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Quarantine for the South American Cactus Moth, *Cactoblastis cactorum,* in Florida, South Carolina, Georgia, Alabama, and Mississippi

Environmental Assessment
October 2008

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I. Background and Introduction

The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), is proposing to amend the domestic quarantine regulations to establish regulations to restrict the interstate movement of South American cactus moth (*Cactoblastis cactorum* Berg) host material, including nursery stock and plant parts for consumption, from infested areas of the United States (Florida, South Carolina, Georgia, Alabama, and Mississippi). This action would help prevent the artificial (human-assisted) spread of the South American cactus moth into uninfested areas of the United States.

Consistent with the National Environmental Policy Act of 1969 (NEPA) (42 United States Code 4321 *et seq*.) and the Council on Environmental Quality (CEQ) implementing regulations (40 Code of Federal Regulations (CFR) Parts 1500–1508), as well as the implementing procedures of the USDA, APHIS (7 CFR Part 372), this environmental assessment (EA) explores potential environmental effects associated with the proposed action and its alternatives, including no action.

A. Description and Life History of the South American Cactus Moth

1. Description

The South American cactus moth is a grayish-brown moth with a wingspan of 22 to 35 millimeters (approximately 0.86 to 1.4 inches) belonging to the insect family Pyralidae. The first instar larvae are 2.5 millimeters (mm) long and are greenish-gray in color. Later instar larvae have a rich salmon orange to red color with blackish spots that form bands. Full-grown larvae are about 33 mm long before they pupate. The moth is a serious pest of *Opuntia* species (also known as prickly pear cactus), and an occasional pest of *Nopalea*, *Cylindropuntia*, and *Consolea* species, four closely related opuntioid cactus genera belonging to the plant family Cactaceae.

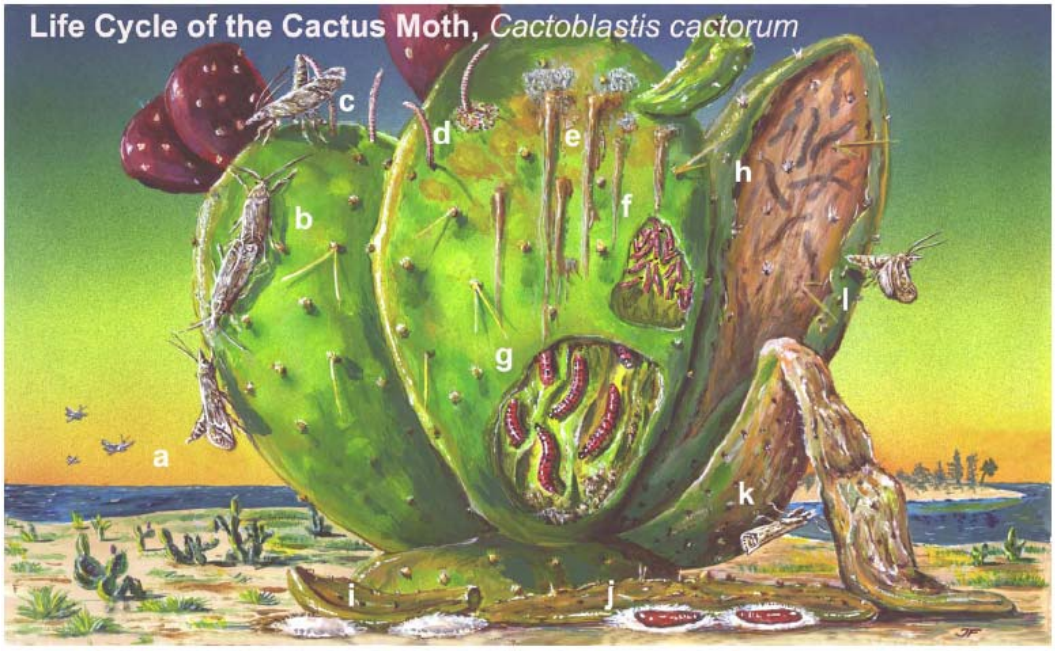
2. Life history

Before sunrise, the female moth begins to release sex pheromone signaling to males her readiness to mate. Males respond and mating takes place for a short time. After an incubation period, the female deposits an egg stick, which resembles a cactus spine, consisting of an average of 70−90 eggs. Eggs develop and hatch in 25−30 days. It takes from 130−180 days for larval development. The first instar larvae bore into the cactus pad and feed as a colony while tunneling through the cactus pad. The external damage is characterized by yellowing of plant tissue, with oozing of plant

fluids and insect frass. Larvae feed and develop internally, eventually hollowing out the cactus pad, and killing the plant. Mature larvae exit the cactus pad to form cocoons and pupate under debris on the ground at the base of the plant. After emergence, adult moths disperse to new areas. Typically, in the southeastern United States, the moth undergoes three generations per year. Within a short period of time, the South American cactus moth can destroy whole stands of cactus. See figure 1 for an illustration of the life cycle.

Figure 1. Illustration of the life cycle of the South American cactus moth (Joel Floyd, USDA-APHIS-PPQ)

a) Female moth releasing sex pheromone, (b) mating, (c) female depositing an egg stick, d) hatching, (e) external damage,(f) Shown here in cross-section, larval feeding, (g) internal development of larvae, (h) hollowing out the cactus pad, (i) mature larvae, (j) pupae, (k), adult moths.



B. History of the South American Cactus Moth

The South American cactus moth is native to the northern parts of Argentina, Uruguay, Paraguay, and the southern parts of Brazil. It was introduced from Argentina into Australia in the mid 1920's for the biological control of invasive and nonnative *Opuntia* species that had been introduced as natural fences for cattle. The moth was very effective in Australia where it cleared 25 million hectares invaded by *Opuntia stricta,* and is known as the best example of biological control of weeds in Australia and elsewhere. It was then intentionally introduced into other countries, such as South Africa, where prickly pear cacti were considered

problematic. It was intentionally introduced into the Caribbean Islands and Hawaii in the 1950's but by 1989, it had unexpectedly found its way into Florida, most likely by natural spread but possibly by movement of infested nursery stock. By 2003, the cactus moth has established in Florida, Georgia, and along the Atlantic coast almost as far north as Charleston, South Carolina. At the end of 2003, it had spread as far west as Pensacola, Florida near the Alabama state line. The pest has continued to move north and west and in July 2004, the moth was detected on Dauphin Island, Alabama. In August 2006, the moth was detected in Mexico on the island of Isla Mujeres, located 9 kilometers from the mainland in the state of Quintana Roo, in southeastern Mexico. In early 2008, the moth was discovered on two Mississippi barrier islands, Petit Bois and Horn Islands.

