European Cherry Fruit Fly (*Rhagoletis cerasi*)
Cooperative Control Program in Select Counties in New York State

Draft Environmental Assessment—July 2022

**Agency Contact:**
Richard Johnson
Fruit Fly National Policy Manager
Plant Protection and Quarantine
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
4700 River Road
Riverdale, MD 20737-1231

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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>A</td>
<td>Acre</td>
</tr>
<tr>
<td>a.i.</td>
<td>Active ingredient</td>
</tr>
<tr>
<td>APHIS</td>
<td>Animal and Plant Health Inspection Service</td>
</tr>
<tr>
<td>BA</td>
<td>Biological assessment</td>
</tr>
<tr>
<td>BGEPA</td>
<td>Bald and Golden Eagle Protection Act</td>
</tr>
<tr>
<td>CEQ</td>
<td>Council on Environmental Quality</td>
</tr>
<tr>
<td>CFR</td>
<td>Code of Federal Regulations</td>
</tr>
<tr>
<td>DDVP</td>
<td>Dichlorvos or 2,2-dichlorovinyl dimethyl phosphate</td>
</tr>
<tr>
<td>DT$_{50}$</td>
<td>Dissipation half-life values</td>
</tr>
<tr>
<td>EA</td>
<td>Environmental assessment</td>
</tr>
<tr>
<td>ECFF</td>
<td>European cherry fruit fly</td>
</tr>
<tr>
<td>ESA</td>
<td>Endangered Species Act of 1973</td>
</tr>
<tr>
<td>fl</td>
<td>fluid</td>
</tr>
<tr>
<td>g</td>
<td>gallons</td>
</tr>
<tr>
<td>km</td>
<td>kilometers</td>
</tr>
<tr>
<td>Koc</td>
<td>Soil adsorption coefficient</td>
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<tr>
<td>LC</td>
<td>Lambda-cyhalothrin</td>
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<tr>
<td>LOC</td>
<td>Level of concern</td>
</tr>
<tr>
<td>MB</td>
<td>Methyl bromide</td>
</tr>
<tr>
<td>MBTA</td>
<td>Migratory Bird Treaty Act of 1918</td>
</tr>
<tr>
<td>NASS</td>
<td>National Agricultural Statistics Service</td>
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<tr>
<td>NEPA</td>
<td>National Environmental Policy Act</td>
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<tr>
<td>NYS AGM</td>
<td>New York Department of Agriculture and Markets</td>
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<tr>
<td>oz</td>
<td>ounces</td>
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<tr>
<td>lb</td>
<td>pounds</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal protective equipment</td>
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<tr>
<td>qt</td>
<td>Quart</td>
</tr>
<tr>
<td>R.</td>
<td><em>Rhagoletis</em> species</td>
</tr>
<tr>
<td>REI</td>
<td>Restricted-entry interval</td>
</tr>
<tr>
<td>SHPO</td>
<td>State Historic Preservation Officer</td>
</tr>
<tr>
<td>spp.</td>
<td>Species (plural)</td>
</tr>
<tr>
<td>T&amp;E</td>
<td>Threatened and endangered</td>
</tr>
<tr>
<td>USDA</td>
<td>U.S. Department of Agriculture</td>
</tr>
<tr>
<td>USEPA</td>
<td>U.S. Environmental Protection Agency</td>
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<tr>
<td>USFWS</td>
<td>U.S. Fish and Wildlife Service</td>
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</tbody>
</table>
I. Introduction

The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), in cooperation with the New York Department of Agriculture and Markets, Division of Plant Industry (NYS AGM) is considering options for actions it can take to control the invasive European cherry fruit fly (ECFF), *Rhagoletis cerasi* (L.) (Order: Diptera) in commercial cherry orchards in select counties in New York as part of its systems approach (Figure 1). A new protocol (USDA APHIS 2022b) is available that will facilitate the production, harvest, and sale of cherries from areas where ECFF has been detected, while reducing the risk that the production, harvest, and sale of these cherries will contribute to the expansion of the invasive range of ECFF. The principal safeguards of the protocol include a quarantined area of New York State and the following:

- A pesticide-based control program.
- The application of a float test to check against pest-management failure.
- Application of approved destruction and disposal methods for high-risk culled fruit outside of quarantine areas.
- Restrictions against the shipment of quarantine fruit to areas where ECFF establishment would have major impacts.

Transport and sale of quarantine cherries outside the ECFF quarantine are permitted for the following types of fruit:

- Cherries destined for processing and cherries sold fresh, destined to a low-risk area, produced under a compliance agreement, that pass the appropriate float test.
- Cherries destined for processing in a high-risk area, produced under a compliance agreement, that pass a standard float test and are received by an approved processor that will dispose of all unprocessed and culled fruit following an APHIS-approved method.
Figure 1. Proposed European cherry fruit fly systems approach program area.

A. Purpose and Need

To prevent damage to potential plant hosts and to protect the U.S. cherry industry, APHIS proposes to control ECFF where it is currently found, in the state of New York. APHIS has the responsibility for taking actions to exclude, eradicate, and control plant pests under the Plant Protection Act of 2000 (7 United States Code (U.S.C.) 7701 et seq.). The ECFF can cause adverse agronomic and economic impacts in vulnerable areas. Because of the introduction of this exotic pest into western New York and its threat to the New York cherry industry, NYS AGM requested APHIS assistance in designing a program to prevent further spread of ECFF without halting cherry production. Spread can occur naturally and through the movement of nursery stock and infested fruit.

The ECFF is native to Europe and is univoltine (produces one brood per year). Eggs are laid in host fruit; larvae hatch and tunnel through the fruit, rendering it unfit for human consumption. After the infested fruit has fallen to the ground, the mature larva exits the fruit and completes metamorphosis underground from the pupal state to an adult. Ongoing ECFF detections in
Canada and New York, and the abundance of naturally occurring host species in the Northern Hemisphere, are of great concern to U.S. cherry producers. APHIS considers cherry-producing states to be at risk for ECFF, i.e., California, Colorado, Maryland, Michigan, New Mexico, New York, Oregon, Pennsylvania, Utah, and Washington. For more information about ECFF biology and ECFF hosts, visit USDA APHIS Hungry Pests: ECFF.

Due to the fly’s univoltine biology, the efficacy of an ECFF control program can only be evaluated in ensuing years. Since its first confirmed detection in the United States (September 2017-Niagara County, NY) the ECFF infestation has slowly expanded to the south and east in New York. APHIS estimates the natural rate of ECFF spread (unassisted by human action) to be 13-40 km per year (see Figure 2). At the time of preparation of this environmental assessment (EA), no additional states have reported ECFF. Between 2017 and 2022 APHIS and NYS AGM imposed a quarantine and collected data about ECFF and its potential hosts, developing systems approaches to prevent (a) further ECFF spread and (b) unnecessary adverse impacts to U.S. cherry producers, processors, shippers, and consumers.

![Figure 2. Confirmed ECFF detections (2019-2021) and estimated potential ECFF population spread (2022-2025). Source: (USDA APHIS 2022a)](image)

Having amassed data to evaluate the initial effectiveness of the ECFF control program (program components are listed under Alternative B in Chapter 2 of this EA), APHIS proposes to revise the systems approach for moving commercial fruit safely during the cherry fruiting and harvest
season. Implementation would require parallel state and federal commodity regulation and the continued collaboration of APHIS with NYS AGM. Provided that ECFF program requirements are satisfied, APHIS would allow commercial producers to move fruit outside the quarantine without post-harvest fumigation; methyl bromide fumigation is effective against ECFF but can make fresh cherries unmarketable. Details of the proposed systems approach (“Protocol for the Distribution and Sale of Cherries Produced in the ECFF Quarantine”) are available at https://www.aphis.usda.gov/plant-health/ff (last accessed April 20, 2022). This website also contains past and present ECFF program information. Based on the current and projected areas of ECFF infestation in New York the systems approach would be applied in select counties that include Cayuga, Erie, Monroe, Niagara, Ontario, Orleans, Oswego, and Wayne Counties. If ECFF expands beyond these counties and the systems approach is applied APHIS will prepare a supplemental EA to evaluate the potential impacts to the human environment in the new counties.

