specific invertebrate species but is considered to be nontoxic to humans and other animals. Limited data exist regarding the toxicity of the protein hydrolysate; the available data suggests low acute toxicity to human health.

Exposure to program pesticides can vary, depending upon the pesticide and the use pattern. The Mexfly eradication program will employ ground-based targeted applications of spinosad or malathion combined with protein bait. Commercial applications, should they become necessary, will be applied to properties owned by commercial growers and producers where exposure to the general public is unlikely. Exposure and risk for program workers are not expected based on the proper use of personal protective equipment.

If spinosad bait and malathion bait applications are restricted to target surfaces and made in accordance with EPA label instructions, effects to human health and the environment are expected to be incrementally negligible. The use of protein hydrolysate as an attractant in the Mexfly program is also expected to present a low risk to human health. The attractant has low toxicity and its ground-based, targeted method of application results in a low probability of exposure and 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 assessments 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 risk.).

Another mitigation measure designed to minimize exposure of humans to program pesticides is the requirement for public notification. Information concerning the Mexfly 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 contacted directly or 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- to14-day intervals for one life cycle of the fly (typically 2 to 3 months, sometimes longer dependent on temperature).

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 three 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 Mexfly 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

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

The National Historic Preservation Act of 1966, as amended (16 U.S.Code (U.S.C.) § 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 identified numerous listed Historic Places within the three LRGV counties, even though only a few are within the currently defined quarantine areas. Activities associated with any of the alternatives analyzed in this assessment will not affect historic structures because APHIS' actions will not disturb the ground or the facility, the deployed chemicals do not affect building materials, and the deployed chemicals rapidly degrade in the environment. APHIS may hand-pick fruit from surrounding landscape plants, and place bait stations outside of the historic site's property whenever possible.

APHIS is initiating consultation with the State Historic Preservation Office (SHPO) for Texas. The Mexfly project area under consideration includes Cameron, Hidalgo, and Willacy Counties. In February 2014, the SHPO's evaluation of the same area concurred with APHIS' finding that historic properties would not be affected by the proposed action. Currently, the Texas Historical Commission lists 26 locations on the National Register of Historic Places in Cameron County, 22 in Hidalgo County, and one in Willacy County (Anon., 2016). They list five Historic battlefields and 33 Texas Historic Cemeteries within the three counties. The historic places also include three ranches (King Ranch, McAllen Ranch, and Rancho Toluca), two parks (Oblate Park Historic District, Garcia Pasture Site), the Louisiana–Rio Grande Canal Company Irrigation System, and a wide variety of buildings that may have surrounding landscaping with host plants (Anon., 2016).

In general, APHIS' fruit fly eradication programs are compatible with the preservation of historic sites because APHIS discreetly integrates control activities into the site, activities do not disturb the ground, and the treatments do not affect human-made structures. APHIS restricts program treatments and activities to an as-needed basis, and also can modify normal program activities at historically significant locations to reduce pesticide release, if necessary. APHIS will not conduct aerial chemical applications and spraying will be ground-based, directly targeting foliage. This may include hand spraying with a backpack sprayer. Surveillance trapping and fruit stripping by hand may occur. For all these reasons, the proposed action will not adversely affect historic properties. If APHIS discovers any archaeological resources, APHIS will notify the appropriate individuals.

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*. APHIS considered the potential environmental impacts of implementing the action alternatives on minority and/or low-income communities, tribal interactions, and historical and culturally sensitive sites in the program area. A lack of Federal action could result in adverse economic and health impacts on affected producers and consumers, such as decreased harvests, higher consumer prices, loss of local employment, reduced nutritional options, loss of market share, compromised mental and physical health, loss of property, and so on. These indirect impacts are expected to occur to a lesser extent under the quarantine and commodity certification alternative. APHIS does not expect adverse effects as a result of carrying out the preferred alternative's surveillance activities, trapping, or program chemical applications.

"Colonia" is a term used in the southwestern States to describe subdivisions where developers divide the land into small lots and offer

affordable housing to low-income families. Purchase of these lots occurs through a contract for a deed with a low down payment and low monthly payments. They issue the title for the house only after the homeowners make the final payment (TSOS, 2016). Residents build the housing in these locations over time as they can afford materials. Consequently, many residences lack connections to sewers or running water, and residents may not be able to access water lines because their homes do not meet county building codes (TSOS, 2016).