C. Damage Caused by the South American Cactus Moth

The feeding larvae cause physical damage by hollowing out and destroying young cactus pads that have not become woody. The damage caused by the larvae enables disease-causing organisms to enter the plant, leading to secondary infections that can cause death to the entire plant. If not controlled, the South American cactus moth poses a serious threat to opuntioid cacti in the United States and Mexico. The Southwestern United States and Mexico are home to 114 native species of *Opuntia*, which are highly valued for their ecological and agricultural uses. The rooting characteristics of *Opuntia* spp. reduce wind and rain erosion, encouraging the growth of other plants in degraded areas. In addition, many species of birds, mammals, reptiles, and insects eat, nest in, or otherwise rely on *Opuntia* spp. for survival. *Opuntia* spp. are also important sources of food, medicine, cosmetics, and dye. In Mexico, *Opuntia* spp. are an important agricultural commodity, and it is estimated that 2 percent of the value and production of Mexico's agriculture comes from them. In the Southwestern United States, *Opuntia* spp. are only a minor agricultural crop, but are popular plants in the landscaping and ornamental nursery industries. *Opuntia* spp. can also be an important source of emergency forage for cattle grazing during drought periods. If the South American cactus moth were to spread to these areas, there would be significant ecological and economic damage.

II. Purpose and Need for the Proposed Action

APHIS is proposing a quarantine program for the purpose of managing the artificial spread of the South American cactus moth with the

implementation of a quarantine wherever the moth is detected in the United States.

APHIS has responsibility for taking actions to exclude, eradicate, and/or control plant pests, including the South American cactus moth, under the Plant Protection Act (7 United States Code (U.S.C.) 7701 *et seq.*). APHIS has been delegated the authority to administer these statutes and has promulgated quarantines and regulations (7 CFR 319) which regulate the importation of commodities and means of conveyance to help protect against the introduction and spread of harmful pests. The underlying strategy of the proposed quarantine is to prevent the spread of the moth from currently infested areas to other States, particularly the *Opuntia*-rich areas of the United States, including Texas, New Mexico, Arizona, and California. Additionally, the purpose of the quarantine is to prevent artificial spread of the moth into Mexico, where *Opuntia* species are a significant agricultural commodity and where there is a high diversity of native *Opuntia*.

A. Decisions to be Made

A decision that must be made by APHIS is whether or not to amend the domestic quarantine regulations to establish regulations to restrict the interstate movement of South American cactus moth host material, including nursery stock and plant parts for consumption, from infested areas of the United States in order to prevent artificial spread of the South American cactus moth into uninfested areas of the United States and Mexico.

B. Relevant Issues

This EA will deal in detail with the issues of—

Biological Resources: The protection of cacti species (mainly *Opuntia*) susceptible to attack by the South American cactus moth and the species that depend on them in the United States, and the impact of insecticide treatments on nontarget species.

Threatened and Endangered Species: The effect of implementation of the quarantine on threatened and endangered species and their habitats in the United States. Section 7 of the Endangered Species Act requires that APHIS determine that actions it authorizes, funds, or carries out do not jeopardize the existence of threatened or endangered species or critical habitat.

III. Alternatives

APHIS considered two alternatives in response to prevent the artificial spread of the South American cactus moth into uninfested areas of the United States: no action and implementation of a quarantine. Both alternatives are described briefly in this section and the potential impacts of each are considered in the following section.

A. No Action

Under the no action alternative, APHIS would not amend the domestic quarantine regulations to establish regulations to restrict the interstate movement of South American cactus moth. Some control or management measures could be taken by other Federal or non-Federal entities; those actions would not be under APHIS' control nor funded by APHIS. The lack of measures to prevent the artificial or human-assisted spread of the South American cactus moth from infested areas could lead to an increase in moth populations and increase its range of distribution within the United States and Mexico.

Currently, cactus plants or parts thereof moving from Hawaii, Puerto Rico, or the U.S. Virgin Islands into the continental United States are prohibited or restricted under 7 CFR part 318 in order to prevent the spread of South American cactus moth. With limited exceptions, all plants, including cacti, imported into the United States for propagation from foreign countries are required to be accompanied by a phytosanitary certificate and to be inspected at a USDA, APHIS plant inspection station in accordance with 7 CFR part 319. Any propagative plant material found to be infested with the South American cactus moth currently must be returned to its place of origin, treated, or destroyed. Since the South American cactus moth larvae are internal feeders, they are difficult to detect during normal inspection. Therefore, the current regulations that require only inspection may not provide an adequate safeguard to prevent the introduction and spread of South American cactus moth. APHIS is in the process of amending the regulations to better address the risks associated with the movement of host material from areas where South American cactus moth is known to occur.

In order to provide a barrier to the natural westward spread of South American cactus moth, APHIS, in cooperation with the USDA, Agricultural Research Service (ARS) with funding provided by the Government of Mexico, is testing a sterile insect release program along the U.S. Gulf Coast. However, without a domestic quarantine program to address the artificial spread of the pest by restricting the movement of host material from infested States, this barrier alone will not be effective in stopping the westward movement of the South American cactus moth.

B. Implement a Quarantine

Under this alternative, APHIS would amend the domestic quarantine regulations to restrict the interstate movement of South American cactus moth host material, including nursery stock and plant parts for consumption, from infested areas of the United States, including Florida, South Carolina, Georgia, Alabama, and Mississippi. This alternative is expected to prevent the artificial spread of the cactus moth by limiting the movement of *Opuntia* spp. from South American cactus moth-infested areas into uninfested areas but is not expected to prevent the natural dispersal of the insect. To reduce the risk of artificial movement of South American cactus moth from infested areas to uninfested areas, the following conditions would apply:

1. Regulated Articles

Certain articles present a risk of spreading the South American cactus moth if they are moved from quarantined areas without restrictions; these are called regulated articles, and restrictions would be imposed on their movement because the South American cactus moth can survive in these materials if present and could possibly be transported to uninfested areas.

The following would be listed as regulated articles:

- The South American cactus moth, in any living stage of its development;

- Cactus plants or parts thereof (excluding seeds and canned, preserved, or frozen pads or fruits) of the following genera: *Consolea, Cylindropuntia, Nopalea*, and *Opuntia*; and

- Any other product, article, or means of conveyance when an inspector determines that it presents a risk of spreading the South American cactus moth.

The last item listed above, which would provide for the designation of "any other product, article, or means of conveyance" as a regulated article, would be intended to address the risks presented by, for example, a truck that may have inadvertently picked up plant material or adult South American cactus moths while driving through fields, thus enabling an inspector to designate that truck as a regulated article in order to ensure that any necessary risk-mitigating measures are carried out.

2. Quarantined Areas

Any State or portion of a State in which the South American cactus moth is found by an inspector, in which APHIS has reason to believe that the South American cactus moth is present, or that APHIS considers necessary to regulate due to the area's inseparability for quarantine enforcement purposes from localities in which the South American cactus moth has been found, would be listed as a quarantined area. APHIS would designate less than an entire State as a quarantined area only if it was determined that the State has adopted and is enforcing restrictions on the intrastate movement of regulated articles that are equivalent to those imposed on the interstate movement of regulated articles and that the designation of less than the entire State as a quarantined area would prevent the interstate spread of the South American cactus moth.