APHIS and its cooperating partners discuss and comprehensively analyze alternatives for exotic fruit fly programs. APHIS prepared this EA to comply with the provisions of the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. §§ 4321 et seq.) as prescribed in implementing regulations adopted by the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations (CFR) parts 1500-1508), USDA’s NEPA regulations at 7 CFR part 1b, and APHIS NEPA implementing procedures (7 CFR part 372) for the purpose of evaluating the potential effects of the proposed action on the human environment (40 CFR § 1508.1(m)).

II. Alternatives

Alternatives considered for this proposed program include (A) No Federal action, (B) Maintain the existing ECFF control program, and (C) the preferred alternative, which adds to the current actions the Program follows under Alternative B a new protocol for the distribution and sale of cherries produced in the ECFF quarantine. Under all these alternatives, trapping and surveys for ECFF will be conducted as a diagnostic measure as described in (USDA APHIS 2018a, c).

All pesticides used in USDA programs are required to comply with the Federal Insecticide, Fungicide, and Rodenticide Act. To fulfill obligations under this statute, APHIS will ensure that a full pesticide registration (i.e., Section 3 registration), a special local needs registration (i.e., Section 24(c) registration) or an emergency quarantine exemption (i.e., Section 18 exemption) have been approved by the U.S. Environmental Protection Agency (USEPA) for each pesticide use pattern in fruit fly program applications.

A. No Action Alternative

NEPA regulations require the scope of analysis to include a no action alternative in comparison to other reasonable courses of action. Under the no action alternative, there would be no Federal
efforts to control ECFF or restrict expansion of the ECFF population from the infested area. In the absence of a federal effort, quarantine and control efforts would remain under the control of State and local government, grower groups, and individuals. Specifically, this means ECFF control efforts would be managed by, and be wholly under the control of, NYS AGM. Expansion of ECFF populations would be influenced by the proximity of host plants, local weather conditions, and any control measures used in the area.

“No treatment” might be the only reasonable alternative for some sensitive sites. In such cases, lack of treatment could lead to an ongoing infestation and establishment of the pest. An expansion of the infestation could result in substantial economic losses to growers in the United States, as well as negative impacts to the U.S. export agricultural markets.

Under the no action alternative, USDA would continue cooperative practices to support NYS AGM’s detection program and research. For information on New York State’s ECFF and other invasive plant pest programs, please use this link: https://agriculture.ny.gov/plants-natural-resources (last accessed April 20, 2022).

B. Maintain the Existing ECFF Control Program

Under this alternative, APHIS would continue to support the control and preventive buffer programs introduced in 2018 and the emergency quarantine expansion option introduced in 2019 (USDA APHIS 2018a, b, 2019b). The associated systems approach (USDA APHIS 2017) endorses pest control methods that combine host movement restriction, commodity certification, delimitation trapping, host material inspection, targeted ECFF eradication, targeted host removal, processed waste management, grower and production facility support, and community outreach.

Eradication options under Alternative B are those currently approved for the cooperative ECFF program (USDA APHIS 2019b), and are designed to address ECFF infestation at a variety of sites. Eradication actions may include

- host plant removal
- ground litter removal
- mass fly trapping with lures targeting ECFF
- cold treatment of host commodities, and
- USEPA-registered and NYS AGM-approved host treatments: ground-based spinosad or malathion bait sprays to host foliage, lambda-cyhalothrin (LC) soil drenches at the base of hosts, mass trapping, and cold treatment of host material intended for shipping. (For more information about each method refer to the 2018 EA, “European Cherry Fruit Fly Cooperative Control Program, Niagara Area, New York” (USDA APHIS 2018a).)

Each year, the degree of program implementation depends upon the amount of funding and other resources available to APHIS and NYS AGM. Due to reduced program funding starting in 2020 (USDA APHIS 2020), APHIS undertook quarantine and surveillance in five counties but ceased
host removal, management of processed waste, and provision of ECFF-eradication chemical treatments. The program area expanded to six counties for 2021 (USDA APHIS 2021a); program actions, limited to host movement control and pest monitoring, included the following:

- Establish parallel Federal and New York State quarantines with regulated host movement over counties with a confirmed ECFF population. ECFF program quarantines established by APHIS and NYS AGM shall not include lands within the state that belong to Indian Tribes.
- Remove quarantine restrictions from counties determined to be free of ECFF.
- Conduct delimitation of ECFF infestations and movement using traps placed in varying density outside of the quarantine area.
- Survey host plant life and the surrounding soil for ECFF in every county where ECFF is detected or considered likely to be present.

The 2021 program area included all of Niagara, Erie, Orleans, Monroe, and Wayne Counties, and a small portion of Ontario County (USDA APHIS 2021a). Under Alternative B, no new counties would be added to the 2022 ECFF control program area.

Full implementation of the existing program (USDA APHIS 2019b) would resume use of most of the previously approved eradication methods (USDA APHIS 2018a, b) and would not change or add to the 2021 control protocols. The ECFF control program for 2022 would not authorize the use of two chemical treatments: malathion bait spray and methyl bromide (MB) fumigation. Use of malathion as an alternative bait spray was dismissed as likely to pose greater risks to the human environment than the use of spinosad bait spray. MB was dismissed because of this fumigant’s potential to affect the properties and taste of cherries. Also, there is no convenient facility in the program area where the prescribed MB treatment could safely be applied to harvested fruit (USDA APHIS 2019b).

**C. Preferred Alternative – ECFF Control Program**

Under this Alternative, the Program would implement Alternative B, as described above, and include the “Protocol for the Distribution and Sale of Cherries Produced in the ECFF Quarantine” (USDA APHIS 2022b) which is incorporated by reference. The protocol applies to commercial growers and processors and combines pesticide applications, testing to ensure fruit is pest-free, destroying and disposing of culled fruit and fruit waste following approved methods, and shipping restrictions of quarantine fruit to ECFF high-risk areas. The protocol applies to the following counties in New York: Cayuga, Erie, Monroe, Niagara, Ontario, Orleans, Oswego, and Wayne. As mentioned, the Program is discontinuing its use of malathion and methyl bromide. It would continue to use spinosad and lambda-cyhalothrin as described in Alternative B and proposes to add ten active ingredients to its list of Program-recommended pesticides for use in commercial cherry orchards (Table 1). Additional use patterns for spinosad and lambda-cyhalothrin are included in the list of Program-recommended pesticides.
Commercial growers and the Program will establish a compliance agreement that ensures all parties are aware that only fruit produced under the ECFF protocol may be moved outside of the ECFF quarantine area, to acknowledge the restrictions against moving cherries into high-risk areas, and to ensure that the appropriate disposal methods are used for culled and waste fruit.

The protocol describes the steps commercial growers within the quarantine area and processors receiving their fruit must follow for disposing of fruit waste. Growers and processors typically dump waste fruit into the environment or bury the waste under 12 inches of substrate. This poses a risk if ECFF larvae are present in the fruit waste. The Protocol allows field spreading of fruit waste only in areas APHIS identifies as low risk and are not within or adjacent to cherry orchards. Disposal of fruit waste in areas APHIS identifies as high risk may only occur through one of the following:

- burial under 12 inches of soil, or as regular household garbage, if fruit is placed in double bagged plastic trash bags that are destined for a landfill or destructive disposal
- heat treated by steam, immersion heating, or incineration prior to disposal
- submersed in water for a minimum of 8 days in a sealed container
- ground and discarded into a sanitary sewer, or by freezing prior to disposal

Below is a summary of the Program-recommended pesticides for commercial cherry orchards and the Program’s proposed use pattern.

