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Marketing and Regulatory Programs

Animal and Plant Health Inspection Service

Giant African Snail Cooperative Eradication Program

Miami-Dade County, Florida

Environmental Assessment Supplement, February 2013

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I. Introduction

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), in cooperation with the Florida Department of Agriculture and Consumer Services (FDACS), is conducting a program to eradicate the giant African snail (GAS), *Lissachatina* (*Achatina*) *fulica*, in Miami-Dade County, Florida. GAS is a large, African terrestrial snail in the family Achatinidae. It has been introduced purposefully and accidentally to many parts of the world for medicinal purposes, food (escargot), as pets, and for research purposes. Where it is introduced, it has the potential to be a significant pest of agricultural crops and can serve as an intermediate host for the rat lungworm (Venette and Larson, 2004) which has been identified in a small sample of GAS recently collected in Florida. As a result, this species has been listed as one of the 100 worst invasive species in the world (Lowe et al., 2000).

A. Background

On September 8, 2011, GAS was confirmed in the Coral Gables area of Miami-Dade County, Florida. As of November 24, 2012, nearly 101,400 snails have been collected with more than 58,800 properties surveyed and 22,748 treatments with iron phosphate or boric acid bait (FDACS, 2012). It is still unknown how or when the snails entered the United States or how the area became infested. Since the initial detection, APHIS has actively worked with the FDACS to conduct survey, regulatory, control and outreach activities. While residential areas have been affected, to date, extensive surveys of nurseries and agricultural production facilities within the infested areas have been negative for GAS. See Appendix A for a map of the currently infested areas in Miami-Dade County.

In October 2011, an environmental assessment (EA) was prepared for the program to eradicate GAS from Miami-Dade County in Florida (USDA, APHIS, 2011). This EA is incorporated by reference into this document and is available at http://www.aphis.usda.gov/plant_health/ea/gas.shtml. The EA analyzed alternatives consisting of (1) no APHIS action other than to continue to prohibit the importation and interstate movement of GAS, and confiscate it where discovered, and (2) the preferred alternative, where APHIS would work cooperatively with FDACS to eradicate this exotic snail from Miami-Dade County, Florida. The EA described the effects of GAS on the environment and analyzed the impacts of the use of a molluscicide, iron phosphate, in conjunction with physical removal for eradication of GAS. APHIS issued a finding of no significant impact (FONSI) dated October 7, 2011, concluding that implementation of the program would not significantly impact the quality of the human

environment. This FONSI is available at http://www.aphis.usda.gov/plant_health/ea/gas.shtml.

In August 2012, a supplemental EA was prepared to add the molluscicide boric acid to the GAS program in Miami-Dade County (USDA, APHIS, 2012). This EA is also incorporated by reference into this document and is available at http://www.aphis.usda.gov/plant_health/ea/gas.shtml. The EA analyzed two alternatives consisting of (1) no action (not adding boric acid to the program and continuing the program as described in the October 2011 EA), and (2) adding boric acid to the GAS program to increase the efficacy of the GAS program. APHIS issued an amended FONSI dated November 14, 2011, concluding that the addition of boric acid to the existing GAS eradication program would not significantly impact the quality of the human environment. The amended FONSI is available at http://www.aphis.usda.gov/plant_health/ea/gas.shtml.

B. Purpose and Need

APHIS has the responsibility for taking actions to exclude, eradicate and/or control plant pests under the Plant Protection Act of 2000 (7 United States Code (U.S.C.) 7701 et seq.). APHIS, in cooperation with the FDACS, is proposing to add the molluscicide metaldehyde to the program to eradicate the GAS from Miami-Dade County, Florida.

The purpose of this action is to increase the efficacy of the GAS eradication program which currently uses the molluscicides iron phosphate and boric acid. The proposed addition of metaldehyde will allow for treatments to be made in areas where high densities of GAS may occur and provide an alternative product where greater efficacy may be required.

This EA has been prepared consistent with the National Environmental Policy Act of 1969 (NEPA) and APHIS' NEPA implementing procedures (7 Code of Federal Regulations (CFR) part 372) for the purpose of evaluating how the proposed action, if implemented, may affect the quality of the human environment.

II. Alternatives

This EA analyzes the potential environmental consequences associated with no action and the proposed action to add metaldehyde as a control method to the GAS eradication program. Two alternatives are being considered: (1) no action by APHIS to add metaldehyde to the program; the program would continue as described in the previous EAs prepared for this program, and (2) the preferred alternative, to add metaldehyde as a treatment to eradicate GAS from Miami-Dade County in Florida.