Areas quarantined because of the presence of the South American cactus moth would be listed in the revised regulations. Surveys conducted by State agriculture departments in Alabama, Florida, Georgia, South Carolina, and Mississippi during recent years have confirmed the presence of South American cactus moth in both wild and cultivated cactus plants. None of these States currently have intrastate quarantines in place. Therefore, APHIS proposes to designate the States of Alabama, Florida, Georgia, South Carolina, and Mississippi, in their entirety, as quarantined areas.

3. Interstate Movement of Regulated Articles

Any regulated articles from a quarantined area may be moved interstate if moved with a certificate or limited permit. Seeds and canned, preserved, or frozen pads or fruits of regulated cactus genera would not considered to be regulated articles because the life stages of the South American cactus moth either do not inhabit the specified plant part (i.e., seeds) or would be destroyed by the specified handling, processing, or utilization.

Regulated articles from a quarantined area may be moved interstate without a certificate or limited permit if the regulated article:

- Originated outside the quarantined area and is either moved in an enclosed vehicle or is completely enclosed by a covering (such as canvas, plastic, or other closely woven cloth) adequate to prevent access by South American cactus moths while moving through the quarantined area;

- Is kept in an enclosed vehicle or the enclosure that contains the regulated article is not opened, unpacked, or unloaded in the

quarantined area and the point of origin of the regulated article is indicated on the waybill; and

- Is moved through the quarantined area without stopping except for refueling or for traffic conditions, such as traffic lights or stop signs.

A certificate or limited permit would also not be required if the regulated article is moved by the USDA for experimental or scientific purposes in accordance with conditions specified on a departmental permit and with a tag or label bearing the number of the departmental permit issued for the regulated article attached to the outside of the container of the regulated article or attached to the regulated article itself if not in a container.

4. Certificates and Limited Permits

Certificates would be issued for regulated articles when an inspector or other person authorized to issue certificates finds that the articles have met the conditions of the regulations and may be safely moved interstate without further restrictions. Specifically, the proposed regulations would provide that a certificate may be issued for the interstate movement of a regulated article by an inspector, or a person operating under a compliance agreement, if the inspector or other authorized person determines that:

- The regulated article to be moved and all other regulated articles on the premises have been grown and maintained indoors in a shadehouse or greenhouse and no other cactus moth host material exists on the premises outside of a shadehouse or greenhouse;

- The regulated article to be moved and all other regulated articles on the premises are maintained on benches that are kept separate from benches containing non-host material;

- The regulated article to be moved and all other regulated articles on the premises have been placed on a 21-day insecticide spray cycle and have been sprayed with *Bacillus thuringiensis* subspecies *kurstaki* (Btk), carbaryl, spinosad, or imidacloprid if maintained in the nursery for longer than 21 days;

- The regulated article to be moved has been sprayed with Btk, carbaryl, spinosad, or imidacloprid 3 to 5 days prior to shipment and inspected and found free of South American cactus moth egg sticks and larval damage; and

- If the regulated article was moved into the premises from another premises in a quarantined area, it was immediately placed inside

the shadehouse or greenhouse and sprayed with Btk, carbaryl, spinosad, or imidacloprid within 24 hours.

Limited permits would be issued for regulated articles when an inspector finds that, because of a possible pest risk, the articles may be safely moved interstate only subject to further restrictions, such as movement to limited areas or movement for limited purposes. Specifically, the proposed regulations would provide that a limited permit may be issued by an inspector for the interstate movement of a regulated article if the inspector determines that the article (1) is to be moved interstate to a specified destination for specified handling, processing or utilization, and that the movement will not result in the spread of the South American cactus moth because life stages of the South American cactus moth will be destroyed by the specified handling, processing, or utilization; (2) will be moved in compliance with any additional conditions imposed by APHIS under section 414 of the Plant Protection Act (7 U.S.C. 7714) to prevent the spread of the South American cactus moth; and (3) is eligible for interstate movement under all other Federal domestic plant quarantines and regulations applicable to the regulated article.

5. Compliance Agreements

Compliance agreements would be provided for the convenience of persons who are involved in the growing, handling, or moving of regulated articles from quarantined areas. A nursery would be able to enter into a compliance agreement when an inspector has determined that the person requesting the compliance agreement has been made aware of the requirements of the regulations and the person has agreed to comply with the requirements of the regulations and the provisions of the compliance agreement.

6. Assembly and Inspection of Regulated Articles

The proposed regulations would provide that any person (other than an inspector or a person operating under a compliance agreement) who desires to move interstate regulated articles which must be accompanied by a certificate or limited permit would have to request that an inspector inspect the articles for movement no more than 48 hours before the desired movement. The regulated articles would have to be assembled in a place and manner directed by the inspector.

IV. Affected Environment

A. Hosts of the South American Cactus Moth

The South American cactus moth prefers to lay its eggs and feed on prickly pear cacti which fall in the genus *Opuntia*, species with typical flat prickly pear pads. An estimated 79 prickly pear species are at risk: 51 species endemic to Mexico; nine species endemic to the United States; and 19 species common to both countries. The threat may be limited to species within the subfamily Opuntiae (particularly *Opuntia, Nopalea*, and *Consolea* species). Other related cacti not thought to be preferred hosts are members of a newer named genus *Cylindropuntia* (formerly *Opuntia*), called "cholla cactus" (pronounced "choya"). The South American cactus moth attacks all six native *Opuntia* species in Florida and one of the rare species, *Opuntia spinosissima* P. Miller, is now threatened with extinction. The South American cactus moth can kill individual plants and whole populations of small-to medium-sized *Opuntia* species but individual plants of the large, woody tree-like *Opuntias* are generally not killed (Zimmerman et al., 2000).

The following is a list of *Opuntia* commonly used in nurseries and landscaping:

A selection of prickly pear species commonly found in the nursery and landscape trade:	
Opuntia basilaris	*O. microdasys*
O. engelmanii	*O. robusta*
O. ficus-indica	*O. rufida*
O. lindheimeri	*O. santa-rita*

The following is a list of *Opuntia* species, both native and naturalized, that are found in the United States (excluding non-native nursery stock):