**Table 1. Program-recommended pesticides for use in commercial cherry orchards located in the ECFF quarantine area.**

<table>
<thead>
<tr>
<th>Product*</th>
<th>Formulation</th>
<th>Labelled uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asana XL</td>
<td>Active ingredient (a.i.): Esfenvalerate 8.4% by weight (wt) Other ingredients: 91.6% by wt</td>
<td>Restricted use or agriculture only pesticide. Labelled for use on a wide range of fruit, vegetable, and row crops.</td>
</tr>
<tr>
<td>EPA Reg. No. 325-515 April 6, 2006</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assail® 30 SG</td>
<td>a.i: Acetamiprid 30% by wt Other ingredients: 70% by wt</td>
<td>Agricultural use only. Labelled for use on a wide range of fruit, nut, and row crops to control sucking and chewing insects</td>
</tr>
<tr>
<td>EPA Reg. No. 8033-36 June 11, 2021</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assail® 70 WP</td>
<td>a.i: Acetamiprid 70% by wt Other ingredients: 30% by wt</td>
<td>Agricultural use only. Labelled for use on a wide range of fruit, nut, and row crops to control sucking and chewing insects</td>
</tr>
<tr>
<td>EPA Reg. No. 8033-23 June 11, 2021</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baythroid® XL</td>
<td>a.i: Beta-cyfluthrin 12.70% Other ingredients: 87.30%</td>
<td>Restricted use pesticide: only certified applicators or persons under their direct supervision may use the</td>
</tr>
<tr>
<td>EPA Reg. No. 264-840 October 9, 2019</td>
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<td></td>
</tr>
<tr>
<td><strong>Product</strong>*</td>
<td><strong>Formulation</strong></td>
<td><strong>Labelled uses</strong></td>
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</tr>
<tr>
<td>Delegate® WG EPA Reg. No. 62719-541 April 15, 2021</td>
<td>a.i.: Spinetoram 25% Other ingredients: 75%</td>
<td>Not a restricted use or agricultural only pesticide. Labelled for use on a range of fruit, vegetable, grain, and row crops.</td>
</tr>
<tr>
<td>Entrust® SC EPA Reg. No. 62719-621 April 9, 2021</td>
<td>a.i.: Spinosad 22.5% Other ingredients: 77.5%</td>
<td>Labelled for use on a wide range of fruit, nut, row crops, pasture and rangeland, and ornamentals</td>
</tr>
<tr>
<td>Entrust® EPA Reg. No. 62719-282 January 22, 2015</td>
<td>a.i.: Spinosad 80% Other ingredients: 20%</td>
<td>Labelled for use on a wide range of fruit, nut, row crops, pasture and rangeland, and ornamentals</td>
</tr>
<tr>
<td>Exirel® EPA Reg. No. 279-9615 June 11, 2019</td>
<td>a.i.: Cynatanaliprole 10.2% by wt Other ingredients: 89.8%</td>
<td>Not a restricted use or agricultural only pesticide. Labelled for use on a wide range of fruit, vegetable, and row crops</td>
</tr>
<tr>
<td>GF-120® Naturalyte® Fruit Fly Bait EPA Reg. No. 62719-359 December 21, 2005</td>
<td>a.i.: Spinosad 0.02% Other ingredients (water, sugars, and plant proteins and extracts): 99.98%</td>
<td>Not a restricted use or agricultural only pesticide. Labelled for use on various tree, fruit, nut, vine and vegetable crops and ornamentals, and on non-crop vegetation which may serve as resting sites for species of tephritid fruit flies</td>
</tr>
<tr>
<td>Imidan® 70-W EPA Reg. No. 10163-169 December 20, 2018</td>
<td>a.i.: Phosmet 70% by wt Other ingredients: 30%</td>
<td>Labeled for sour (tart) cherry, not sweet cherry. Labeled for use on fruit, nut, field, forage, and vegetable crops; trees and ornamental plants but not for homeowner use.</td>
</tr>
<tr>
<td>Mustang® Maxx (F9114 EC) EPA Reg. No. 279-3426 August 6, 2021 24(c) SLN No. NY-200001 (expires Dec. 31, 2025)</td>
<td>a.i.: Zeta-cypermethrin 9.15% by wt Other ingredients: 90.85%</td>
<td>Restricted use pesticide. Labeled for use on a variety of fruit, nut, vegetable, and row crops; sod farms, pasture and rangeland</td>
</tr>
<tr>
<td>Sevin® XLR Plus EPA Reg. No. 61842-37 November 2, 2012</td>
<td>a.i.: Carbaryl 44.1% by wt Other ingredients: 55.9% by wt</td>
<td>Intended for agricultural use. Labeled for use on a wide range of fruit, nut, row crops, ornamental trees and plants, and turfgrass</td>
</tr>
</tbody>
</table>
### Product Information

<table>
<thead>
<tr>
<th>Product*</th>
<th>Formulation</th>
<th>Labelled uses</th>
</tr>
</thead>
</table>
| Warrior II  
EPA Reg. No. 100-1295  
November 13, 2014 | a.i.: Lambda-cyhalothrin 22.8% by wt  
Other ingredients: 77.2% | Restricted use pesticide. Labeled for use on fruit, nut and row crops, and tree plantations and nurseries |

*Other products in the same chemical class and with the same use directions may be used in the ECFF program. Only products with the appropriate registration under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) will be used in the ECFF control program.

**Acetamiprid (Assail 30 SG and Assail 70 WP)**

The active ingredient in Assail 30 SG (soluble granule) and Assail 70 WP (wettable powder) is acetamiprid \((\text{1E})-N^-\[(6\text{-chloro-3-pyridinyl})\text{methyl}\]-\text{N'}\text{-cyano-\text{N}-methyleneamidamide})\. Acetamiprid is a chloropyridinyl neonicotinoid insecticide (distinct from nitroguanidine neonicotinoids like imidacloprid) that controls sucking and chewing insects through contact and ingestion. It works by binding to nicotinic acetylcholine receptors in the insect’s post-synaptic neurons which results in the opening of ion pores, causing a subsequent overload of sodium ions in the neurons (USEPA 2017). This leads to nervous system hyper-excitation and eventual death of the insect (USEPA 2017).

The Assail products the Program proposes to use are labeled for agricultural use only and are registered for use on a wide range of fruit, nut, and row crops. The Program proposes to use Assail 30 SG at the label rate of 5.3-8 ounces (oz)/acre (A) and Assail 70 WP at the label rate of 2.3-3.4 oz/A (acetamiprid is more concentrated in Assail 70 WP than Assail 30 SG). The Program would make ground or aerial applications according to label instructions. The labels recommend ground applications because these provide more thorough coverage than aerial applications. Applications begin at ECFF emergence and continue on a 10-day spray interval through egg hatch (Nippon Soda Ltd 2021a, b). A maximum of 4 applications are allowed per calendar year, not to exceed a total of 0.6 pounds (lb) (32.0 oz for Assail 30 SG and 13.6 oz for Assail 70 WP) of active ingredient per acre per calendar year (Nippon Soda Ltd 2021a, b). The labels do not allow applications less than 7 days before harvest.

**Beta-cyfluthrin (Baythroid XL)**

Beta-cyfluthrin is the active ingredient in Baythroid XL. Beta-cyfluthrin is a type II synthetic pyrethroid insecticide registered for use on agricultural sites, residential indoor/outdoor areas, turf/ornamentals, pet/pet houses, poultry processing plant premises, golf areas, tobacco, and for use as an outdoor wood protection treatment. Label requirements specify no more than 0.044 lbs/A per season for stone fruit, including cherries, and 2.4-2.8 fluid (fl) oz/A for treatment of cherry fruit fly, with a maximum of 2.8 fl oz/A at a 14-day interval (Bayer CropScience 2020). The program would make ground or aerial applications according to label instructions. The label does not allow application less than 7 days before harvest.
**Carbaryl (Sevin XLR Plus)**

The active ingredient in Sevin XLR Plus is carbaryl, a broad-spectrum insecticide used in agriculture, professional turf management, professional ornamental production, residential lawns and gardens, and in area-wide pest control and public health programs (USEPA 2017h). The Program proposes to use carbaryl at the label rate of 2 to 3 quarts (qt/A), not to exceed a total of 14 qt/A per year (and not more than 9 qt/A during the production season) (NovaSource 2012). In addition, the label restricts applications to 3 times per crop with a minimum of 7 days between applications. The label does not allow applications within 3 days of harvest. The Program would make ground or aerial applications according to label instructions.

