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Marketing and Regulatory Programs

Animal and Plant Health Inspection Service

# Asian Longhorned Beetle Eradication Efforts in Clermont and Brown Counties, Ohio

## Environmental Assessment
## September 2011

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# I. Introduction

Asian longhorned beetle (*Anoplophora glabripennis*) (ALB) is a foreign wood-boring beetle that threatens a wide variety of hardwood trees in North America. The native range of ALB includes China and Korea. ALB is believed to have been introduced into the United States from wood pallets and other wood packing material accompanying cargo shipments from Asia.

## A. Asian Longhorned Beetle

### 1. Biology

ALB is in the wood-boring beetle family Cerambycidae. Adults are 1 to 1½ inches in length with long antennae, and are shiny black with small white markings on the body and antennae. After mating, adult females chew depressions into the bark of various hardwood tree species in which they lay (oviposit) their eggs. There are 13 known genera of host trees: *Acer* (maple and box elder), *Aesculus* (horsechestnut), *Salix* (willow), *Ulmus* (elm), *Betula* (birch), *Albizia* (mimosa), *Celtis* (hackberry), *Cercidiphyllum* (katsura tree), *Fraxinus* (ash), *Koelreuteria* (goldenraintree), *Platanus* (sycamore and London planetree), *Sorbus* (mountain ash), and *Populus* (poplar) (USDA–APHIS, 2008a).

Once the eggs hatch, small white larvae bore into the tree, feeding on the vascular layer beneath. The larvae continue to feed deeper into the tree's heartwood, forming tunnels (or galleries) in the trunk and branches. This damage cuts off nutrient flow and weakens the integrity of the tree, which will eventually die if the infestation is severe enough. Sawdust debris and insect waste and excrement (or frass) is commonly found on the base of afflicted trees, as well. Infested trees are also prone to secondary attack by diseases and other insects.

Over the course of a year, a larva will mature and then pupate. From the pupa, an adult beetle emerges chewing its way out of the tree, forming characteristic round holes approximately ⅜ inch in diameter. The emergence of beetles typically takes place from June through October, with adults then searching for mates and new egg-laying sites to complete their life cycle.

### 2. History of ALB in the United States

ALB was first discovered in August 1996 in the Greenpoint neighborhood of Brooklyn, New York. Within weeks, another infestation was found on Long Island in Amityville, New York, after officials learned that infested wood had been moved from Greenpoint to Amityville. ALB was also found in Queens and Manhattan, New York.

In July 1998, due to the U.S. Department of Agriculture's (USDA) national ALB pest alert campaign, a separate infestation was discovered in

the Ravenswood area of Chicago. This discovery prompted USDA's Animal and Plant Health Inspection Service (APHIS) to amend its existing quarantine of wood movement from infested areas, and place additional restrictions on importing solid wood packing material into the United States from China and Hong Kong. In 2006, these restrictions were expanded to imports from all countries.

In October 2002, ALB was discovered in Jersey City, New Jersey, and in August 2004, ALB was discovered in the Borough of Carteret, the Avenel section of Woodbridge Township, and in the nearby cities of Rahway and Linden, New Jersey. It was subsequently found in 2007 in Richmond County, New York (Staten Island), across the Arthur Kill River from the New Jersey infestation sites.

In August 2008, ALB was discovered in Worcester, Massachusetts. This infestation includes the city of Worcester and the towns of Holden, West Boylston, Boylston, and Shrewsbury.

In July 2010, an infestation was reported in the Jamaica Plain area of Boston, Massachusetts; however, to date, only six infested trees have been detected in this area.

On June 17, 2011, ALB life stages were confirmed in Clermont County, Ohio. A quarantine was enacted, including Tate Township and East Fork State Park, to stop movement of infested material outside the county. Surveys are being conducted in and around the area to determine the size of the infestation and to identify infested host trees (delimitation). As of July 15, at least 284 infested trees have been identified within the regulated area.

## 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.). In initial eradication efforts in Ohio, APHIS is proposing to remove all infested trees and continue surveillance to determine what additional program tools may be used in this area. This action is necessary to prevent further spread of ALB and help to eradicate ALB from the area.

This environmental assessment (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.