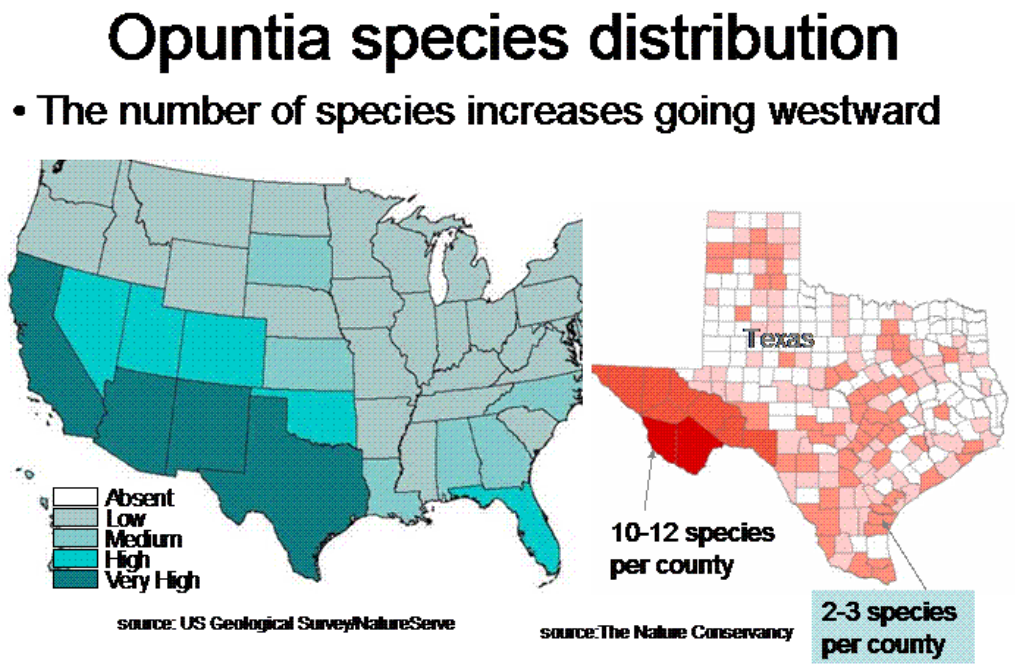
Alabama	**Arizona**	**California**
Opuntia ficus-indica	*O. aurea*	*O. basilaris*
O. humifusa	*O. basilaris*	*O. chlorotica*
O. monacantha	*O. chlorotica*	*O. engelmannii*
O. pusilla	*O. engelmannii*	*O. ficus-indica*
O. stricta	*O. ficus-indica*	*O. fragilis*
	O. fragilis	*O. littoralis*
	O. littoralis	*O. oricola*
	O. macrocentra	*O. phaeacantha*
	O. macrorhiza	*O. polycantha*
	O. phaeacantha	*O. tomentosa*
	O. pinkavae	

	O. polycantha *O. santa-rita*	
Colorado	**Florida**	**Louisiana**
O. fragilis *O. humifusa* *O. macrorhiza* *O. phaeacantha* *O. polycantha* *O. tortispina*	*O. cochennillifera (Syn. Nopalea cochenillifera)* *O. cubensis* *O. ficus-indica* *O. humifusa* *O. leucotricha* *O. monacantha* *O. pusilla* *O. spinosissima (Syn. Consolea corallicola)* *O. stricta* *O. triacantha*	*O. engelmannii* *O. ficus-indica* *O. humifusa* *O. macrorhiza* *O. monacantha* *O. pusilla* *O. stricta*
Mississippi	**Nevada**	**New Mexico**
O. engelmannii *O. ficus-indica* *O. humifusa* *O. monacantha* *O. pusilla* *O. stricta*	*O. basilaris* *O. chlorotica* *O. engelmannii* *O. fragilis* *O. phaeacantha* *O. polycantha*	*O. chlorotica* *O. cynochila* *O. engelmannii* *O. ficus-indica* *O. fragilis* *O. grahamii* *O. humifusa* *O. macrocentra* *O. macrorhiza* *O. phaeacantha* *O. polycantha* *O. santa-rita*
Texas	**Utah**	
O. aciculata *O. atrispina* *O. aureispina* *O. chisosensis* *O. cymochila* *O. edwardsii* *O. ellisiana* *O. engelmannii* *O. ficus-indica* *O. fragilis* *O. humifusa* *O. macrocentra* *O. macrorhiza*	*O. aurea* *O. basilaris* *O. chlorotica (Syn. Consolea chlorotica)* *O. engelmannii* *O. fragilis* *O. macrocentra* *O. macrorhiza* *O. phaeacantha* *O. pinkavae* *O. polycantha*	

O. phaeacantha *O. polycantha* *O. pusilla* *O. rufida* *O. santa-rita* *O. strigil*		

In the United States, the genera *Nopalea* and *Consolea*, are found only in Florida. Just one species of *Nopalea* (*N. cochinellifera*) is found in the United States and has naturalized from cultivation in central Florida (SDNHM, 2008). There is one species of *Consolea* in the United States, the nearly extinct native *C. corallicola* from the Florida Keys (SDNHM, 2008). *Cylindropuntia* has 20 species, six additional varieties and at least nine named interspecific hybrids in the United States (SDNHM, 2008).

These species would likely serve as hosts of the South American cactus moth in the United States and are at risk from this insect. Since prickly pear cactus occurs from Florida to California, with no significant geological barriers, the South American cactus moth can be expected to continue to expand its range where climates can accommodate. Predictive maps based on suitable climates in the native range have determined that there are no climatic restrictions for the moth in Mexico (Soberon et al., 2001). In the United States, there are 6 hardiness zones that the moth could potentially inhabit (Simonson et al., 2005). Exceptions may be areas of cold temperatures and extremely hot and dry desert areas (Simonson et al., 2005).



B. Nontarget Species Affected by Insecticides

Under the quarantine alternative, nurseries within the quarantined States that want to ship regulated articles to States outside of the quarantined area must have these articles placed on a 21-day insecticide spray cycle using the insecticides Btk, carbaryl, spinosad, or imidacloprid. These insecticides could have adverse impacts on invertebrate and aquatic species within the vicinity of the nurseries applying these insecticides. Currently, there are only about five nurseries within the area proposed for quarantine that have expressed interest in shipping regulated articles into States outside of the quarantined area.

If the South American cactus moth continues its spread across the United States and into Mexico, commercial prickly pear plantations would be the most likely to apply insecticides to protect their prickly pear plantings. Leibee and Osborne (2001) list an array of insecticides that could potentially be used in the United States to manage the moth. However, chemical control is expensive and potential nontarget effects are problematic (Stiling, 2002). It is not economical to protect low-value *Opuntia* orchards or natural populations with rigorous chemical control. Other management practices would likely be used including releases of sterile moths, as is currently being tested on the Gulf Coast, and pruning off infested pads. These practices in plantations and natural areas would have fewer impacts on nontarget species than insecticide applications.

V. Environmental Consequences

A. No Action

1. Impacts on *Opuntia* Species

Establishment of the South American cactus moth in the southwestern United States and Mexico could have devastating effects on the landscape and biodiversity of native desert ecosystems, and on the forage and vegetable prickly pear industries in these areas (IAEA, 2004).

a. Economic impacts

The risk of South American cactus moth spread to economic impacts in the southwest United States and Mexico is high (Simonson *et al.,* 2005 see appendix 1). Prickly pear cactus is of minor importance as an agricultural crop in the United States. However, the increase in demand for edible cactus leaves (nopales) and fruit (tuna) has been met largely through imports from Mexico where it is a significant agricultural crop (Garrett, 2004). In Mexico, several cultivated species are likely to be attacked by the moth including *O. albicarpa, O. amyclaea, O. cochinillifera, O. rubusta* var. *larreyi, O. streptacantha,* and particularly the many cultivars of *O. ficus-indica* (Zimmerman et al., 2000).