**Cyantraniliprole (Exirel)**

The active ingredient in Exirel is cyantraniliprole, a systemic broad-spectrum insecticide used to control sucking and chewing insects on a wide range of vegetable, row, and fruit crops. The Program proposes to use cyantraniliprole at the label rate of 10-17 oz/A (0.065-0.11 lb a.i./A), not to exceed a total of 0.4 lb a.i./A per year (FMC Corporation 2019). The label restricts applications of Exirel to no more than 3 times within a single generation of the target pest on a crop. The label specifies a minimum of 7 days between applications. The pre-harvest interval is 3 days. The Program would make ground or aerial applications according to label instructions.

**Esfenvalterate (Asana XL)**

The active ingredient Asana® XL is esfenvalerate, a type II synthetic pyrethroid used on a variety of fruits, nuts, ornamentals, and vegetables. Esfenvalterate formulations include liquid concentrates, wettable powders (homeowner use only), ready-to-use aerosols, and trigger sprays. The Program proposes to use esfenvalerate at the label rate of 0.025-0.075 lbs/A (concentrated spray) or at 2.0-5.8 per 100 fl oz (diluted)/A. The label also specifies application of no more than 0.375 lbs a.i./A per season with no more than 0.3 lbs a.i./A per season between bloom and harvest. For dilute spray, the label specifies 200-400 gallons (g)/A, and no more than 14.5 fl oz of Asana XL per acre (Dupont, 2010). The pre-harvest interval is 14 days. The program would make ground or aerial applications according to label instructions.

**Lambda-cyhalothrin (Warrior II)**

The active ingredient in Warrior II® is lambda-cyhalothrin, a non-synthetic pyrethroid insecticide formulated for sprays, liquids, and granules. Lambda-cyhalothrin is a Group 3 insecticide registered for use on a wide range of fruit, nuts, vegetables, grains, conifer trees, ornamentals, turf, and others. The Program proposes to use lambda-cyhalothrin at the label rate of 0.02 to 0.04 lbs/A, or 1.28 to 2.56 fl oz/A and no more than 0.2 lb a.i. (12.8 fl oz or 0.80 pints of product)/A per year. The label specifies no application within 14 days of harvest (Syngenta 2014). The program would make ground or aerial applications according to label instructions.
The Program would follow the use pattern described under Alternative B using soil drench applications for non-commercial cherry orchard settings.

*Phosmet (Imidan 70-W)*

The active ingredient in Imidan 70-W® is phosmet (N-(Mercaptomethyl) phthalimide, S-(O,O-dimethyl phosphorodithioate). Phosmet is an organophosphate insecticide that is currently labeled for use on a wide variety of orchard crops, vegetables, ornamental trees, grains, and others. Its use in residential, park, or recreational areas is prohibited. Phosmet is labeled for use on sour (tart) cherries, not sweet cherry. The application rate is 2 1/8 lbs/A (1.5 lbs a.i.) or ¾ lb per 100 gallons not to exceed 2 1/8 lbs product or 1.5 lbs a.i./A. The label restricts applications to no more than 7 ½ lbs (5.25 lbs a.i.)/A per year. The restricted entry interval is 3 days. The public is not allowed to enter the orchard for 14 days after application. The Program would make aerial or ground applications according to label instructions.

*Spinetoram (Delegate WG)*

The active ingredient in Delegate WG is spinetoram, which is derived from the fermentation of *Saccharopolyspora spinosa*, a naturally occurring soil organism (like spinosad below). It is registered for use on a wide range of fruit, nut, vegetable, and row crops. The Program would make ground or aerial applications according to label instructions (Corteva Agriscience 2021a). The Program proposes to use spinetoram at the label rate of 6-7 oz/A, applied at 7-day intervals while adult ECFFs are present, and fruit is susceptible to attack. The maximum annual load is 28 oz/A/year (0.438 lb. a.i. spinetoram), not to exceed 4 application per year. The preharvest interval is 7 days.

*Spinosad (Entrust, Entrust SC, and GF-120 Naturalyte Fruit Fly Bait)*

The active ingredient in Entrust, Entrust SC, and GF-120 Naturalyte Fruit Fly Bait is spinosad, which is biologically derived from the fermentation of *Saccharopolyspora spinosa*, a naturally occurring soil organism. Entrust and Entrust SC are wettable powder formulations and differ in the initial concentration of spinosad. Both Entrust formulations are listed by the Organic Materials Review Institute (OMRI) for use in organic production. Entrust formulations are labelled for use on a wide range of fruit, vegetable, and grass crops, pastures and rangeland, and ornamentals. The Program would make ground or aerial applications of Entrust formulations according to label instructions. The Program proposes to use Entrust formulations at the label rate of 1.25-2.5 oz/A Entrust or 4-8 oz/A Entrust SC at 7-day intervals while adults are present, and the fruit is susceptible to attack. The preharvest interval is 7 days (Dow AgroSciences 2015, Corteva Agriscience 2021b). GF-120 Naturalyte is labelled for the attractance and control of fruit flies infesting various tree, fruit, nut, vine and vegetable crops and ornamentals, and on non-crop vegetation which may serve as resting sites. The Program would make ground or aerial applications of GF-120 Naturalyte at the rate of 10-20 fl oz/A according to label instructions.
(Dow AgroSciences 2011). The Program would follow the use pattern described under Alternative B for non-commercial cherry orchard settings.

**Zeta cypermethrin (Mustang MAXX)**

The active ingredient in Mustang MAXX is zeta-cypermethrin, a pyrethroid pesticide. It is a neural toxin in insects and works by binding to voltage-gated sodium channels which leads to muscle spasms, paralysis, and eventually death (USEPA 2013c). It is a restricted use pesticide and only certified applicators, or persons under their direct supervision may use the product. It is labeled for use on a wide range of fruit, nut, grain, and row crops. The application rate on cherry is 1.28-4.0 fl oz/A (0.008-0.025 lb a.i./A). The label allows for ground or aerial application, including airblast and ground boom applications but does not allow for ultra-low volume spray. The application interval is a minimum of 7 days. The label does not allow for more than 6 applications per year and has a maximum seasonal load of 24 fl oz/A per year. The restricted entry interval is 12 hours. The product cannot be applied within 14 days of harvest (FMC Corporation 2021b).

### III. Potential Environmental Consequences

This section evaluates the potential environmental impacts associated with each of the alternatives. The no action alternative is compared to the potential of the existing program alternative and preferred alternative (ECFF control program) to affect environmental quality, ecological resources, human health and safety, and the cherry industry. The potential impacts may be direct, indirect, and of short or long duration. The impacts may also be either beneficial or adverse.

**A. No Action Alternative**

Under the no action alternative, APHIS would not participate or fund in the control of ECFF in the state of New York. Other Federal or non-Federal entities, such as NYS AGM or growers, could take control measures.

The potential environmental consequences associated with the proposed “no action” alternative was analyzed in the 2018 and 2019 ECFF control program (USDA APHIS 2018a, b, 2019b), and remain unchanged. Below is a short summary of the potential impacts analyzed in the prior EAs.

**1. Environmental Quality**

Environmental quality concerns potential impacts to air, water, and soil resources. Under the no action alternative, APHIS would not positively or negatively impact the air, water, and soil resources in the program area.
2. Ecological Resources

Ecological resources include plant and animal species and protected species as well as their habitats. Protected species refers to migratory birds protected under the Migratory Bird Treaty Act of 1918 (MBTA), as amended, bald and golden eagles protected under the Bald and Golden Eagle Protection Act (BGEPA) and threatened and endangered species and their critical habitats as protected under the Endangered Species Act of 1973 (ESA), as amended.