APHIS has prepared six other EAs that are relevant to this current EA: Asian Longhorned Beetle Control Program (December 1996), Asian Longhorned Beetle Program (February 2000), Asian Longhorned Beetle Cooperative Eradication Program, Hudson County, New Jersey (March 2003), Asian Longhorned Beetle Cooperative Eradication Program in the New York Metropolitan Area (May 2007), Asian Longhorned Beetle Cooperative Eradication Program in Worcester and Middlesex Counties, Massachusetts (September 2008b) and Asian Longhorned Beetle Cooperative Eradication Program in Essex, Norfolk, and Suffolk Counties, Massachusetts (May 2011).

It is anticipated that once additional information is determined with regards to ALB finds in the Ohio area, the program may want to add other tools in addition to tree removal and the use of triclopyr, as discussed in this EA. Additional tools for this eradication program will be discussed in detail in a future EA.

# II. Alternatives

This EA analyzes the potential environmental consequences associated with the proposed action to cut down infested trees in Clermont and Brown Counties, Ohio. As of July 20, there have been at least 388 infested trees detected within the quarantined area of Clermont County (see appendix A). Delimitation is ongoing and more trees may be found. Two alternatives are being considered: (1) no action by APHIS to remove ALB infested trees, and (2) the preferred alternative, to cut down and remove infested trees to prevent further spread of ALB.

## A. No Action

Under the no action alternative, APHIS would continue to implement the quarantine restrictions in the area, as defined in the quarantine order for Clermont, Ohio. No eradication efforts would be undertaken by APHIS. Some control measures could be taken by other Federal or non-Federal entities; however, these measures would not be controlled or funded by APHIS.

The current quarantine restricts the movement of firewood, green lumber, and other living, dead, cut, or fallen material, including nursery stock, logs, stumps, roots, and branches from ALB host trees. These articles may not move outside the quarantine zone unless each article is issued a certificate or limited permit by an APHIS or State inspector.

## B. Preferred Alternative

The ALB eradication program (preferred alternative) is a cooperative effort among APHIS, the U.S. Forest Service (FS), State cooperators, impacted municipalities, and local residents. APHIS and the cooperators share responsibility for survey; tree removal and destruction; replanting; and public outreach. APHIS has the lead responsibility in the areas of regulatory actions, control, survey, environmental monitoring, data management, public outreach, and technology enhancement. FS helps communities recover from tree loss with replanting efforts, and works with APHIS on technology enhancement issues, public outreach, and detection of infestations.

Under the preferred alternative, APHIS and its cooperators would remove infested trees from the quarantine area to prevent ALB from spreading. This is the initial step in an ALB eradication program. Additional information regarding this infestation is needed before a detailed eradication response plan can be developed. The preferred alternative consists of the following:

- selective tree removal of infested trees,
- stump grinding of removed host trees,
- the application of herbicide triclopyr on stumps that cannot be removed to eliminate regrowth, and
- chipping or burning of cut trees.

Surveys are made of all host trees within a designated area surrounding an infested tree to ensure that they are not infested with ALB. For control purposes, hosts include *Acer* spp., *Aesculus* spp., *Albizia* spp., *Betula* spp., *Celtis* spp., *Cercidiphyllum spp., Fraxinus* spp., *Koelreuteria* spp., *Platanus* spp., *Populus* spp., *Salix* spp., *Sorbus* spp., and *Ulmus* spp. The surveyors look for signs of infestation, such as round ALB exit holes and heavy sap flow from damaged sites on the trees. ALB inspectors utilize many methods and resources to conduct tree surveys. Inspectors conduct visual surveys from the ground using binoculars to look for signs of infestation. Aerial tree inspections are performed by trained professionals using bucket trucks to peer into trees from above. Tree climbers also survey trees to search for signs of an infestation. Many interest groups and organizations voluntarily assist inspectors by searching trees from the ground.

It is recommended that the roots of infested host trees be removed to a minimum of 9 inches below ground level using a stump grinder. Any aboveground roots with a diameter of a ½ inch or more should also be removed. Because of limitations in moving equipment into certain areas, the program may apply a cut-stump herbicide treatment of triclopyr instead of using a stump grinder. Program or contract personnel will spray or paint the root collar area, the sides of the stump, and the outer portion of the cut surface including the cambium until thoroughly wet, but not to runoff. A handheld wand sprayer or brush is used to apply the herbicide to the stump to prevent resprouting and becoming reinfested with ALB.