Prickly-pear cactus is important plant resource to the U.S. nursery and landscape industry. It is used as ornamental plant material for both commercial and residential landscape projects. They are grown as ornamental plants in public, private, residential, and commercial landscapes throughout the more arid areas of Arizona, California, Nevada, New Mexico, and Texas (Irish, 2001). A survey of Arizona nurseries indicated an inventory of 550,000 prickly pear plants in stock with retail value of $9.5 million (Irish, 2001). Small specialized nurseries would suffer more than large, diversified nurseries if prickly pear cacti were lost as a viable nursery crop (Irish, 2001).

During periods of drought, prickly-pear cactus is used as an emergency forage for cattle. The cactus can survive during dry periods when other forms of forage are absent. Both spined and spineless varieties are used as emergency forage. The reported value of prickly pear cactus to a small breeding herd of 50 head of cattle during the summer months when forage is limited could replace hay forage valued at up to $700 (Whitehead, 2003).

The plant has medicinal uses in several manufactured and cosmetic products in both the United States and Mexico. Cultivars of *O. ficus-indica* serve as host plants for rearing the cochineal insect, *Dactylopius*

coccus, which is the basis of a carmine-dye industry that has been in practice since ancient times (Sáenz-Hernández, 1995). Prickly pear cacti are so important in the life and culture of Mexico that they are depicted in the National flag and on the modern-day Mexican coat-of-arms (Zimmerman et al., 2000).

In south Texas, prickly-pear cactus serves as a wildlife food for game animals. Farm and rural residents that rent their land for hunting in hunting lease arrangements utilize natural plant life to maintain wildlife habitat in range and natural areas. The value of these hunting leases is higher than land grazing leases for cattle (Garrett, 2004).

b. Environmental resources

Prickly-pear cactus is important to wildlife habitat in much of the Southwest. Some estimates predict a 50 to 70 percent reduction in prickly pear cactus population would have a negative influence on most wildlife habitat in Texas (Rakowitz, 1997). Prickly pear cactus comprises 21 to 33 percent of the diet of the white-tailed deer in the south and west region of Texas, and it comprises as much as 85 percent of the javelina's diet. It can provide shade and resting habitat for bird species and nesting habitat for bird species such as the cactus wren and the curve-billed thrasher. In the southern rolling plains of Texas, 57% of bobwhite nests were found in prickly pear cactus (Carter et al., 2002). The fruits are consumed by birds such as thrushes and woodpeckers, the desert woodrat (*Neotoma lepida*), and by the Texas tortoise (*Gopherus berlandieri*). Numerous native bee species are visitors to prickly pear and cholla cacti. Honey bees are also attracted to the *Opuntia* flowers.

Prickly pear cactus is important for soil conservation in the fragile desert environment. Loss of cactus will alter the nutrients available in soil profiles, affecting the microbial communities (IAEA, 2004). This will in turn affect the composition and structure of plant communities (IAEA, 2004). *Opuntia* species have been identified as nurse plants, facilitating the establishment of other plant species by providing a more moderate and protected growing environment (IAEA, 2004). Reduction of nurse plants can lead to lower forage availability, and increased bare ground and erosion in arid desert landscapes (IAEA, 2004).

Central Mexico is considered an important center of biodiversity for opuntioid cacti. Cacti in the genera *Nopalea, Consolea,* and *Opuntia* comprise more than 200 species worldwide, of which 114 are present in Mexico (Vigueras and Portillo, 2001).

c. Recreational resources

Tourism and many recreational activities occur in the same areas in the southwestern United States where the prickly pear cactus comprises a significant portion of the plant life (IAEA, 2004). Aesthetic values are important to ecotourists, hikers, campers, picnickers, and sightseers who enjoy the plant life in parks and monuments. Because prickly pear provides an important food source to wildlife, loss of these species could impact hunters and bird watchers.

B. Implement a Quarantine

The quarantine alternative is designed to stop the spread of the South American cactus moth through human actions. Quarantine is widely accepted as an effective method to prevent the artificial or human-assisted spread of pests. Quarantine regulations would require that regulated articles to be moved out of the quarantined area have been placed on a 21-day insecticide spray cycle if maintained in the nursery for longer than 21 days The regulated articles to receive insecticide treatment include cactus plants or parts thereof of the following genera: *Consolea, Cylindropuntia, Nopalea*, and *Opuntia*. The environmental impacts of any required insecticide treatments are expected to be minimal as the treatments are generally considered to be safe and routine measures when conducted according to general practices and will be applied to plants in greenhouses and shadehouses.

1. Insecticides

The four insecticides considered for use in quarantine treatments will be spinosad, Btk, carbaryl, and imidacloprid. The use of one product as opposed to the other is at the discretion of the nursery operator.

a. Spinosad

(1) Toxicity

Spinosad is an insecticide that contains the two active ingredients, spinosyn A and spinosyn D. Spinosyn is a metabolite of the bacteria, *Saccharapolyspora spinosa*, which has been shown to demonstrate insecticidal activity (Thompson et al., 2000). Spinosad is registered as a reduced risk pesticide by EPA, Office of Pesticide Programs and is listed by the Organic Material Reviews Institute (OMRI) for use in organic production. It has insecticidal activity against some butterflies and moths (Lepidoptera), thrips (Thysanoptera), flies (Diptera), termites (Isoptera), wasps, ants and bees (Hymenoptera), and some beetles (Coleoptera)

(Cleveland et al., 2001). Spinosad is used in two primary formulations, Tracer® and Entrust®, to control a wide variety of pests on multiple crops.

Spinosad has low toxicity to mammals based on acute LD_{50} (values of 3,738 mg/kg and >5,000 milligrams (mg)/kilogram (kg) for male and female rats, respectively (EPA, 1997). An LD_{50} is defined as a dose of a substance that produces death in 50 percent of a population of experimental animals. The dermal and inhalation toxicity is also low with a dermal LD_{50} value of >2,000 mg/kg in the rat, and an inhalation acute LC_{50} value of >5.18 mg/liter (L) in the rabbit (EPA, 1997). An LC_{50} is defined as the lethal concentration required to kill 50 percent of the test population. Based on chronic exposure studies, spinosad has not been shown to be carcinogenic, mutagenic, or a reproductive toxicant in rats. Metabolism studies revealed that spinosyn A and D have similar routes of excretion and are metabolized in a similar manner with most of the material excreted within 48 hours.

Spinosad also has low toxicity to birds with acute LD_{50} and LC_{50} values for the bobwhite quail and mallard duck greater than the highest test concentration tested, 1,333 mg/kg and 5,156 mg/kg, respectively (EPA, 1997). Chronic toxicity to birds is also low with a no observable effect concentration (NOEC) of 550 parts per million (ppm) for the bobwhite quail and mallard duck. Toxicity tests using terrestrial plants demonstrate that spinosad is not phytotoxic. Toxicity to terrestrial invertebrates has shown a range of sensitivities based on the test species and exposure route (Holt et al., 2006; Miles and Eelen, 2006; Kim et al., 2006; Medina et al., 2003; Cisneros et al., 2002; Elzen, 2001). Spinosad has comparatively lower toxicity to predatory mites and other beneficial insects such as predatory bugs (Hemiptera), flies, beetles and spiders (Miles and Eelen, 2006). Parasitic wasps appear to be more sensitive to spinosad when compared to predatory insects (Miles and Eelen, 2006; Williams et al., 2003). Spinosad is highly toxic to honeybees and bumblebees, based on oral and contact studies (EPA, 1997; Morandin et al., 2005).