The ECFF is expected to damage cherry fruit and cause economic loss to cherry growers. The presence of the ECFF could result in additional pesticide applications in commercial cherry orchards. It is difficult to quantify the potential increase in pesticide loading that would occur; however, APHIS anticipates pesticide applications would increase over the long term as ECFF populations increase and spread. In addition to increased pesticide loading, there is the potential for the use of pesticides that pose a higher comparative risk to human health and the environment than the pesticides the Program proposes to use under the preferred alternative.

While other federal and non-federal entities may take control actions on their own, without APHIS participation, the ECFF population would likely continue to increase and spread as people inadvertently move the ECFF through infested plant material. With limited state funding for ECFF control, the insect could spread outside of its current range and expand to other areas of New York State and the United States. Under this alternative, the ECFF is likely to spread.

(1) Migratory Bird Treaty Act

Federal law prohibits an individual to pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird or any part, nest, or egg of any such bird (16 U.S.C. §§ 703-712; 50 CFR § 21).

Flyways are the flight paths used by many birds while migrating between their breeding grounds and their overwintering sites. New York State is within the Atlantic Flyway for migratory birds. Under the no action alternative, APHIS will not improve habitat conditions for migratory birds, nor will it inadvertently disturb migratory birds.

(2) Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C. § 668) prohibits the take of bald or golden eagles unless permitted by the U.S. Fish and Wildlife Service (USFWS). The term “take” is defined as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb” (50 CFR § 22.3). Disturb means to “agitate or bother to a degree that causes . . . injury . . . a decrease in its productivity . . . or nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior” (§ 22.3).
Most of New York State is designated as nonbreeding area for the bald eagle (*Haliaeetus leucocephalus*); there is a small location south of Lake Ontario where the bald eagle may reside year-round, but it is uncommon for the bald eagle to reside year-round in the state (Audubon 2022, The Cornell Lab 2022). New York State falls within the migration area for the golden eagle (*Aquila chrysaetos*), but not the breeding, non-breeding, or year-round range for the bird (The Cornell Lab 2022). The golden eagle is uncommon in the state (Audubon 2022).

APHIS conducted a literature review and did not find evidence of the ECFF impacting bald eagles or golden eagles. Therefore, the no action alternative is unlikely to have any negative impacts on nesting bald and golden eagles, particularly since New York State is not within their breeding range.

(3) *Endangered Species Act*

Section 7 of the ESA and ESA’s implementing regulations require Federal agencies to ensure that their actions are not likely to jeopardize the continued existence of federally listed threatened and endangered (T&E) species or result in the destruction or adverse modification of critical habitat. Federally listed species and species proposed for listing in the program area include mammal, bird, reptile, mussel, snail, insect, and plant species.

3. **Human Health and Safety**

As mentioned above, the presence of the ECFF could result in additional pesticide applications in commercial cherry orchards. In addition to a potential increase in pesticide loading there is the potential for the use of other pesticides that pose a higher comparative risk to human health and the environment than the pesticides the Program proposes to use under the preferred alternative.

4. **Cherry Industry**

Under the No Action alternative, commercial growers and processors would not be required to follow the “Protocol for the Distribution and Sale of Cherries Produced in the ECFF Quarantine”. They would be allowed to distribute their product and disposed of unprocessed fruit without safeguarding steps to prevent the spread of ECFF. Lack of Federal action would place the burden of ECFF control on private agricultural producers and the State of New York. It is reasonable to expect ECFF populations would continue to expand in number and into new areas. Unsuccessful control of ECFF could lead to the establishment of this pest within the conterminous United States, causing substantial economic loss to U.S. growers and impacts to trade. Crop loss could lead to commodity scarcity and higher costs for U.S. consumers. ECFF establishment would lead to a change in the regulatory status of potential ECFF hosts and could cause temporary or permanent loss of valuable local and U.S. export markets.

In 2021, the annual U.S. sweet cherry (fresh and processed) market value was about $866 million, while the tart cherry crop (fresh and processed) is valued at $84 million (USDA NASS 2022a). In New York sweet cherry production was valued at $2.9 million (In 2015, the latest reported data) (USDA NASS 2022b) and tart cherry production was valued at $4.6 million (in
The United States ranked second (in 2015) in sweet cherry export volume compared to the top sweet cherry export countries (Lang 2019). ECFF has the potential to infest 100 percent of cherry crops rendering the fruit unmarketable. Growers cannot sell ECFF-infested cherries as fresh or processed fruit. Fruit must either be sold to distilleries at a financial loss, or disposed of as waste (Cornell University 2017). The European experience in ECFF control shows that, if left untreated, nearly 100 percent fruit damage can occur (AliNiazee and Long 1996, Daniel and Grunder 2012).

USDA NASS conducts surveys on fruit chemical usage and includes only a sample of establishments that sold (or would have sold) at least $1,000 of agricultural products during the year (USDA NASS 2020). These surveys do not include pesticide usage by smaller establishments. In 2019, the latest data available for New York, 14,600 pounds (lbs) of fungicide (captan, chlorothalonil, fenbuconazole, and iprodione), 100 lbs of insecticide (thiamethoxam), and 30 lbs of other chemicals (ethephon, a plant growth regulator) were used on cherries. One application of acetamiprid was reported, but the lbs applied was not provided.

B. Maintain the Existing ECFF Control Program Alternative

The potential environmental consequences associated with this alternative were analyzed in the 2018 and 2019 EAs for the ECFF control program (USDA APHIS 2018a, b, 2019b) and remain unchanged. Below is a short summary of the potential impacts analyzed in the prior EAs.

1. Environment Quality

The types of environmental consequences resulting from maintaining the existing program are expected to be like the types of potential consequences documented for the 2019 ECFF cooperative control program (USDA APHIS, 2019). Adverse environmental impacts are not likely to occur in the greater Niagara region, based on program actions being carried out as proposed with chemical treatments adhering to EPA label requirements.

2. Ecological Resources

Impacts to ecological resources resulting from continuing the existing program are expected to be the same impacts discussed in the 2019 EA. The program pesticides currently in use (spinosad and lambda cyhalothrin) are toxic to invertebrates, with severity dependent on likelihood of exposure, specified use patterns, and the pesticide itself (2019 EA). Methods of application including pheromone lures, food baits, foliar spray and soil drenches according to label instructions would be greatly minimize the potential for effects to nontarget species. Chemical drift is not expected to have impacts on nontarget species because of the prescribed use of targeted delivery systems (EA, 2019). The ongoing ECFF control program will slow the dispersal of ECFF. This would likely reduce damage to trees and other resources outside of cherry orchards.
3. Human Health and Safety

The EIS and prior EAs indicate exposures to pesticides from ongoing ECFF program operations are not likely to result in substantial adverse human health effects (USDA APHIS 2018a, b, c, 2019b).

Traps in this Program would employ pheromone lures and food baits, which are unlikely to adversely affect human health or the environment, based on the amounts used and methods of delivery. Potential for direct or indirect consequences associated with the use of this Program’s foliar sprays and soil drenches on human health and safety would be short-term and limited to application sites on private lands. Proper application rates and application techniques coupled with adherence to label instructions for PPE and reentry rules greatly reduce any potential for human health consequences.

4. Cherry Industry

Under the existing program, commercial growers and processors would continue to be required to follow the “Protocol for the Distribution and Sale of Cherries Produced in the ECFF Quarantine”. In this program, growers are required to implement safeguards to control the spread of ECFF in distribution and disposal of their product.

C. Preferred Alternative – ECFF Cooperative Control Program

The preferred alternative includes the actions under Alternative B “Maintain the Existing ECFF Control Program” alternative (described above) and adds and a protocol for the distribution and sale of cherries produced in the ECFF quarantine which includes ten active ingredients to the list of Program-recommended pesticides for use in commercial cherry orchards (Table 1). This protocol would be implemented in select counties include Cayuga, Erie, Monroe, Niagara, Ontario, Orleans, Oswego, and Wayne Counties. The environmental consequences from the actions proposed under Alternative B were analyzed in prior EAs (USDA APHIS 2018a, b, 2019b) and are incorporated by reference. APHIS concluded there were no significant impacts from the preferred alternatives evaluated in those prior EAs.