# III. Affected Environment

The initial ALB detection in Ohio was found approximately 2 miles southwest from the village of Bethel. This area consists of agricultural fields with few residences. The several forested areas in and around the agricultural fields were where initial detections of ALB were found.

Surrounding the initial ALB detections, a quarantine area has been defined. The quarantine area includes the East Fork State Park which is less than 5 miles to the North of the initial ALB find. East Fork State Park is one of Ohio's largest State parks offering recreational and natural history opportunities (DNR, 2011). It provides hiking trails, boating, fishing, swimming, and hunting, and contains an abundance of plant and animal life. The woodlands are composed of beech, sugar maple, red and white oak, shagbark hickory, and wild black cherry. Swamp forested areas contain silver maple, American elm, sycamore, and black gum (DNR, 2011). Red foxes, white-tailed deer, raccoons, Canada geese, song sparrows, eastern meadowlarks, and barn swallows are frequently seen in the park (DNR, 2011).

This EA not only covers the initial infestation area and the surrounding quarantined area, but also the entire of Clermont and Brown Counties where ALB may be found during delimitation. Most of this area is rolling country hills with few residences. The western portion of Clermont is the suburbs for Cincinnati. This area has an increasing population density to the northeast as it approaches Cincinnati.

These counties are within the south-central Ohio forest area. The forest composition in south-central Ohio contains an abundance of species. There are few areas where any one species represents more than half of the stock of live trees (FS, 2009). White ash, hickory, black cherry, and sugar maple constitute a higher percentage of the tree stand compared to northern red oak, chestnut oak, white oak, American beech, and yellow poplar in both Clermont and Brown Counties, Ohio (FS, 2009).

# IV. Environmental Impacts

## A. No Action

Environmental impacts from the no action alternative are related to the damage caused by the establishment and spread of ALB and impacts from the quarantine. The potential establishment would cause damage to and loss of valuable ornamental and commercial trees, as well as naturalized and forested areas. If ALB were allowed to spread to other parts of the country, it could result in damage to commercial trees, as well as products, such as maple syrup and hardwood lumber.

The wide distribution of host plants suggests the danger that ALB could spread across much of the country with increases in damage and losses commensurate with the spread. The damage and losses could result in reduction of private property value. There would be changes in the composition and age structure of forests, which could have long-term effects on the ecological relationships in the naturalized and forested areas.

The quarantine restricts the movement of firewood, green lumber, and other living, dead, cut, or fallen material, including nursery stock, logs, stumps, roots, and branches from ALB host trees to prevent human-aided spread. This can result in losses to industries that rely on transporting host trees and their products outside the quarantine zone. No chemical treatments have been approved to allow for the interstate movement of host material.

As ALB continues to spread, other Federal agencies or non-Federal entities may try to control or eradicate ALB through the use of chemical treatments. There are elevated environmental risks from the uncoordinated application of pesticides to limit the damage from ALB.

## B. Preferred Alternative

Under the preferred alternative, areas found to have ALB will be quarantined, and infested trees will be cut. The impacts from the quarantine are the same as the impacts examined under the no action alternative above. The impacts from felling trees and cut-stump herbicide treatments of triclopyr in the area are examined below in detail.

### 1. Cutting

The cutting and removal of ALB-infested trees may have adverse effects on local wildlife that depend on those trees for food, cover, and related needs. These include birds, squirrels, and other animals that nest in trees, insects that live on or in trees, and animals that use trees for cover or

shelter. Most stands of trees within Ohio are mixed with several different species, and there are few areas where any one tree species represents more than half of the stock of live trees (FS, 2009). For the most part, only infested host trees will be cut down, thus limiting the number of trees removed in any given area.

Most impacts to animals in the area will be temporary. Temporary impacts to animals include disturbance by noises and tree removal activities including grinding. Some animals may be displaced when their home is cut down; however, only infested host trees will be removed, allowing animals to find new homes and habitat in the surrounding trees. Cutting trees may occur year round, but cutting in the fall and winter months would lessen impacts to nesting birds and other mammals during their breeding months when they are most vulnerable.

Impacts will be greater for some invertebrates and other animals that have limited foraging ranges. However, impacts to local populations are not expected as local populations will continue to exist in surrounding trees.

Human impacts are generally aesthetic from the loss of trees in an area. These impacts are short term as other trees may be grown in place of trees that are removed.