Spinosad is slightly toxic to fish, with carp (*Cyprinus carpio*) being the most sensitive of the species tested (LC_{50} = 4.99 mg/L) and the rainbow trout (*Oncorynchus mykiss*) being the least sensitive (LC_{50} = 30 mg/L). In chronic early life stage studies, the rainbow trout (*O. mykiss)* had a NOEC value of 0.498 mg/L while the sheepshead minnow's NOEC value was 1.15 mg/L. Acute aquatic invertebrate toxicity is comparable to fish, based on toxicity values for *Daphnia magna* and the mysid shrimp (*Palaemonetes pugio*; however, spinosad is considered highly toxic to the eastern oyster (*Crassostrea virginica*), with a median lethal effective concentration (EC_{50}) value of 0.295 mg/L. Chronic toxicity to aquatic invertebrates ranged from a NOEC of 0.62 mg/L for *D. magna* in a 25-day exposure study to a NOEC of 84.2 mg/L for the mysid shrimp in a 28-day

exposure (Cleveland et al., 2001). Toxicity to aquatic plants varies widely with green algae (*Selenastrum capricornutum*) being the least sensitive (EC_{50} >105 mg/L), and the freshwater diatom (*Navicula pelliculosa*) being the most sensitive species with an EC_{50} and NOEC value of 0.135 and 0.049 mg/L, respectively (Cleveland et al., 2001).

(2) Exposure and risk

Spinosyn A is considered soluble at 89.4 mg/L while spinosyn D is comparatively insoluble at 0.49 mg/L. In soil, spinosyn A has a relatively short half-life ranging from 9.4 to 17.3 days, while spinosyn D has a soil half-life of 14.5 days. Spinosyn A and D are not considered mobile based on the soil-binding affinity of spinosyn A which has reported adsorption coefficients ranging from 5.4 to 323. The soil-binding affinity for spinosyn D is unknown; however, it is assumed to be higher than spinosyn A because of its low solubility in water. In field dissipation studies, the half-lives for spinosyn A were short with a reported range of 0.3 to 0.5 days. In aquatic environments, spinosyn A and D are considered stable to hydrolysis at all relevant pH values; however, photodegradation in water results in a half-life of less than a day for spinosyn A and D. Spinosyn A has been shown to have a low potential to bioaccumulate in fish tissue.

The exposure and risk of spinosad to human health is expected to be low due to the favorable toxicity profile, use pattern, and the fate of spinosad in the environment. Risk to nontarget terrestrial and aquatic wildlife is expected to be negligible since applications will occur in greenhouses eliminating exposure. Some terrestrial invertebrates present in a greenhouse during the time of application could be impacted but effects will be restricted to indoors.

b. *Bacillus thuringiensis kurstaki* (Btk)

(1) Toxicity

Btk is a naturally derived soil bacteria that has selective insecticidal activity against certain Lepidopteran (butterfly and moth) species. Btk is available in several formulations with some approved for use in organic production.

Based on mammalian toxicity studies testing the technical active ingredient and the formulated product, Btk has low acute oral, dermal, and inhalation toxicity and pathogenicity (EPA, 1998; USDA, FS, 2004). These laboratory studies have also been supported by epidemiology studies that revealed no direct human health effects from Btk applications. Results from laboratory and epidemiology studies indicate that Btk is not a

carcinogen, mutagen, or a reproductive toxicant (EPA, 1998; USDA, FS, 2004). Btk is not considered a strong irritant, based on the proposed use pattern for this program.

Btk is considered to have low toxicity to birds, based on acute oral and dietary toxicity values. Oral LD_{50} values were greater than 3,333 mg/kg/day and dietary LC_{50} values were greater than 1.8×10^{10} spores/kg for the bobwhite quail and mallard duck (EPA, 1998). Chronic toxicity studies for birds have not been undertaken because Btk's low acute toxicity does not justify the effort. The lack of acute toxicity to birds is supported by several field studies where no direct effects to birds were seen in forestry applications of Btk; however, some indirect effects were noted in studies where birds relied on caterpillar larvae as a primary food source. In some cases slight effects on reproduction, such as nestling growth rates, were noted (Norton et al., 2001); however, in other studies, no indirect effects on reproduction were noted (USDA, FS, 2004). The studies that noted indirect effects had applications over large forested areas which will not occur in the proposed treatments for South American cactus moth. Effects to nontarget terrestrial invertebrates are highly variable and dependent on the test organism. Even within the lepidopteran group (butterflies and moths), sensitivities can be highly variable (Peacock et al., 1998). In general, toxicity to pollinators and beneficial insects is considered low based on laboratory and field studies testing honeybees, as well as other beneficial insects (USDA, FS, 2004).

Btk has low acute aquatic vertebrate toxicity based in laboratory studies with multiple freshwater and saltwater fish species. In all cases, the calculated LC_{50} value was above the highest test concentration used in the study (USDA, FS, 2004). Sublethal toxicity to fish is also low with a reported NOEC of 1.4 mg/L for the most sensitive fish species. Btk has low toxicity to *D. magna* in 21-day studies with EC_{50} values between 5 and 50 mg/L, while other aquatic invertebrate groups such as mayflies, stoneflies, copepods, and mysid shrimp appear to be tolerant of Btk when exposed to concentrations well above those expected in the environment (USDA, FS, 2004). Results from laboratory studies are supported by field data that suggest minimal effects to aquatic invertebrates from Btk use (Richardson and Perrin, 1994; Kreutzweiser et al., 1992; USDA, FS, 2004).

(2) Exposure and risk

Btk persistence in terrestrial environments is dependent upon light, moisture, and temperature. Increased exposure to light, higher temperature, and moisture decrease the viability of Btk. In a summary regarding the environmental fate of Btk, the majority of studies indicate that insecticidal activity of Btk is approximately 1 week; however, other

studies have shown that while spore viability can decrease rapidly, insecticidal activity can persist up to 3 months under certain environmental conditions (USDA, APHIS, and FS, 1995). In water, Btk activity is photolytically sensitive and dependent on organic matter content and salinity (USDA, APHIS and FS, 1995). Spores have been detected in aquatic field studies for 13 days and up to 4 weeks after spraying.

Based on the method of application and the low mammalian and nontarget toxicity of Btk risk from program applications are expected to be negligible. Adherence to the label will minimize exposure to applicators while risks to nontarget organisms is not expected since applications will occur inside greenhouse areas.

c. Carbaryl

(1) Toxicity

Carbaryl is a carbamate insecticide with a mode of action that occurs primarily through acetylcholinesterase (AChE) inhibition (Klaassen et al., 1986). The AChE enzyme is responsible for the breakdown (hydrolysis) of acetylcholine, a neurotransmitter that permits the transmission of nerve impulses across the nerve synapse. Carbamates exhibit a reversible pesticide-enzyme binding reaction (carbamylation), which results in gradual decreases in binding as their concentration decreases through metabolism and excretion.