This section evaluates the environmental consequences from the new protocol for the distribution and sale of cherries produced in the ECFF quarantine, specifically the insecticides the Program recommends for use in commercial cherry orchards and the treatment and disposal of fruit waste. The specific location of a ECFF population is not likely to alter the type or frequency of any direct or indirect impacts.

1. Impacts of Program-Recommended Pesticides

This section evaluates the potential impacts of Program-recommended pesticides for use in commercial cherry orchards on environmental quality, ecological resources, and human health. The 2018 and 2019 EAs evaluated the impacts from the use of lambda-cyhalothrin in soil drench applications and spinosad in ground-based applications to commercial cherry orchards and non-
Commercial/non-agricultural areas and are not evaluated in this EA. This section is organized in two parts: 1) a summary of the impacts and 2) impact evaluations for the individual active ingredients.

Environmental quality encompasses air, soil and water quality and considers the environmental fate properties of the pesticides as well as the label requirements and Program’s use patterns that affect the exposure potential. Ecological resources are the terrestrial and aquatic species potentially impacted by Program actions (e.g., applying pesticides). Ecological resources include terrestrial vertebrates (birds, mammals, reptiles, and terrestrial-phase amphibians), aquatic vertebrates (fish and aquatic-phase amphibians), terrestrial and aquatic invertebrates (insects and mollusks), and terrestrial and aquatic plants. Human health considers the exposure through dermal (skin), oral (intake of food and water), and inhalation routes and the subsequent health impacts to two population subgroups: the public and occupational workers.

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) requires all pesticides sold or distributed in the United States to be registered by the USEPA. During the registration process, the USEPA prepares screening level risk assessments that evaluate the potential for harm to humans, wildlife, fish, and plants as well as the potential for contamination of surface water or ground water from leaching, runoff, and spray drift. USEPA evaluates toxicology studies that are carried out on plants and animals which broadly represent non-target organisms. The animals and plants are exposed to different amounts of pesticide to determine short- and long-term responses to varying pesticide concentrations. Most toxicity studies report the lethal dose or concentration at which 50 percent of the test animals die when given a single exposure (LD$_{50}$/LC$_{50}$). USEPA assigns toxicity categories ranging from highly toxic to practically non-toxic based on the LD$_{50}$/LC$_{50}$. Environmental fate studies test how the pesticide breaks down in water, soil, and light. The studies also look at how easily the pesticide enters the air and moves through soil. USEPA uses the environmental fate studies to estimate pesticide concentrations in the environment. USEPA combines the toxicity information with the amount of pesticide in the environment an organism may be exposed to estimate a risk quotient which is a deterministic method used in their risk assessments. USEPA has established levels of concern (LOCs) that are used as a benchmark to compare estimated risk quotients to that determine if the risk for a pesticide exceeds an LOC. The Program uses USEPA screening level risk assessments in their evaluation of risks associated with the Program’s use of pesticides to control the ECFF. In this case the terrestrial risk is estimated for those organisms within a cherry orchard that may receive ECFF treatments as part of the systems approach. Cherry orchards are highly managed agricultural areas that are subject to a variety of management actions, including other pesticide treatments.

The Program does not expect the pesticides it recommends for use in commercial cherry orchards will impact air, soil and water quality because of the use pattern, label requirements,
and the pesticides’ environmental fate (Table 2). The Program follows label restrictions that minimize drift and runoff and protect sensitive areas.

Terrestrial vertebrate and invertebrate species in commercial cherry orchards during pesticide treatments would be exposed to Program pesticides. They may also be exposed to the pesticide after treatment, depending on how soon they encounter treated plant material. For most of the Program-recommended pesticides, the risk to terrestrial vertebrates within commercial orchards is anticipated to be minimal to moderate based on the toxicity profiles and their use pattern in the ECFF control program (Table 2). All the pesticides are high risk to various terrestrial invertebrates within commercial orchards. The Program expects direct and indirect effects to occur to some terrestrial invertebrates within commercial orchards from pesticides during, as well as for a period after, application. Direct risk to nontarget organisms is defined as effects resulting from direct acute or chronic exposure to a pesticide. Indirect risk is defined as any impacts to prey items and vegetation that may serve as habitat or provide a food source for a group of organisms. The Program’s use pattern and pesticide labels result in negligible to minimal exposure to aquatic resources. Depending on the pesticide used, risk is negligible to moderate for aquatic vertebrates and invertebrates located within or in proximity to commercial orchards (Table 2).

The risk to human health from the use of the proposed pesticides in the Program is anticipated to be very low when used according to the Program’s proposed use pattern and label requirements. Exposure will be low to the public based on the proposed use pattern for each pesticide and lack of significant exposure. All pesticide applications will take place in commercial cherry orchards where the public would not have access. Significant dietary risk is not anticipated; USEPA sets the tolerance limits for pesticides in or on food and residues that are unlikely to exceed this level when a pesticide is applied according to label directions. Drinking water sources are also not anticipated to be impacted based on the proposed use pattern for each pesticide, label requirements to protect water resources, and favorable environmental fate data for most Program pesticides. Applicators are at the greatest risk of exposure to ECFF pesticides; however, these risks are reduced by adhering to label requirements including the use of appropriate personal protective equipment (PPE). Program personnel and contractors are required to comply with all USEPA use requirements and meet all recommendations for PPE during pesticide application. Adherence to label requirements (e.g., PPE requirements include long-sleeved shirt and long pants and shoes plus socks, mitigations to protect water sources and to limit spray drift, and restricted-entry intervals) result in low health risk to all human population segments from program use of pesticides. Most of the pesticide formulations proposed for use in this program do not persist in the environment and are not expected to accumulate in the environment under the proposed uses.
Acetamiprid (Assail® 30 SG, Assail® 70 WP)

**Environmental Quality**

Although acetamiprid has low solubility in water (USEPA 2017i), it is moderately mobile in soil and may leach into groundwater if used in areas where soils are permeable (USEPA 2017i, a, Nippon Soda Ltd 2021a). Acetamiprid has the potential to runoff for several months or more after application and may reach surface water. Both Assail labels recommend avoiding applications when rainfall is forecasted to occur within 48 hours (Nippon Soda Ltd 2021a, b). The labels do not allow applications directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark (Nippon Soda Ltd 2021a, b).

Acetamiprid primarily degrades through aerobic metabolism and has a degradation half-life (DT50) of 1 to 12 days in nine soil types and 38 to 59 days in aerobic aquatic systems (USEPA 2017a). Acetamiprid is stable to hydrolysis but undergoes aqueous photolysis (half-life = 34 days) (USEPA 2017a). In anaerobic soil, the DT50 is much slower, ranging from 336 to 585 days in three sediments (USEPA 2017a). Acetamiprid’s terrestrial field DT50 ranges from 3 to 18 days (USEPA 2017i).

Acetamiprid has low volatility (USEPA 2017a) and is unlikely to impact air quality. Acetamiprid’s octanol/water partition coefficient indicates it is unlikely to bioconcentrate (e.g., accumulate in fatty tissues) (USEPA 2017a, i).

**Ecological Resources**

The Program would make foliar applications of acetamiprid using aerial, airblast, and ground-based applications. The labels do not permit applications to water resources, however, spray drift, leaching, and runoff are potential ways acetamiprid would move to aquatic habitats and expose nontarget aquatic species. To minimize spray drift outside of the cherry orchard during aerial applications, the labels require medium size droplets and do not allow applications when wind speeds are greater than 10 miles per hour (mph) or during periods of temperature inversion. In addition, the label specifies applications should not be made at heights greater than 10 feet above the top of the target plants unless a greater height is required for aircraft safety. Although applicators follow the labels to reduce drift through aerial and ground applications, drift may occur into areas adjacent to cherry orchards. Terrestrial species present in commercial cherry orchards during applications or that forage on or consume recently treated plants would be exposed to acetamiprid.