The population identifying as Hispanic or Latino averages about 89 percent in these three counties; approximately 55 percent do not speak English at home, and slightly more than one-third of the adult population has not graduated from high school (USCB, 2016f). The median household income in these three counties averages less than $32,000; the median value of owner-occupied houses in these counties averages approximately 40 percent of the nationwide value of homes; and, these counties average 35.6 percent of the population below the poverty level (USCB, 2016f). To meet the needs of these low-income and minority groups, APHIS will provide advance notice of program activities and potential exposure hazards to members of colonias, other non-English-speaking populations, and people in areas that generally lack access to news media. Providing notice ensures people avoid exposure during bait trap placement and maintenance. Any exposure by low-income or minority individuals to applied products is negligible based on the program's application methods and the product formulations.

Federal agencies comply with Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. The preferred alternative does not pose any disproportionate adverse effects to children because maintenance of traps and any pesticide applications would not occur when children are present in the immediate area. The intermittent presence of children at shelters, playgrounds, parks and picnic areas, religious centers, public/private campgrounds and trailer parks, athletic fields, bus depots, and outdoor community facilities means they are likely to be at locations where bait traps are in use; however, the placement of these traps is likely to be far above their reach. There are approximately 40 schools within the quarantine area and, at present, none are within the 500-meter radius treatment zone. If the treatment zone expands, then APHIS will maintain traps and apply any pesticide applications only when children are not present in the immediate area. The surrounding landscape plants may have fruit removed by handpicking. Where possible, APHIS will not apply baits on school property. When pesticide applications are essential, APHIS would use either a bait trap or backpack sprayer. Any exposure of children to applied products is negligible based on the program's application methods and the product formulations. The proposed program does not pose any highly disproportionate adverse effects to children, minority, or low-income populations because (1) these individuals

are unlikely to be present when APHIS applies treatments or maintains bait traps, and (2) there will be negligible exposure to applied pesticides.

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. The Archaeological Resources Protection Act of 1979 (16 U.S.C. §§ 470aa-mm), secures the protection of archaeological resources and sites on public and tribal lands. Using the Native American Graves Protection and Repatriation Act Online Databases (NPS, 2016; 25 USC § 3001 et seq.) APHIS finds there are no Indian Reservations in the quarantine area, no ceded lands reported in the three counties, and no judicially established Indian ands in the three counties (NPS, 2016). The nearest tribe in the region is the Kickapoo Reservation located approximately 250 miles from the quarantine area in Hidalgo County. APHIS met with the Kickapoo Tribe on February 4, 2013 to review the tribe's needs, interests, and concerns. During the discussion, the Tribal Administrator reiterated that the Kickapoo Tribe does not have any land holdings within the Lower Rio Grande Valley area (Duhaime, pers. comm., 01/30/2014). This situation does not appear to be changed.

Individual Native Americans living within the quarantine zone will not be disproportionately affected in comparison to other individuals in the area because APHIS applies treatments above the unassisted reach of most humans, and uses only targeted foliar canopy spraying. The proposed action will not disturb the ground, so it is unlikely to affect Native American sites or artifacts. For these reasons, program activities are unlikely to affect Native Americans.

APHIS considered the potential environmental impacts of implementing the action alternatives on minority and/or low-income communities, tribal interactions, and historical and culturally sensitive sites in the program area. A lack of Federal action could result in adverse economic and health impacts on affected producers and consumers, such as decreased harvests, higher consumer prices, loss of local employment, reduced nutritional options, loss of market share, compromised mental and physical health, loss of property, and so on. These indirect impacts may occur to a lesser extent under the quarantine and commodity certification alternative. APHIS does not anticipate adverse effects as a result of carrying out the preferred alternative's surveillance activities, trapping, SIT, and program ground-based chemical applications.

4. Nontarget Species

Potential environmental impacts of alternative A (the no action alternative) or alternative B (quarantine and commodity certification) on nontarget species could include loss of animal and plant life and habitat from unregulated pesticide use by the public, or from Mexfly host damage. Under the preferred alternative, the principal concerns for nontarget

species, including threatened and endangered species, relate to potential harm from the use of program pesticides. Paralleling human health risk, the risk to nontarget species is related to the pesticides' fate in the environment, their toxicity to the nontarget species, and their exposure to nontarget species.

Current eradication activities in the LRGV will be limited to ground-based foliar applications of malathion or spinosad combined with protein hydrolysate bait that is applied to host plants, and the use of SIT to control invasive Mexfly populations. The malathion and spinosad bait treatments target Mexfly life stages on host plants in a manner that minimizes potential exposure and associated risks to nontarget species.