Carbaryl is moderate in toxicity when ingested by male and female rats. The oral LD_{50} in male and female rats is 302.6 mg/kg and 311.5 mg/kg, respectively (EPA, OPPTS, 2003b). Low doses can cause skin and eye irritation. The acute inhalation LD_{50} is 721 mg/kg (HSDB, 1987). The acute dermal toxicity is low with an LD_{50} in excess of 4,000 mg/kg for rats and in excess of 5,000 mg/kg for rabbits. Based on chronic toxicity data at high doses carbaryl has been demonstrated to be a possible carcinogen and mutagen (EPA, 2003b). Long term reproductive and developmental studies using different mammal species demonstrate NOEL values that range from approximately 4 mg/kg/day to greater than 1000 mg/kg/day based on the test species and endpoint.

The acute oral LD_{50} of carbaryl to avian species ranges from 16 mg/kg to >2000 mg/kg with starlings (*Sturnis vulgaris*) and red-winged black birds (*Agelaius phoeniceus*) considered to be the most sensitive (Hudson et al., 1984; Schafer et al., 1983). Chronic toxicity to birds based on standardized reproduction tests is low with chronic NOEC values ranging from 300 to 3000 ppm depending on the test species and endpoint.

Carbaryl is highly toxic to honey bees (*Apis mellifera*), with an acute contact LD_{50} of 0.0011 mg/bee; however, acute contact toxicity testing of Carbaryl SC indicates bees are slightly less sensitive to the formulated product with an LD_{50} of 0.0040 mg/bee (EPA, 2003a). Based on toxicity data for several groups of terrestrial arthropod predator, carbaryl effects can range from moderately to highly toxic (EPA, 2003a).

The 96-hour median lethal concentration of carbaryl to fish ranges from 0.25 mg/L for the Atlantic salmon, *Salmo salar* to 20 mg/L for *Amelurus melas* (Mayer and Ellersieck, 1986). Species of catfish and minnow are generally 10 times more tolerant than salmonids. Sublethal acute and chronic effects to fish occur at lower concentrations with NOEC values ranging from 0.1 mg/L to 0.65 mg/L for reproductive effects and behavioral effects such as swimming behavior and predator avoidance (Beyers et al., 1994; Labenia et al., 2007). Carbaryl is very highly toxic to all aquatic insects and highly to very highly toxic to most aquatic crustaceans. The toxicity from 96-hour static tests ranged from 1.5 µg/L in the shrimp, *Paneaus aztecus*, to 22.7 mg/L in the mussel, *Mytilus edulis*. (Mayer, 1987; EPA, 2003a).

(2) Exposure and risk

Carbaryl is not considered to be persistent in soil due to multiple degradation pathways including hydrolysis, photolysis and microbial metabolism. Residues in soil, water and on plants are short-lived with half lives ranging from a few hours to approximately 21 days under aerobic conditions (EPA, 2003a).

Based on the favorable environmental fate profile of carbaryl and its proposed use pattern the risk to human health and nontarget fish and wildlife is expected to be minimal. Applications will be made according to label with appropriate protective equipment used to minimize exposure to applicators. Risks to fish and wildlife will also be minimal since the applications are being made inside greenhouses which will eliminate the possibility of drift and runoff from treated areas.

d. Imidacloprid

Imidacloprid is a systemic neo-nicotinyl insecticide that is used to control primarily sucking insects in a wide variety of agricultural and non-agricultural uses. Imidacloprid is available in several formulations that can be used for foliar, soil and seed applications. The mode of action is based on its ability to interfere with neurotransmission in the nicotinic cholinergic nervous system.

(1) Toxicity

Imidacloprid is moderately toxic to mammals with mice and rat median lethal doses ranging from 131 to 450 mg/kg. Acute dermal and inhalation toxicity is considered low with median lethal concentrations greater than the highest test concentration tested in both studies. Long term toxicity varies depending on the length of the study and endpoint assessed with NOEL values ranging from 5.7 to 1000 mg/kg/day (EPA, 2007; CA DPR, 2006). Imidacloprid is not carcinogenic and is considered a weak mutagen.

Imidacloprid is considered highly toxic to birds based on oral median toxicity values which range from 41.0 mg/kg for the house sparrow (*Passer domesticus*) to 152.3 for the bobwhite quail. Chronic NOEL values for birds range from 61 to 126 ppm (EPA 2008). Imidacloprid is also considered toxic to honeybees with oral and contact LD50 values ranging from 0.0039 to 0.078 µg/bee.

In aquatic systems imidacloprid acute toxicity to fish is low with median toxicity values ranging from greater than 83 mg/L to 280 mg/L for different fish species. Aquatic invertebrates are more sensitive when compared to fish with LC_{50}/EC_{50} values ranging from 1 µg/L for the ostracod, *Cyretta seurata*, to 85.2 mg/L for *Daphnia magna* (EPA, 2008; Sanchez-Bayo and Goka, 2006). Chronic toxicity to aquatic biota ranges from a LOEC of 1.2 mg/L for the rainbow trout to 3.6 for *D. magna*.

(2) Exposure and risk

Imidacloprid degradation occurs primarily through photolysis and microbial degradation. Photodegradation is much quicker in water with a half life of four hours compared to soil where the half life is 171 days. Imidacloprid is resistant to hydrolysis and persists in soil based on aerobic soil metabolism half life values of 188 days to greater than one year. Based on the solubility, persistence and mobility of imidacloprid it is considered a threat to groundwater (CA DPR, 2006).

Human health and the environmental risks of imidacloprid use in this program are minimal. Applications are made inside greenhouses where the only significant amount of exposure that would be expected would be to applicators. The method of application and adherence to the label will reduce the exposure and subsequent risk to applicators. Risk is extremely low to nontarget organisms since exposure is not expected due to the method of application. Risks to resources such as groundwater are not expected since applications will occur directly to plants where a majority of the chemical will be taken up by the treated cactus or restricted to soil inside containers.

2. Summary

Insecticides proposed in this program have a varied toxicological profile. While the potential human health and environmental effects of some products are greater than others the risks are comparable due to the method of application and where plants will be treated. Human health risks to each program insecticide will be minimal due to the method of application and adherence to label recommendations which will minimize exposure to humans, and in particular applicators. Risks to the environment are comparable and extremely low since all applications will occur in greenhouses and shadehouses and eliminate the potential for exposure and risk.

C. Cumulative Effects

"Cumulative impacts are defined as the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agencies or person undertakes such other actions" (40 CFR 1508.7).

Direct cumulative impacts attributed to the quarantine for the South American cactus moth could be related to the use of the insecticides Btk, carbaryl, spinosad, or imidacloprid to treat host material before it is shipped from the quarantined area to unifested States. The use of these insecticides in the quarantined area will have no negative cumulative impacts because very few nurseries are interested in shipping prickly pear cacti out of the quarantined area. In addition, insecticide treatments will be applied within enclosed areas (shadehouses and greenhouses), limiting exposure and risk to human health and the environment.