Acetamiprid is moderately toxic to mammals in acute oral exposures (USEPA 2017i). Chronic exposure of mammals has caused impaired growth (USEPA 2017i). It is very highly toxic to passerine (perching) birds for acute oral exposure and highly toxic on a subacute dietary exposure. In other birds it is moderately toxic on acute oral exposure and practically non-toxic on a sub-acute dietary exposure (USEPA 2017i). Upland game birds (e.g., bobwhite quail) and
waterfowl (e.g., mallard duck) are not particularly sensitive to acetamiprid. The USEPA (2017i) evaluated the use of acetamiprid according to label instructions and the potential this would result in exposure levels that would cause adverse impacts to non-target species. In their evaluation, they included pome fruit, citrus, and tree nut scenarios which the Program considers representative of potential effects in commercial cherry orchards based on the application rate, frequency, and method, and similar growth form of the crops. USEPA found potential risks to birds, reptiles, terrestrial-phase amphibians, and sensitive small- and -medium sized mammals in its screening level risk assessment. These risks are based on the assumption that nontarget animals are present in the cherry orchards and only consume prey and plant materials that have been treated with acetamiprid.

Acetamiprid is moderately toxic to terrestrial invertebrates, based on acute oral and contact exposure studies with adult honey bees (USEPA 2017i). Adult and larval honey bees appear to have impaired survival from chronic exposure to acetamiprid (USEPA 2017i). In semi-field studies, application of acetamiprid at rates ≤ 0.089 lbs a.i./A had no detectable adverse colony-level effects on bees. At the highest application rate (0.15 lb/A), the Program would exceed this level; however, the lowest application rate is below the rate used in the semi-field study. The Program expects adverse effects to occur to terrestrial invertebrates, including some pollinators, that are present in the commercial cherry orchard during application. Bumble bees are less sensitive than honey bees and USEPA presumes the likelihood of adverse effects to be low for social non-\textit{Apis} bees. Adverse impacts are for individual bees and do not indicate long-term adverse effects on colonies (USEPA 2017i). The labels indicate not to make applications when bees are foraging in the treatment area, which would provide reduce exposure to pollinators.

In freshwater and estuarine/marine fish, acetamiprid is practically nontoxic to slightly toxic on an acute exposure basis; there is evidence of impaired growth and reproductive effects from chronic exposure (USEPA 2017i). Acetamiprid is very highly toxic on an acute oral basis to aquatic invertebrates (both freshwater and estuarine/marine) (USEPA 2017i). There is evidence chronic exposure has caused reproductive effects in freshwater invertebrates and impaired growth effects in estuarine/marine invertebrates (USEPA 2017i). The USEPA (2017i) found foliar agricultural use patterns could cause adverse effects to aquatic invertebrates based on their sensitivity to acetamiprid and exposure potential; however, the likelihood of adverse effects is low to aquatic vertebrates (fish and aquatic-phase amphibians).

Based on seedling emergence and vegetative vigor studies, acetamiprid has some toxicity to terrestrial plants. It is not toxic to aquatic plants and adverse effects are considered low (USEPA 2017i). The USEPA (2017i) evaluated the potential of adverse effects associated with aerial and ground applications of 0.15 lbs a.i./A acetamiprid, the highest application rate used on cherry, on terrestrial plants. Ground applications at this rate are not a risk concern for monocot and dicot plants. However, aerial applications and aerial spray drift may cause adverse effects to semi-aquatic Federally listed T&E species and spray drift from aerial applications may cause harm to listed and non-listed dicot species.
The USEPA (2017i) expects indirect effects to all taxa from the proposed uses based on the direct effects to aquatic invertebrates, birds, mammals (listed species), and terrestrial plants. Directly affected species may be a food item or serve an important habitat function that other species depend upon.

**Human Health**

The two Assail products are registered for agricultural use only. The Program’s use pattern for acetamiprid is ground or aerial applications in commercial cherry orchards with ECFF. Acetamiprid is classified as “not likely to be carcinogenic to humans” (USEPA 2017a). Although acetamiprid is moderately toxic by the acute oral route (Category II) and has lower toxicity for the acute dermal or inhalation routes (Category III) (USEPA 2017a), the negligible exposure potential to people makes adverse health and safety risks unlikely.

The Program does not anticipate exposure to the general public from commercial orchard treatments where the general public typically does not enter, and the Program follows label requirements to prevent exposure to water resources and to minimize drift. The two Assail labels do not allow applications to non-agricultural areas such as residences and commercial properties. The USEPA (2017a) estimated spray drift exposure from agricultural fields into adjoining properties and found no concern of dermal exposure for adults and dermal and incidental oral exposure in children. The USEPA included exposures of 50-ft wide lawns adjacent to a treated field and at varied distances up to 300 feet downwind of a treated field. In the spray drift model, the USEPA used the highest application rate for agricultural use which is protective of all other agricultural use rates. It also included aerial, ground boom, and airblast application methods. The USEPA (2017a) evaluated the dietary and occupational risks to people. The USEPA found applicators and workers are the main group of people with potential dermal and inhalation exposure. The USEPA (2020a) conducted a risk evaluation for acetamiprid acute and chronic dietary exposure from food and drinking water and found no risks of concern when the acetamiprid formulations are used according to label instructions.

The USEPA (2017a) found acetamiprid is non-irritating to the eyes and skin (Toxicity Category IV for eye and skin irritation) and is not a dermal sensitizer. However, the Assail labels mention acetamiprid is a moderate eye irritant (Nippon Soda Ltd 2021a, b). Both Assail labels require mixers, loaders, applicators, and other handlers to wear PPE including long-sleeved shirts, long pants, shoes plus socks, and chemical resistant and waterproof gloves (indicates the type and thickness of the glove material) (Nippon Soda Ltd 2021a, b). The Assail 70 WP label requires mixers and loaders to wear a filtering face piece, half piece or full-face NIOSH approved particulate respirator (TC-84A) with any R or P filter during aerial applications. The USEPA (2017a) found applicators making aerial, airblast, ground boom, mechanically pressurized handgun, and backpack applications in orchards are not at risk of inhalation or dermal exposure when wearing a single layer of clothing and gloves. The USEPA (2017a) found the handler inhalation exposure estimates during application would be protective of most occupational post-
application inhalation exposure scenarios. Similarly, the dermal post-application exposure was not a concern (USEPA 2017a).

The reentry period for workers is 12 hours (Nippon Soda Ltd 2021a, b); the USEPA (2020a) found this to be adequate to protect agricultural workers based on the acute toxicity of acetamiprid. The USEPA (2017a) reviewed reports of incidents associated with acetamiprid in the Incident Data System (IDS) and Sentinel Event Notification System for Occupational Risk (SENSOR)-Pesticides; the Agency found the low frequency and mostly low severity of acetamiprid incidents reported indicate no concern.

**Beta-cyfluthrin (Baythroid XL®)**

**Environmental Quality**

Beta-cyfluthrin has low water solubility and preferentially binds to soil and sediment suggesting low mobility in runoff (USEPA 2016d). These chemical fate properties support that beta-cyfluthrin does not pose a threat to groundwater resources. Transport of beta-cyfluthrin to surface water would be either from drift during application, or runoff which would be primarily as bound material to soil particles. Several label restrictions are in place to protect surface water resources from off-site transport of beta-cyfluthrin (Bayer CropScience 2020). These restrictions include no-treatment buffer zones adjacent to water bodies that vary in size based on the method of application, vegetative filter strips, avoiding applications when the soil is saturated and when rainfall is imminent. The labels also provide label restrictions to prevent offsite transport from drift during application. These restrictions include wind speed and direction restrictions, avoiding applications during temperature inversions, droplet size restrictions, and other measures intended to reduce drift.