### 2. Triclopyr

Triclopyr is commonly used for control of woody and broadleaf plants under a variety of use patterns, ranging from poison ivy control by homeowners to maintenance of rights-of-way. It is a widely used and commonly available product for both consumers and commercial herbicide applicators for the purposes described above and, therefore, it is difficult for APHIS to estimate the the quantity of triclopyr applied in the control area.

For this program, it will be applied only to the stumps of cut trees in specific areas, thus limiting its exposure of humans and other plant and animal wildlife. Toxicity is considered low with the exception of terrestrial plants. Drift and runoff will be limited because of the application method (direct hand application to infested trees). The method of application and adherence to label requirements will minimize the exposure and risk to human health, as well as aquatic and terrestrial nontarget organisms (see appendix B).

## C. Cumulative Effects

Cumulative effects from the preferred alternative are not anticipated. The preferred alternative, as described above, involves cutting and removal of infested trees. Nonhost trees and host trees that have not been infested

will still remain in the forest providing homes to animals that may have been displaced from the cut trees.

In addition, stumps that cannot be removed by grinding will be treated with triclopyr. The application of triclopyr is targeted to the stumps and should not result in drift or runoff. Due to the limited nature of impacts from the use of triclopyr on stumps and the lack of drift or runoff, the use of triclopyr in the ALB program is unlikely to contribute to significant cumulative effects.

## D. Threatened and Endangered Species

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 contacted the U.S. Fish and Wildlife Service (FWS) in Columbus, Ohio for technical assistance regarding impacts to federally listed species in Clermont County. Currently, four endangered species ( Indiana bat, *Myotis sodalis*; running buffalo clover, *Trifolium stoloniferum*; fanshell, *Cyprogenia stegaria*; and pink mucket pearlymussel, *Lampsilis abrupta*) and three species proposed for listing as endangered (rayed bean, *Villosa fabalis*; sheepnose, *Plethobasus cyphyus*; and snuffbox, *Epioblasma triquetra*) occur in Clermont County. FWS personnel conducted a site visit on July 7, 2011 and provided an interim guidance letter on July 19, 2011 that provides guidance and recommendations for removal and destruction of trees infested with ALB. Meausures to protect Indiana bat, running buffalo clover, and rayed bean were provided to APHIS. No critical habitat, Federal wildlife refuges, or wilderness areas are present within the vicinity of the currently infested area. APHIS prepared a biological assessment (BA), including the measures provided by FWS in the interim guidance letter, and requested concurrence with its determination that with the with implementation of the proposed measures, the program is not likely to affect federally listed species in the program area. APHIS received a concurrence letter dated August 15, 2011. APHIS is preparing a BA to analyze program activities in an expanded area and will not conduct any new activities in new areas without considering impacts on threatened and endangered species, and entering into Section 7 consultation with FWS if necessary.

## E. Other Considerations

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. The human health and environmental effects from the proposed applications are expected to be minimal and are not expected to have disproportionate adverse effects to any minority or low-income family.

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. No disproportionate risks to children are anticipated as a consequence of cutting ALB host trees or applying herbicides to cut stumps.

Consistent with the National Historic Preservation Act of 1966, APHIS has examined the proposed action in light of its impacts to national historic properties. If ALB were to affect trees on properties that are identified as National Historic Sites, APHIS will coordinate with the State Historic Preservation Office to limit affects to these areas.

# IV. Listing of Agencies and Persons Consulted

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
PPQ–Emergency and Domestic Programs
4700 River Road, Unit 26
Riverdale, MD 20737

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
PPQ–Environmental Compliance
4700 River Road, Unit 150
Riverdale, MD 20737

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

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
PPQ–ALB Eradication Program
920 Main Campus Drive, Suite 200
Raleigh, NC 27606

Ohio Department of Agriculture
8995 E. Main St.
Reynoldsburg, OH 43068

Ohio State University-Extension Service
110 Boggs Lane, Suite 315
Cincinnati, OH 45246

Ohio Department of Natural Resouces
2045 Morse Road, Building H
Columbus. OH 43229–6693

United States Department of Interior
Fish and Wildlife Service
Ecological Services
4625 Morse Road, Suite, 104
Columbus, OH 43230

# V. References

DNR—See Department of Natural Resources

Department of Natural Resources, 2011. Ohio State Parks – East Fork State Park. [Online]. Aailable: www.dnr.state.oh.us/parks/parks/eastfork/tabid/732/default.aspx. [2011, July 11].