A. No Action

Under the no action alternative, APHIS would continue the current GAS eradication program without adding metaldehyde as a treatment option for the program. The GAS eradication program is a cooperative effort between APHIS and FDACS, and uses two molluscides. One contains iron phosphate and the other contains boric acid as the active ingredients.

The iron phosphate formulation used by the program is Sluggo®-AG which contains 1.0% iron phosphate and a slug and snail bait attractant in the form of wheat gluten. After eating the bait, snails stop feeding immediately because the iron phosphate interferes with calcium metabolism in their gut. Snails die three to six days later. Sluggo®-AG is a pellet that is applied with a broadcast spreader, such as would be used to apply grass seed or fertilizer, in a 200-yard radius from GAS finds. The bait is applied evenly at approximately 20–44 pounds per acre, or 0.5–1 pound per 1,000 square feet. The bait is reapplied at least every two weeks. Treatments are applied year-round. A 10-foot treatment buffer from aquatic areas is observed.

Boric acid is used in a variety of agricultural and non-agricultural applications, such as residential, commercial, medical, veterinary, and industrial uses. A granular formulation that is applied using a broadcast spreader is used by the GAS program. The product used, NiBan®, contains 5% orthoboric acid. The remaining ingredients in the bait include corn grit and food grade additives to attract targeted pest species to ingest the bait. To control snails, the bait is applied evenly to soil at a rate of 6 ounces per 100 square feet, no more than once every 4 to 6 weeks. Treatments are applied year-round. As with iron phosphate bait, a 10-foot treatment buffer from aquatic areas will be observed.

Prior to treatment, signed consent forms are obtained from residents/homeowners. Homeowners are provided with a notice that treatment will occur within the next 24 hours. Once treated, a notice of date and time treatment occurred is provided and homeowners/residents may then enter the treated area.

Hand collection of snails will also continue as part of the eradication program. Regular and extensive hand collection is effective in reducing snail numbers when done in combination with other control methods, particularly in newly infested areas (USDA, APHIS, 2005). Snails may be disposed of by freezing or immersion in boiling water or alcohol.

Program treatments may continue for two to four years. After termination of eradication treatments, the area will be monitored for another one to two years to ensure that the GAS has been eradicated.

B. Preferred Alternative

Under the preferred alternative, APHIS and FDCAS would continue to conduct the GAS eradication program as described under the no-action alternative, but would add molluscicides that contain metaldehyde as the active ingredient to the program.

Metaldehyde is a commonly used molluscicide that has a wide variety of agricultural and non-agricultural uses. Formulations vary, but applications are typically made as bait incorporated into a granule or pellet. Slugs and snails that come into contact with the bait can be exposed by ingestion or absorption. The mode of action against slugs and snails is through the disruption of mucus-secreting cells which results in dehydration and eventual death. Three formulations of metaldehyde are proposed for use in the program to be used in various application scenarios (Table 1). The first formulation, Ortho® Bug-Geta, contains a bittering agent that reduces the chance of incidental exposure to birds and mammals. It is proposed for use as a broadcast-applied material, primarily in residential applications. Currently, the other two formulations are proposed for limited use under an Experimental Use Permit (EUP) exemption. These two formulations will be applied to areas where high concentrations of GAS occur, typically in places where shrubs and other low growing woody vegetation are present. Under the EUP, no more than 10 acres would be treated. If shown to be effective against GAS in limited trials, FDACS will pursue a Special Local Need (24c) registration for broader use of the two formulations in residential areas. In the case of Durham®, a bittering agent is being evaluated by the registrant and would be incorporated into the formulation if registration beyond an EUP is granted.

Table 1. Proposed metaldehyde formulations for use in the GAS program.

Formulation	Use Rate	Use Pattern
Ortho® Bug-Geta* (3.25%)	1.0 lb./4,400 sq. ft.	Broadcast-applied as a pellet to soil in lawns, near ornamental plants, and open areas where GAS occurs.
Durham® Metaldehyde Granules (7.50 %)	1.0 lb./2,500 sq. ft.	Broadcast-applied as a pellet to soil in lawns, near ornamental plants, and open areas where GAS occurs.
Slug-Fest (25%)	2-4 qts./acre	Spot applied as a liquid to areas under plants where high concentrations of GAS occur.

*Currently contains the bittering agent, Bitrex.

As with iron phosphate and boric acid baits, a 10-foot treatment buffer from aquatic areas will be observed for metaldeyde bait and liquid spot applications.

III. Affected Environment

The affected environment in Miami-Dade County, Florida has been described in the October 2011 EA (USDA, APHIS, 2011) and is the same for this proposed action. See Appendix A for a map of the currently infested areas of Miami-Dade County.