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). Mexflies are attracted to the protein hydrolysate where they then receive a lethal dose of the pesticide (spinosad or malathion) that is mixed with the attractant. Protein hydrolysate alone is expected to have minimal impacts to environmental quality and nontarget species because of its low toxicity.

Malathion is an organophosphate pesticide whose mode of toxic action is primarily through acetylcholinesterase inhibition (Klaassen et al., 1986; Smith, 1987). The toxicity of malathion is very slight to moderate for mammals and birds. For fish, the acute toxicity of malathion varies from moderately toxic to some species of fish to very highly toxic to other species (Beyers et al., 1994; Mayer and Ellersieck, 1986; USFS, 2008). Malathion is moderately to very highly toxic to most aquatic invertebrates on an acute basis, depending on the sensitivity of the species. 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. Risks to nontarget species from the use of either malathion or spinosad baits are anticipated to be negligible because the proposed use pattern (targeted, hand application of the bait) results in a low potential for exposure to most taxa. The bait applications attract only a small number of invertebrate species other than Mexfly. (Refer to EIS1 and EIS2 (APHIS, 2001, 2008) and the supporting nontarget risk assessments (APHIS, 2014, 2003, 1998b) for more information on risks to all classes of nontarget species.)

Conservation areas in the LRGV provide important habitat for a wide variety of wildlife that cannot be seen anywhere else in the United States. The LRGV contains numerous protected wetlands, parkland, and refuges; among others, units of the Las Palomas National Wildlife Management Area (Las Palomas WMA), the Laguna Atascosa National Wildlife Refuge, and the Lower Rio Grande Valley National Wildlife Refuge lie inside or

within 30 miles of current Mexfly program areas. APHIS' Mexfly programs are designed to prevent the introduction of program chemicals into nontargeted areas. Sites near the program area that might require special consideration, should the program area expand, include irrigation canals or wetlands of potential ecological importance. No program chemical applications will be permitted at these sites or other protected areas. However, aerial SIT and surveillance trapping will continue, and fruit stripping by hand will be undertaken if Mexfly detections occur at such locations. Pesticide applications would only occur in national wildlife refuges with the approval of the U.S. Fish and Wildlife Service (FWS) and coordination with the refuge manager.

a. Migratory Birds

Unless permitted by regulation, the Migratory Bird Treaty Act of 1918 (16 U.S.C. §§ 703–712) provides that it is unlawful 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, included in the terms of this Convention . . . for the protection of migratory birds . . . 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 FWS that promotes the conservation of migratory bird populations. On August 2, 2012, an MOU between APHIS and FWS was signed to facilitate the implementation of this Executive order.

The LRGV contains a large diversity of bird species, with more than 500 species documented (FWS, n.d.). The LRGV is an important migration corridor that provides suitable habitat for many bird species. APHIS evaluated the proposed Mexfly program in terms of potential impact on migratory avian species in the program area. Malathion is only slightly to moderately toxic to birds, and spinosad acute and chronic toxicity to birds is low (APHIS, 2014). The targeted application of the insecticide baits to Medfly host plants within 500 meters of Mexfly detections, usually in residential areas, and the short half-life of malathion on vegetation would result in limited to no exposure of birds to malathion. The localized and direct application of malathion and spinosad baits to host plants would not result in any impacts to food of birds. Birds would not be exposed to methyl bromide treatments.

In a July 2015 concurrence letter for Endangered Species Act consultation (discussed below), the FWS made recommendations regarding the protection of migratory birds. The FWS recommended that activities requiring vegetation removal or disturbance avoid the peak nesting period of March through August to avoid destruction of individual birds, nests, or eggs. If project activities must be conducted during this time, FWS recommends surveying for nests prior to commencing work. If a nest is found, if possible, FWS recommends a buffer of vegetation (≥ 50 feet) remain around the nest until young have fledged or the nest is abandoned.

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.