FS—See U.S. Department of Agriculture, Forest Service

USDA–APHIS—See U.S. Department of Agriculture, Animal and Plant Health Inspection Service

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U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 2008b. Asian Longhorned Beetle Cooperative Eradication Program in Worcester and Middlesex Counties, Massachusetts. September 2008. Riverdale, MD.

U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 2011. Asian Longhorned Beetle Cooperative Eradication Program in Essex, Norfolk, and Suffolk Counties, Massachusetts. May 2011. Riverdale, MD.

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# Appendix A.  Map of Regulated Area

# Appendix B. Triclopyr

USDA–APHIS proposes the use of two triclopyr formulations in the treatment of stumps and their associated sprouts from host trees that have been removed as part of the Asian Longhorned Beetle (ALB) Eradication Program. As part of the ALB eradication effort, host trees may be physically removed along with the stumps to prevent re-infestation; however, under certain circumstances, physical removal of the stumps may not be possible. Areas where trees have been removed but the stumps cannot be physically destroyed may require herbicide applications to insure that stumps and associated sprouts do not allow for ALB re-infestation. In a previous environmental assessment, USDA–APHIS evaluated the triclopyr formulation, Garlon® 3A, that contains the active ingredient triclopyr triethylamine salt (TEA), for the treatment of stumps from trees that have been removed to eradicate the ALB (USDA–APHIS, 2008). USDA–APHIS is now also proposing an additional formulation, Pathfinder® II, that contains the active ingredient triclopyr butoxyethyl ester (BEE). This formulation allows more flexibility in being able to treat the bark instead of direct application to cut areas of the stem. In addition, USDA–APHIS is proposing some foliar applications of Garlon® 3A that will be tank-mixed with two other herbicides, Arsenal® and Escort® XP, to treat sprouting foliage from stumps that that have been removed as part of the eradication efforts. This use is considered minor compared to physical removal and treatment of stumps, and would only occur in areas where older stumps have not been removed or treated and have began to resprout. All applications will be made by hand either by painting undiluted material on the stump or directly spraying stumps and/or sprouting foliage using a backpack sprayer.

The purpose of this assessment is to summarize the available response data for each triclopyr formulation, as well as other herbicides that may be used, and discuss the potential for exposure and risk to human health and the environment under the proposed use in the ALB program.

## A. Herbicide Response Data

Garlon® 3A contains the active ingredient, TEA, which is a pyridine systemic herbicide commonly used for control of woody and broadleaf plants. This formulation can cause significant eye irritation but has low acute inhalation and dermal toxicity. Acute oral median lethal concentrations range from approximately 600 to 1000 mg/kg suggesting low to moderate toxicity (FS, 2003). Long-term toxicity studies have shown that triclopyr TEA is not a carcinogen or mutagen, and that toxicity in developmental and reproductive studies primarily occurs at high doses and at levels that are also maternally toxic (EPA, 1998). The other proposed triclopyr formulation, Pathfinder ® II, can cause slight temporary eye irritation during application, as well as some skin irritation in cases of prolonged exposure. Acute oral median lethal concentrations are 1,000 mg/kg, with acute inhalation and dermal toxicity median lethality values greater than the highest test concentration, suggesting low acute mammalian toxicity under various exposure pathways. Triclopyr BEE is not considered carcinogenic or mutagenic and, in cases where developmental and reproductive studies demonstrate effects, doses were at levels considered to be maternally toxic.

The primary degradation product of triclopyr TEA and BEE is triclopyr acid, which has also been evaluated and found to have a similar mammalian toxicity profile to the amine and ester.

Triclopyr TEA toxicity to terrestrial nontarget organisms is considered low, with the exception of terrestrial plants. Toxicity to avian species is low for triclopyr TEA, with oral and dietary median lethal toxicity values greater than 2,000 mg/kg and 10,000 ppm, respectively (FS, 2003; EPA, 2008). Chronic toxicity to birds is also expected to be low with reproductive toxicity no observable effect levels (NOEL) of 100 and 500 ppm for the mallard and bobwhite quail, respectively, when exposed to triclopyr acid (EPA, 1998). Triclopyr TEA is considered practically nontoxic to honey bees, based on acute contact studies (EPA, 1998). Triclopyr TEA does exhibit toxicity to terrestrial plants, as expected, based on results from seedling emergence, germination, and vegetative vigor studies. The primary degradation product of triclopyr TEA, triclopyr acid, is similar in toxicity to terrestrial nontarget organisms, based on the available toxicity data. Available avian toxicity data for triclopyr BEE demonstrates slight toxicity with median lethal dose values ranging from 735 to 849 mg/kg for the bobwhite quail (EPA, 1998).