IV. Environmental Impacts

A. No Action

The environmental impacts of the current GAS eradication program, including human health risk, ecological risk, and impacts on environmental quality from program activities were described in the October 2011 EA (USDA, APHIS, 2011) and the September 2012 supplemental EA (USDA, APHIS, 2012) and are not repeated in this document.

B. Preferred Alternative

The environmental impacts of adding metaldehyde to the GAS eradication program are discussed below. All other impacts of the current eradication program were discussed in the October 2011 EA (USDA, APHIS, 2011) and the September 2012 supplemental EA (USDA, APHIS, 2012).

1. Human Health and Domestic Animal Risk

Metaldehyde is moderately toxic to mammals with an acute median lethality value of 283 milligrams/kilogram (mg/kg) in the rat. Dermal and inhalation toxicity is very low with median lethality values greater than the highest test concentration (EPA, 2006a). Longer term exposure to metaldehyde results in no observable effect levels (NOEL) of 10 mg/kg or higher, with the liver being the primary organ where effects have been noted. Developmental toxicity has not been observed in dosing studies at relevant doses; however, there is data to suggest that metaldehyde may be neurotoxic and potentially carcinogenic based on the presence of benign liver tumors in long term studies (EPA, 2006a). Available acute effects data for the proposed formulations demonstrate equivalent or less toxicity to mammals.

Dietary exposure and risk from the proposed use of metaldehyde is expected to be low for all population segments. The population segment with the highest probability of exposure is children who may consume bait and soil containing metaldehyde. However, adherence to label language, notification of treatment to property owners, and the use of a bittering agent will reduce the potential for exposure and reduce the risk to

children. Landowners and residents will be notified prior to treatment with information provided to reduce potential exposure. In addition, a bittering agent is present in the Ortho® Bug-Geta formulation and would also be present in the other two formulations if the efficacy work proposed in the EUP is successful and FDACS is able to obtain additional labeling for more widespread use. In 2003, the primary registrant of metaldehyde required all formulators to add 300 parts per million (ppm) of denatonium benzoate, a bittering agent, to end use products containing metaldehyde (EPA, 2006b). The bittering agent is an effective aversion agent in children and would be expected to reduce exposure. Worker exposure and risk will also be low based on the toxicity of metaldehyde, the method of application, and adherence to label language designed to minimize exposure (EPA, 2006b).

Metaldehyde bait formulations contain common food materials that may be attractive to pets such as dogs. If consumed in sufficient quantities, adverse effects are expected (Richardson et al., 2003). Previous exposure and adverse effects to dogs have been reported by the Animal Poison Control Center (APCC) and National Pesticide Information Center (NPIC). The requirement of the bittering agent, as well as the requirement for additional precautionary label language are designed to reduce risk of domestic pet exposure to metaldehyde (EPA, 2007). Adherence to all precautionary label language, notification to landowners regarding treatments, and the use of bittering agents will reduce the potential for adverse effects to domestic pets where metaldehyde may be used.

2. Ecological Risk

Metaldehyde is moderately toxic to birds and mammals from acute dosing studies that demonstrate a median lethality value of 238 mg/kg for the rat, and a range of 181 mg/kg for the Japanese quail to 1,030 mg/kg for the Peking duck (EPA, 2013). Similar studies with the mallard show a median lethality value of 196 mg/kg and a no observable effect level (NOEL) of 63 mg/kg. Dietary acute exposure in birds demonstrates a range of median lethality values from 2,668 to 3,460 ppm, suggesting slight toxicity. Sublethal acute and chronic studies in mammals reveal NOELs in acute exposures at 75 mg/kg/day, while in chronic exposures using the dog, the NOEL was reported at 10 mg/kg/day (EPA, 2006b). Chronic avian toxicity ranges from a no observable effect concentration (NOEC) of less than 49 ppm in the mallard to 497 ppm in a bobwhite reproduction study.

Conservative estimates of exposure for birds and mammals ingesting terrestrial invertebrates that have consumed metaldehyde would not result in acute or chronic direct risk to those populations. The selective nature of the formulation as well as the localized treatment areas would result in low direct risk to terrestrial insectivores. The presence of bittering agents in the

metaldehyde formulations would also reduce exposure to birds and mammals.