There are 16 federally listed species in Cameron, Hidalgo, and Willacy Counties, including ocelot (*Leopardus pardalis*), Gulf Coast jaguarundi (*Felis yagouaroundi*), West Indian manatee (*Trichechus manatus*), northern aplomado falcon (*Falco femoralis septentrionalis*), piping plover (*Charadrius melodus*), yellow-billed cuckoo (*Coccyzus americanus*), red knot (*Calidris canutus rufa*), hawksbill sea turtle (*Eretmochelys imbricata*), leatherback sea turtle (*Dermochelys coriacea*), Kemp's Ridley sea turtle (*Lepidochelys kempii*), green sea turtle *Chelonia mydas*), loggerhead sea turtle (*Caretta caretta*), South Texas ambrosia (*Ambrosia cheiranthifolia*), Texas ayenia (*Ayenia limitaris*), Walker's manioc (*Manihot walkerae*), and star cactus (*Astrophytum asterias*). APHIS prepared a programmatic biological assessment (BA) for program activities in Cameron, Hidalgo, and Willacy Counties that was submitted to FWS in 2008, and received a concurrence letter dated July 31, 2008. This programmatic consultation is updated yearly to include any new listed species in the three counties.

APHIS submitted a revised BA to FWS in January 2015 to include the yellow-billed cuckoo and red knot. APHIS determined that Mexfly eradication program activities will have no effect on the red-knot and may affect, but are not likely to adversely affect, the yellow-billed cuckoo. APHIS received concurrence from FWS on these determinations in a letter dated July 1, 2015. No new species have been listed or critical habitat designated in the program counties since the consultation was completed. However, APHIS ensures that the programmatic consultation remains up to date, and reinitiates consultation whenever new species are listed, critical habitat is designated, when new information reveals effects of the action that were not previously considered that may affect listed species or critical habitat, or the program is modified in a manner that causes an effect to listed species or critical habitat. In addition, if malathion were planned for use,

consultation would be reinitiated with FWS because this pesticide is currently not included in the programmatic consultation. Malathion has not been used by the Texas Mexfly program in more than 10 years, and is not likely to be used for this quarantine.

APHIS coordinates with the FWS, Ecological Services Field Office in Corpus Christi, Texas before implementing Mexfly program activities. FWS reviews maps of the quarantined area, and notifies APHIS if listed species are present in the program area. If listed species are present, APHIS implements protection measures for those species, as described in the programmatic BA. For the quarantine area near McAllen in Hidalgo County, FWS reviewed a map of the area and indicated that there were no listed species or critical habitat in the area (Fuentes-Capozello, pers. comm., 02/23/2016).

5. Environmental Qualilty

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.). 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, 1999, 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).

- **Malathion** is toxic to many nontarget species; it is used less widely than spinosad, and primarily by commercial growers on private

property. Malathion is considered lower in toxicity and less persistent (1 to 25 days in soil) than other organophosphorus pesticides. In water, malathion has a half-life of approximately 1 week, and is more stable in acidic aquatic conditions. Malathion is soluble in water, and can be highly mobile in soil. Generally, degradation occurs rapidly (a half-life of less than 1 to nearly 9 days) (Gervais et al., 2009); application to foliage allows for exposure of residues to degradation from processes (e.g., photolysis), resulting in a reduced potential for significant movement to ground water. Malaoxon is an oxygen analogue of malathion, and it can be found either as an impurity in malathion products, or can be generated during the oxidation of malathion in air or soil. Malathion and malaoxon can be transported in air over large distances and elevations (Newhart, 2006).

- **Methyl bromide** (MB) fumigation 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 day. The degradation half-life of MB in soil ranges from 31 to 55 days. MB has a low affinity to bind to soils, however, is not considered a major contaminant of ground water (NPIC, 2000). The small quantities used to treat for Mexfly 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, TDA 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 will maintain a minimum distance of 98 feet (30 meters) from surface water. 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 *Anastrepha* spp. cooperative eradication programs.

The alternatives were compared with respect to their potential to affect environmental quality. Risk to environmental quality is considered

minimal. 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 and the quarantine and commodity certification 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 Mexfly infestations in the United States. Federal quarantine restrictions and commodity certification requirements would place the burden of control efforts and expense on producers already engaged in complying with other quarantine and commodity certification requirements. Either of these alternatives 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 consumer shortages and 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 the Granjeño program area (such as pink bollworm and cattle fever tick 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 Mexfly programs could potentially merge into one larger program area. When Mexfly eradication programs are combined with trapping and eradication actions across Texas counties, APHIS expects a beneficial cumulative impact on the environment from reduced Mexfly populations causing damage to fruit combined with overall fewer chemical treatments. Trapping and surveys for Mexfly continue under the Texas fruit fly detection and monitoring program, and sterile Mexflies continue to be released over high-risk regions as a preventive measure (TDA, 2016b).