TEA toxicity to aquatic organisms is low for fish and aquatic invertebrates. Available acute fish toxicity data demonstrates median lethal concentrations greater than 100 mg/L for Garlon® 3A and technical triclopyr TEA (EPA, 2008; Wan et al., 1987). Triclopyr TEA is considered practically nontoxic to aquatic invertebrates in freshwater and marine environments, with toxicity values exceeding 300 mg/L. Chronic toxicity to fish and aquatic invertebrates is also low with chronic toxicity NOEC ranging from approximately 80 mg/L to greater than 100 mg/L, depending on the test organism and endpoint. Triclopyr BEE is considered slightly to highly toxic to aquatic invertebrates and fish, with median lethal concentrations ranging from approximately 0.36 mg/L to 12.0 mg/L (FS, 2003). The primary metabolite of triclopyr TEA and BEE, triclopyr acid, is considered practically nontoxic to aquatic organisms based on available toxicity data (EPA, 1998; EPA, 2010).

For foliar treatments, Garlon® 3A is proposed for use as a tank mix with the active ingredients imazapyr and metsulfuron-methyl. Imazapyr is an imidazolinone herbicide, while metsulfuron-methyl is a sulfonylurea herbicide; both products are a common tank mix partner with triclopyr in the control of woody vegetation. The toxicity of imazapyr and metsulfuron-methyl is considered low for mammals. The formulation containing metsulfuron-methyl, Escort® XP, is considered practically nontoxic to mammals via inhalation, dermal, and oral exposures. All toxicity values were reported as greater than the highest test concentration. In addition, metsulfuron-methyl is not considered to be carcinogenic, nor has it been shown to be a reproductive, teratogenic or developmental hazard (FS, 2005). Escort® XP is considered a slight eye irritant, but is not considered a skin irritant or sensitizer. The other tank mix partner, Arsenal®, containing the active ingredient imazapyr, has a similar mammalian toxicity profile to metsulfuron-methyl, and is considered practically nontoxic in acute inhalation, dermal, and oral exposures. Imazapyr is not considered to be a carcinogen or mutagen, and is not known to be a reproductive, teratogenic, or developmental hazard (FS, 2004).

The toxicity of imazapyr and metsulfuron-methyl is low to all nontarget organisms, with the exception of some aquatic and terrestrial plants. Both products are considered practically nontoxic to wild mammals, birds, and terrestrial invertebrates, based on the available acute and chronic toxicity data (EPA, 2010; FS, 2004; FS,2005). Toxicity to fish and aquatic invertebrates is very low with median lethal acute concentrations typically exceeding 100 mg/L for both chemicals (EPA, 2010; FS, 2004; FS, 2005). Chronic toxicity to fish and aquatic invertebrates is

also considered low, based on the available NOECs that have been reported from standardized toxicity studies.

## B. Herbicide Exposure and Risk

Exposure to humans and the environment from the triclopyr amine or ester is expected to be minimal, based on the environmental fate and use pattern proposed in this program. Triclopyr TEA is considered mobile, based on the available information regarding water solubility and soil adsorption; however, it breaks down in soil (~12 days) and water (< 1 hr) to triclopyr acid, and to a lesser extent, triethanolamine. Triclopyr BEE has low water solubility and adsorbs more strongly to soil when compared to the amine. Triclopyr BEE also breaks down quickly to triclopyr acid in soil and water, with hydrolysis half-lives of less than 1 day (CDPR, 1997). Triclopyr acid is considered slightly mobile, based on soil adsorption values; however, the mobility appears to decrease with time (CDPR, 1997). Half-lives of the acid in water are short ranging from 0.5 to 2.5 days, while in soil half-lives range from 8 to 18 days (EPA, 1998a). The other minor metabolite, triethanolamine, also has a short half-life in the environment under most conditions, with soil and water half-lives ranging from 5.6 to 13.7 days in soil, and 14 to 18 days in water under aerobic conditions (EPA, 1998a). The acid can break down to 3,5,6-trichloro-2-pyridinol (TCP) in soil and water, and available toxicity data suggests TCP is more toxic to aquatic nontarget organisms than either triclopyr TEA, BEE, or the acid. Although this metabolite is more toxic than the parent, its rate of development is such that environmental concentrations will not reach levels that would pose a risk to nontarget organisms. Triethanolamine is less toxic than the parent or acid to aquatic organisms, based on limited toxicity data. Volatilization is not expected to be a significant exposure pathway due to the low vapor pressure that has been measured for triclopyr TEA, BEE, and the associated acid (CDPR, 1997).