Indirect impacts to birds and mammals that depend on terrestrial invertebrate prey are also not anticipated because treatments are localized, typically occurring in residential/developed settings, and would be much less than the foraging areas for most terrestrial vertebrates. In addition, metaldehyde is selective for certain invertebrates, and other prey would be available in the small areas where treatments would occur. Impacts to some soil dwelling terrestrial invertebrates could occur; however, these effects would be localized to the areas of treatment, and specific to those invertebrates that would be attracted to the bait. Impacts have been noted to terrestrial isopods as well as some beetles in some cases, but effects were well above expected environmental concentrations (Biere, 2003; Santos et al., 2010). Risk to insects such as sensitive lepidopterans would not be anticipated because the product is not applied to foliage as a spray where most lepidopterans forage and could be exposed. Applications occur directly to the soil by hand using a granular formulation or as a course droplet for spot liquid applications; therefore drift onto foliage where lepidopterans forage is not anticipated to occur. In addition, the materials in the formulation that are attractive to the pest species are not components that would typically attract lepidopteran insects.

In aquatic systems, fish and aquatic invertebrates show low sensitivity to metaldehyde with acute median lethality values of greater than 100 mg per liter (L), or ppm, or the highest test concentration for most test species. The most sensitive aquatic species appears to be the rainbow trout with reported median lethality values ranging from 7.3 to 69 ppm. The lack of toxicity has also been demonstrated in field studies where metaldehyde has been used to treat aquaculture ponds for invasive snails. Calumpang et al. (1995) demonstrated no acute effects to carp and tilapia in metaldehyde-treated freshwater ponds, and Borlongan and Coloso (1996) found no acute effects to juvenile milkfish (*Chanos chanos*) in metaldehyde-treated brackish water ponds 7 days after treatment.

Label restrictions regarding applications near water, and the program requirement for a 10-foot application buffer from aquatic resources, reduces the potential for exposure and results in a very low probability for any adverse effects to aquatic organisms. Conservative estimates of exposure demonstrate that potential metaldehyde residues would be below effect levels for fish and aquatic invertebrates. Conservative estimates of residues in aquatic systems did not account for the 10-foot application buffer or the granular formulation that is considered weather resistant and would be less susceptible to runoff than other formulations. The spot applications would also adhere to the 10-foot application buffer from

aquatic resources, and with conservative estimates of residues, is not expected to result in impacts to aquatic biota.

The bittering agent, denatonium benzoate appears to have low toxicity to fish with a reported 96-hour median lethality value of greater than 1,000 mg/L. Toxicity to invertebrates ranges from a 48-hour median lethality value value of 13 mg/L for the water flea, *Daphnia magna*, to a 96-hour median lethality value of 400 mg/L for the shrimp (Johnson Mathey MacFarlen and Smith MSDS, 2007).

3. Environmental Quality

Impacts to air, soil and water quality are not anticipated because of the use pattern of metaldehyde in the program and its environmental fate. Metaldehyde is stable to hydrolysis (chemical breakdown from chemical reaction with water) and photolysis (chemical breakdown from reaction to light). Metaldehyde shows degradation in the presence of microbes with a reported aerobic soil metabolism half-life of 67 days. Degradation by microbial processes is also supported by field data that demonstrates a half-life of metaldehyde of less than 15 days in water and sediment (Calumpang et al., 1995; Coloso et al., 1998; Bieri, 2003). The primary degradation products of metaldehyde are acetaldehyde and carbon dioxide which have been shown to represent 11 and 74%, respectively, of the parent in laboratory studies (EPA, 2006b). Metaldehyde may impact some soil dwelling invertebrates after repeated use in the same area, but due to the limited areas of treatment and selective toxicity, impacts are not expected to be widespread or affect other soil dwelling invertebrates. Metaldehyde has a solubility of 200 mg/L with a range of adsorption coefficient values (Koc) of 57 to 173. Degradation is much slower under anaerobic conditions with half-lives typically greater than 200 days (EPA, 2006b).

Label restrictions prohibiting applications to water, as well as the granular formulation, will reduce the likelihood of runoff. Drift and runoff potential from spot liquid applications is also expected to be low since a large coarse droplet size will be used and all applications will be made by hand to areas under vegetated areas. The potential for runoff to occur from applications to treat GAS will further be reduced by treatment restrictions for the program that require a 10-foot application buffer from all water bodies. The use of a granular formulation and large coarse droplets in the spot liquid applications along with a lack of volatility of metaldehyde, suggests that air quality will not be impacted in the treatment areas.

C. Cumulative Impacts/Threatened and Endangered Species/Other Considerations

1. Cumulative Impacts

Cumulative impacts from the proposed use of metaldehyde are not anticipated for human health and the environment. Metaldehyde is used in other applications in Miami-Dade County. There would be an expected increase in metaldehyde use in the county but it would be incrementally minor because applications are proposed in localized core areas where GAS has been detected, or in the case of spot applications, in small areas under vegetation where high densities of GAS have been observed. The potential for cumulative impacts in Miami-Dade County would be very low because of the localized use of the material, program requirements such as notification to residents, use of bittering agents, and other restrictions, such as application buffer zones from aquatic sites, which collectively minimize the risk to human health and/or the environment.