The Granjeño program activities and treatments are designed not to overlap (in time or space) with similar activities and treatments. Pesticide use in a Mexfly control program that overlaps with another *Anastrepha* spp. program is monitored and adjusted, where necessary, to minimize environmental impacts. During 2014, for example, infestations of West Indian fruit fly (*Anastrepha obliqua* (Macquart)) were detected in areas being treated for Mexfly. The eradication program protocols for West Indian fruit fly being the same as that for Mexfly, no additional chemical treatments were considered necessary. Due to the passage of time and the prevailing weather conditions in the LRGV during 2015 and early 2016, no chemical residues are believed to remain from previous Mexfly programs that could result in additive or synergistic chemical effects with previous program chemical applications.

The Mexfly program for quarantined regions of the LRGV was examined for potential synergistic and cumulative environmental impacts. The LRGV is an area of concern for pesticide exposure from the use of pesticides on adjacent fields and in homes or gardens in the rural agricultural communities, and the urban communities in close proximity to agriculture (Belson et al., 2003; Donnelly and Cizmas, 2007).

Malathion is a pesticide approved for use against Mexfly; it is also a prescribed treatment for the Texas cotton boll weevil eradication program. The use of malathion in a Mexfly program within the Texas boll weevil quarantine (currently active in the counties of Brooks, Cameron, Hidalgo, Jim Hogg, Kenedy, Maverick, Starr, Webb, Willacy, and Zapata) should, therefore, be monitored and adjusted, where necessary, to minimize environmental impacts (TBWEF, 2015). Other treatments for potentially overlapping eradication programs in southern Texas target different arthropod species, and do not affect the same nontarget organisms (TDA, 2016c).

No significant environmental impacts are expected to result from proper implementation of this Mexfly eradication and control program. The differences in pesticide chemistries, targets for application, affected species and resources, and application timing between the Mexfly program and other pest control programs in Texas are not likely to create significant cumulative impacts in the human environment. No synergistic, additive, or cumulative impacts from pesticide applications in the Granjeño Quarantine Area are expected with the following active control programs (TDA, 2016c)—

- Asian citrus psyllid: Quarantine over the entire State; pesticide applications in the citrus-growing areas of eight counties, including Cameron, Hidalgo and Willacy.

- Citrus greening: Quarantine over six counties, including Cameron, Hidalgo and Willacy.

- Mexfly and other exotic fruit fly species: Mexfly quarantines in two areas of Cameron 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 Mexfly eradication program could lead to an increase in spinosad use, and the possible overlap of APHIS and non-APHIS program treatments. The Mexfly treatment schedule will be adjusted in locations where another CDFA or APHIS program may have scheduled similar treatments to avoid additive chemical impacts.

It is uncertain how pesticides may be used by private entities in the Mexfly program area. In terms of Federal and Texas 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 Texas, 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 Mexfly 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 assessments (APHIS, 2014, 2003, 1999, 1998a, and 1998b).

IV. Agencies Consulted

State Historic Preservation Officer
Texas Historical Commission
108 W. 16th Street
Austin, TX 78701

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 Risk and Analysis Services
4700 River Road, Unit 149
Riverdale, MD 20737

U.S. Fish and Wildlife Service
Ecological Services
c/o TAMU-CC
6300 Ocean Drive, Unit 5837
Corpus Christi, TX 78412

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EIS2—See U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 2008

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TWDB—See Texas Water Development Board