Imazapyr and metsulfuron-methyl, which are proposed for use as a tank mix with Garlon® 3A to treat some foliage from sprouting host plant stumps, will also result in minimal exposure in the environment. Imazapyr is water soluble and does not appear to bind readily to soil, based on soil adsorption coefficient values that range from 30 to 100 (FS, 2004). Imazapyr degradation and dissipation half-lives are variable, ranging from approximately 25 days to greater than 300 days. Metsulfuron-methyl half-lives in soil range from 17 to 180 days. Reported soil adsorption and water solubility values suggest that metsulfuron-methyl has some mobility. Off-site transport of these two herbicides, as well as Garlon® 3A, is not expected as the products are being applied directly by hand specifically to small sprouts originating from the host plant stumps. Material is applied using a large droplet size under low volume to minimize drift and insure application and uptake directly to the sprouting plants. In addition, this use is minor and will mostly be used in larger wooded areas where physical removal of the stump is not possible. Based on the proposed use pattern and rate for these products, and their favorable toxicity profile, no significant risk to surface water or ground water resources is expected.

Significant risk to human health from applications of Garlon® 3A alone, or as a tank mix, as well as Pathfinder® II is not expected based on the available use pattern and mammalian toxicity data. Exposure will be limited to applicators because treatments are made directly to stumps or sprouting foliage. Adherence to required personal protective equipment and other label

directions will minimize exposure and risk to workers, as well as the environment. Risk is not expected to be significantly greater from the proposed foliar applications that may be made using the tank mix of Garlon® 3A with formulations containing the active ingredients imazapyr and metsulfuron-methyl. This use pattern is minor compared to physical removal of the stumps or the treatment of stumps because they are the preferred method of stump treatment. This application will occur to those stumps that have resprouted in areas where physical removal was not possible or a previous stump treatment with an herbicide did not occur. Exposure to humans is limited to applicators; however, adherence to label requirements regarding personal protective equipment will minimize exposure and risk. The low potential for exposure and favorable mammalian toxicity profile for each active ingredient suggests that significant risk to applicators is not expected.

Exposure to terrestrial and aquatic nontarget organisms is also expected to be minimal from each proposed formulation and tank mix. Significant drift or runoff is not expected as applications are not broadcast applied, but are made using either a backpack sprayer to deliver a coarse droplet size or by painting the material on individual stumps and associated sprouting vegetation. The low probability of off-site transport for any of the products is expected to result in very low exposure to nontarget organisms. The low probability of exposure and the favorable available effects data demonstrate that all products have a very low risk of causing adverse ecological risk. Risk to nontarget organisms is greatest for plants because they are the most sensitive group to each application; however, impacts to terrestrial plants is expected to be minimal and will only potentially occur for those plants that are immediately adjacent to treated stumps or sprouts. Impacts to terrestrial plants immediately adjacent to treated stumps will be minimized by following label directions for each herbicide treatment. Significant exposure to aquatic plants is not expected, based on the method of application and adherence to label restrictions regarding applications near aquatic areas. Exposure in aquatic systems is not expected to occur at levels that could result in any direct impacts to aquatic plants, or at levels that would suggest indirect impacts to aquatic organisms that depend on aquatic plants as a food source or as habitat.

## C. Summary

The selective use of herbicides that are proposed for this program will have minimal human health and environmental risks. Applications are directed specifically at stumps or sprouting vegetation from cut stumps using methods that minimize off-site transport of the proposed formulations. All products proposed for use in the program demonstrate potential effects at levels that are orders of magnitude above any potential residue values that could occur off-site from these types of applications.

## D. References

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