Without successful implementation of the quarantine, the South American cactus moth may spread more rapidly into uninfested areas of the United States and Mexico. Loss of prickly pear cactus over time, due to cactus moth infestation, would result in negative environmental and economic impacts and alter native desert ecosystems.

D. Endangered Species Act

Section 7 of the Endangered Species Act its implementing regulations require Federal agencies to ensure that their actions are not likely to jeopardize the continued existence of federally listed threatened and endangered species or result in the destruction or adverse modification of critical habitat.

There is one federally-listed endangered *Opuntia* species, Bakersfield cactus (*Opuntia treleasei*) that occurs in the southern San Joaquin Valley

of California and may be attacked by the South American cactus moth. A candidate for Federal listing, the Florida semaphore cactus (*Consolea corallicola*) is known to be attacked by the moth. Although the South American cactus moth already occurs in Florida where the Florida semaphore cactus is found, implementation of the quarantine could have a beneficial effect by preventing the artificial spread of the moth into the currently uninfested State of California, where the Bakersfield cactus occurs.

Implementing the quarantine may benefit listed species that are dependent on hosts of the South American cactus moth in the southwestern United States and Mexico. In Florida, where the moth is already present, *Opuntia* habitats are shared by the endangered Schaus swallowtail butterfly (*Heraclides aristodemus ponceanus*) and the candidate for listing, Bartram's hair-streak butterfly (*Strymon acis bartrami*) (Habeck and Bennett, 1990). The moth has nearly eliminated cacti from the preserve on the Florida Atlantic University's Boca Raton campus that serve as an important food source for the threatened gopher tortoise (*Gopherus polyphemus*) (IAEA, 2004).

Currently, no nurseries in Alabama or Georgia plan to distribute moth hosts interstate. Therefore, implementation of the quarantine would have no effect on federally listed species in those States.

Only one nursery in South Carolina, one in Mississippi, and three in Florida have expressed interest in shipping regulated articles outside of the quarantined area. APHIS has determined that the application of insecticides (spinosad, Btk, carbaryl, and imidacloprid) will have no effect on listed species in the vicinity of the five nurseries considered in this document for the following reasons:

1. No federally listed species have been documented in the vicinity of any of the nurseries.
2. Plants that are treated will be located on benches within enclosed greenhouses and shadehouses. Federally listed animals and plants would not be exposed to insecticides applied within these enclosures. Thus, no impacts to pollinators of listed plants and no chronic or acute toxic effects to listed animals are expected.
3. Insecticides will not be applied in outdoor areas.

VI. Other Issues

Consistent with Executive Order (EO) 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations," APHIS considered the potential for disproportionately high and adverse human health and environmental effects on any minority populations and low-income populations. The environmental and human health effects from either of the alternatives are minimal and are not expected to have disproportionate adverse effects to any minority or low-income populations.

Consistent with EO 13045, "Protection of Children from Environmental Health Risks and Safety Risks," APHIS considered the potential for disproportionately high and adverse environmental health and safety risks to children. No circumstances that would trigger the need for special environmental reviews are involved in implementing any of the alternatives. The program applicators will ensure that the general public is not in or around areas being treated and, therefore, no exposure will occur from the application of any herbicides. Hence, it is expected that no disproportionate effects on children are anticipated as a consequence of implementing any of the alternatives evaluated above.

VII. Agencies, Organizations, and Individuals Consulted

This EA was prepared and reviewed by APHIS. The addresses of participating APHIS units, cooperators, and consultants (as applicable) follow.

U.S. Department of Agriculture
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Policy and Program Development
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4700 River Road, Unit 149
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U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection and Quarantine
Emergency and Domestic Programs
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Finding of No Significant Impact
for
Quarantine for the South American Cactus Moth, *Cactoblastis cactorum*, in Florida, South Carolina, Georgia, Alabama, and Mississippi
Environmental Assessment,
October 2008

The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), has prepared an environmental assessment (EA) that analyzes the potential environmental consequences of amending the domestic quarantine regulations to establish regulations to restrict the interstate movement of South American cactus moth (*Cactoblastis cactorum* Berg) host material, including nursery stock and plant parts for consumption, from infested areas of the United States (Florida, South Carolina, Georgia, Alabama, and Mississippi). This action would help prevent the artificial (human-assisted) spread of the South American cactus moth into uninfested areas of the United States. The EA, incorporated by reference in this document, is available from:

U.S. Department of Agriculture
Animal and Plant Health inspection Service
Plant Protection and Quarantine
Emergency and Domestic Programs
Emergency Management
4700 River Road, Unit 134
Riverdale, MD 20737-1236
http://www.aphis.usda.gov/plant_health/ea/cactoblastis.shtml

The EA analyzed two alternatives consisting of no action, and implementation of a quarantine to restrict the interstate movement of South American cactus moth host material, including nursery stock and plant parts for consumption, from infested areas of the United States, including Florida, South Carolina, Georgia, Alabama, and Mississippi. Notice of the EA was made available in the Federal Register on September 18, 2008 for a 30-day public comment period. No comments were received on the EA.

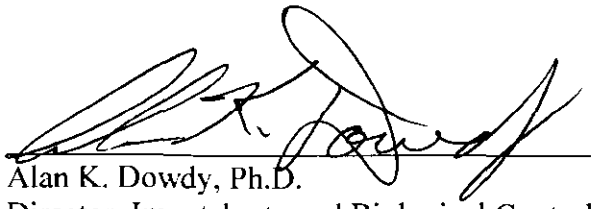
APHIS' finding of no significant impact for this program is based upon the expected limited environmental consequences, as analyzed in the EA. The EA evaluated the potential environmental effects of the quarantine on cacti (mainly *Opuntia* species), and insecticide treatments on nontarget organisms, human health, and federally-listed threatened and endangered species.

The implementation of the quarantine would stop the spread of the South American cactus moth from infested areas to unifested areas through human actions (artificial spread), thus preventing economic, environmental, and recreational impacts as a result of loss of cacti species in the United States. Human health risks due to use of program insecticides (spinosad, imidacloprid, *Bacillus thuringiensis* var. *kurstaki*, and carbaryl) would be minimal due to the method of application and adherence to label recommendations that will minimize exposure to humans, and

in particular applicators. Risks to the environment are extremely low since all applications will occur in greenhouses and shadehouses which will eliminate the potential for exposure and risk. APHIS prepared a biological assessment and has determined that applications of insecticides will have no effect on federally-listed threatened and endangered species at the five nursery locations that have requested to ship regulated articles interstate.

There are no disproportionate adverse effects to minorities, low-income populations, or children in accordance with Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations" and Executive Order 13045, "Protection of Children from Environmental Health Risks and Safety Risks."

An environmental impact statement (EIS) must be prepared if implementation of the proposed action may significantly affect the quality of the human environment. I have determined that there would be no significant impact to the human environment from the implementation of the action alternative and, therefore, no EIS needs to be prepared.



10-28-2008

Alan K. Dowdy, Ph.D. Date
Director, Invertebrate and Biological Control Programs
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Plant Protection and Quarantine
United States Department of Agriculture