There is no data available that suggest that exposure to all materials proposed for use in the program would result in synergistic impacts to human health or other non-target organisms if exposure to all three molluscicides were to occur. Metaldehyde use in either high GAS density areas, or as a more efficacious alternative to iron phosphate and boric acid, will facilitate eradication of GAS in areas where it is used. Its use could result in increased efficacy and may decrease the overall number of treatments of both products to achieve eradication.

2. Endangered Species Act

Section 7 of the Endangered Species Act and its implementing regulations require Federal agencies to ensure their actions are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat. APHIS updated the original biological assessment to include an evaluation of the ecological risks from the use of metaldehyde, and is currently in consultation with the U.S. Fish and Wildlife Service in Vero Beach, Florida (South Florida Ecological Services Office) regarding the proposed changes to the eradication program. APHIS has determined that adding metaldehyde to the program may affect, but is not likely to adversely affect the Everglade snail kite and its designated critical habitat, Cape Sable seaside sparrow and its critical habitat, Florida grasshopper sparrow, Florida scrub jay, Kirtland's warbler, eastern indigo snake, and the Stock island tree snail. APHIS also determined that the addition of metaldehyde would have no effect on other federally listed species and species proposed for listing in Miami-Dade County.

3. EO 12898

Executive Order (EO) 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," focuses Federal attention on the environmental and human health conditions of

minority and low-income communities, and promotes community access to public information and public participation in matters relating to human health and the environment. This EO requires Federal agencies to conduct their programs, policies, and activities that substantially affect human health or the environment in a manner so as not to exclude persons and populations from participation in or benefiting from such programs. It also enforces existing statutes to prevent minority and low-income communities from being subjected to disproportionately high or adverse human health or environmental effects. Notification to all property owners and residential areas where metaldehyde treatments could occur will be made prior to any program activities. The notification process and information provided by the program regarding reducing exposure to metaldehyde treatments, and the use of bittering agents in bait formulations, will insure that human health exposure and risk will be mimized, including minority and low income populations.

4. EO 13045

EO 13045, "Protection of Children from Environmental Health Risks and Safety Risks," acknowledges that children, as compared to adults, may suffer disproportionately from environmental health and safety risks because of developmental stage, greater metabolic activity levels, and behavior patterns. This EO (to the extent permitted by law and consistent with the agency's mission) requires each Federal agency to identify, assess, and address environmental health risks and safety risks that may disproportionately affect children. Treatments for GAS do not include applications to commercial food items therefore no dietary exposure is expected. Oral ingestion could occur through the ingestion of granules or treated soil. Proper notification to homeowners regarding when applications occur will reduce this exposure potential. Additionally, exposure to granules is not anticipated to occur in quantities that could result in adverse effects because the granules will contain a bittering agent designed to deter ingestion. Therefore, no disproportionate risks to children are anticipated as a consequence of applying metaldehyde to eradicate GAS.

5. EO 13175

EO 13175, "Consultation and Coordination with Indian Tribal Governments," was issued to ensure that there would be "meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications….". The Seminole and Miccosukee Tribes are in south Florida; however no GAS detections have occurred on, or adjacent to, tribal property. APHIS will contact the tribes to initiate a dialogue regarding proposed activities to eradicate the GAS in the event that the range of the snail expands.

6. National Historic Preservation Act

APHIS has considered potential impacts under Section 106 of the National Historic Preservation Act. Section 106 requires federal agencies to consider the impacts of their actions on historic properties. Approximately 170 historic properties exist within Miami-Dade County, with a majority of these sites being structures. Based on the criteria defined in Section 106 of what constitutes an adverse effect, the proposed addition of metaldehyde to the program will not have a negative impact to historic or cultural sites but will provide beneficial impacts due to the protection from damage and nuisance that can occur from GAS infestations.

V. Listing of Agencies and Persons Consulted

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection and Quarantine
Plant Health Programs – Pest Management
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U.S. Department of Agriculture
Animal and Plant Health Inspection Service
PPQ–Environmental Compliance
4700 River Road, Unit 150
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U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Policy and Program Development
Environmental and Risk Analysis Services
4700 River Road, Unit 149
Riverdale, MD 20737

Florida Department of Agriculture and Consumer Services
Division of Plant Industry
P.O. Box 147100
Gainesville, FL 32614

U.S. Fish and Wildlife Service
South Florida Ecological Services Office
1339 20th Street
Vero Beach, FL 32960

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Appendix A. Map of GAS-infested area