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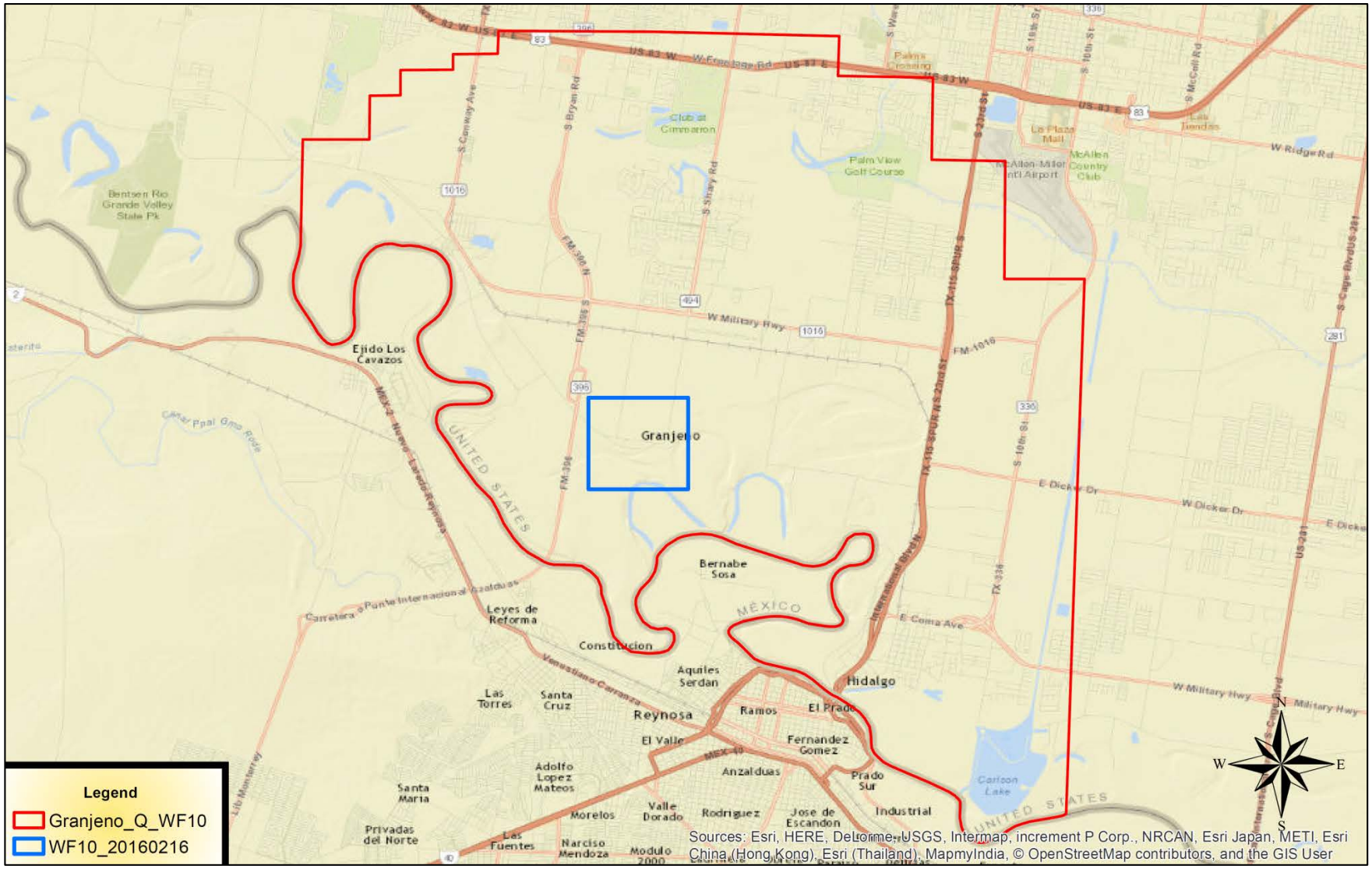
Appendix A. Overview of Mexfly Program Areas in the Lower Rio Grande Valley as of February 23, 2016

Appendix B. Granjeño Program Area as of February 19, 2016



Prepared by: USDA-APHIS-PPQ

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

The following resources were accessed by USDA-APHIS-PPD on 22 February 2016.

Web-Based Mapping Application

- **NepaAssist:** http://nepassisttool.epa.gov/nepassist/entry.aspx

For Information on—

- **Critical habitat for threatened/endangered species:** http://ecos.fws.gov/crithab/
- **Crop data:** http://nassgeodata.gmu.edu/CropScape/
- **Demographics:** http://nepassisttool.epa.gov/nepassist/entry.aspx
- **Historic Sites:** http://www.nps.gov/nr/research/ and http://nepassisttool.epa.gov/nepassist/entry.aspx
- **Migratory birds:** http://ecos.fws.gov/ipac/
- **National wildlife refuges:** http://viewer.nationalmap.gov/
- **Native American areas:** http://viewer.nationalmap.gov/
- **Organic Farms:** http://www.ams.usda.gov/AMSv1.0/nop
- **Schools:** http://nepassisttool.epa.gov/nepassist/entry.aspx
- **Superfund sites:** http://nepassisttool.epa.gov/nepassist/entry.aspx
- **Waters:** http://nepassisttool.epa.gov/nepassist/entry.aspx
- **Wetlands:** http://ecos.fws.gov/ipac/