The persistence of beta-cyfluthrin in the environment varies with half-life values generally longer in terrestrial environments when compared to aquatic environments, and under aerobic conditions compared to anaerobic conditions. Aerobic soil half-life values range from 14 to 123 days compared to 8.4 to 44.8 days and 9.41 to 26.2 days in aerobic aquatic and anaerobic aquatic metabolism studies, respectively (USEPA 2016d). Beta-cyfluthrin is stable to hydrolysis but sensitive to light with a photolysis half-life in water of less than one day.

Beta-cyfluthrin has low volatility from soil and water surfaces suggesting negligible impacts to air quality after applications.

**Ecological Resources**

Beta-cyfluthrin is moderately toxic to wild mammals and practically non-toxic to birds in acute and dietary toxicity studies (USEPA 2010a). Available chronic bird reproduction studies show no effects to reproductive endpoints in adult birds, eggs, or chicks at concentrations well above those that would be expected in field applications. Estimates of direct risk to wild mammals and
birds who forage on plant materials and invertebrate prey items suggest minimal risk to terrestrial vertebrates. Indirect risks to terrestrial vertebrates are not anticipated for those species that feed exclusively on plant material. Available toxicity data suggests that beta-cyfluthrin does not affect terrestrial plants at the proposed application rates. Nontarget vertebrates that obtain part or all their diet from terrestrial invertebrates would be at greater indirect risk from the proposed applications of beta-cyfluthrin. Reductions in sensitive terrestrial plant and soil invertebrates within cherry orchards are anticipated after application. Indirect impacts to vertebrate prey items may occur over multiple applications of beta-cyfluthrin which are allowed on the label. Terrestrial invertebrates serve as prey items for terrestrial and aquatic vertebrates. Terrestrial vertebrates typically have foraging ranges that are greater than the size of the cherry orchards and are able to forage for prey items outside of the cherry orchards. The ability to forage for prey items outside of the orchards reduces the direct and indirect risk to terrestrial vertebrates the are insectivores or omnivores.

Beta-cyfluthrin is considered highly toxic to honeybees as well as many other terrestrial invertebrates. The broad-spectrum mode of action for beta-cyfluthrin suggests impacts to nontarget invertebrates that are present during application within cherry orchards and those that may forage on flowers or other plant parts that contain beta-cyfluthrin residues. Label restrictions to reduce these risks include avoiding applications to blooming crops or allow it to drift to blooming crops if bees are visiting the treatment area.

Beta-cyfluthrin is highly toxic to aquatic vertebrates, such as fish and amphibians, and very highly toxic to most aquatic invertebrates based on available acute and chronic toxicity data. Acute median 96-hour lethality values for fish range from the low ppt range for the rainbow trout to 4 parts per billion (ppb) for marine species such as the sheepshead minnow (USDA APHIS 2021b). Signs of toxicity to fish include loss of equilibrium, erratic swimming, and lethargy. Chronic fish toxicity values show effects in the low parts per trillion (ppt) range for warmwater and cold-water test species. Chronic effects include reduced growth and behavioral effects (USEPA 2016d). Aquatic invertebrates are more sensitive to beta-cyfluthrin compared to fish. The range of toxicity values for aquatic invertebrates is variable for beta-cyfluthrin with the most sensitive species, the freshwater amphipod, *Hyallela azteca*, having a median 96-hour lethality value less than one part per trillion, and the least tolerant species, the eastern oyster, *Crassostrea virginica*, reporting effects in the low ppb range (USDA APHIS 2021b). Beta-cyfluthrin toxicity to aquatic plants is low with toxicity values for algae reported as greater than the highest test concentration tested and exceeding water solubility. The risk to aquatic nontarget species is reduced through multiple label restrictions that are required for all beta-cyfluthrin uses, including stone fruit applications. This includes prohibitions from applying beta-cyfluthrin directly to water or intertidal areas below the mean water mark, aerial and ground no treatment buffers adjacent to water bodies, vegetative filter strips adjacent to water bodies, wind speed and direction restrictions during application, and other restrictions designed to mitigate off-site transport of beta-cyfluthrin from spray drift.
**Human Health**

The Program’s use pattern for beta-cyfluthrin is ground or aerial applications in commercial cherry orchards with ECFF. Beta-cyfluthrin is classified as “not likely to be carcinogenic to humans” (USEPA 2017c). Beta-cyfluthrin exhibits high acute toxicity via the oral route regardless of vehicle used, and high acute toxicity via inhalation (Toxicity Category II). Beta-cyfluthrin is exhibits low dermal acute toxicity and causes mild eye irritation (Toxicity Category III) (USEPA 2017c). However, negative potential exposure to people makes adverse health and safety risks unlikely.

The Program does not anticipate exposure to the general public from treatments in commercial orchards where the general public typically does not enter, and the Program follows label requirements to prevent exposure to water resources and to minimize drift. The USEPA (2017c) did not conduct a spray drift assessment since there are registered turf uses with application rates that exceed the threshold value (set at 26% of the greatest agricultural application rate), a spray drift assessment is not needed. The USEPA (2017c) evaluated the dietary and occupational risks to people. USEPA found applicators and workers are the main group of people with potential dermal and inhalation exposure. The USEPA (2017b) conducted a risk evaluation for beta-cyfluthrin acute and chronic dietary exposure from food and drinking water and found no risks of concern when the beta-cyfluthrin formulations are used according to label instructions.

The USEPA (2017c) found beta-cyfluthrin does not irritate skin and is not a dermal sensitizer, (Toxicity Category IV) and is mildly irritating to the eye (Toxicity Category III). The Baythroid® XL label requires mixers, loaders, applicators, and other handlers to wear PPE including long-sleeved shirts, long pants, shoes plus socks, and chemical resistant and waterproof gloves (indicates the type and thickness of the glove material) (Bayer CropScience 2020). Except when using closed mixing/loading systems, the Baythroid® XL label requires mixers and loaders to wear a dust/mist filtering respirator (MSHA/NIOSH TC-21C) or a respirator with any R, P, or HE filter. The USEPA (2017c) found applicators making aerial, airblast, ground boom, mechanically pressurized handgun, and backpack applications in orchards are not at risk of inhalation or dermal exposure when wearing a single layer of clothing and gloves. The USEPA (2017c) found the handler inhalation exposure estimates during application would be protective of most occupational post-application inhalation exposure scenarios. Dermal and inhalation post-application exposure are anticipated based on registered uses of beta-cyfluthrin. However, repeat exposure resulted in either decreased or very similar toxicity and thus was not a concern (USEPA 2017c).

The reentry period for workers is 12 hours (Bayer CropScience 2020); the USEPA (2017c) found this to be adequate to protect agricultural workers based on the acute toxicity of beta-cyfluthrin. The USEPA (2017c) reviewed reports of incidents associated with beta-cyfluthrin in the IDS and SENSOR-Pesticides; the Agency found a total of 680 cases involving cyfluthrins, 387 of which involved a single active ingredient. Eighty-five percent of these cases were love in severity. Four
cyfluthrin cases, however, were high in severity. High number of reported incidents in IDS and Sensor-Pesticides might be related to the fact that pyrethroids are now among the most used pesticides in residential settings, which replaced more toxic organophosphates after residential organophosphates were phased out.

**Carbaryl (Sevin® XLR Plus)**

*Environmental Quality*

It is unlikely that carbaryl will significantly vaporize from the soil, water, or treated surfaces (Dobroski et al. 1985). Carbaryl may be found in the atmosphere within air-borne particulates or as spray drift and can react with hydroxyl radicals in the ambient atmosphere (Kao 1994). Once in the air, carbaryl has a half-life of 1 to 4 months.

Overall, carbaryl is not persistent in soil due to multiple degradation pathways including hydrolysis, photolysis, and microbial metabolism. Microbes play a significant role in the degradation of carbaryl in soil (Xu 2003). Carbaryl released in soil is expected to have moderate mobility (Jana and Das 1997, USEPA 2003, USDA FS 2008). Carbaryl’s degradation in aerobic soil varies from rapid to slow with half-lives ranging from 4 to 253 days (USEPA 2017h). Under anaerobic soil conditions, carbaryl has a half-life of 72 days. Terrestrial field dissipation studies were conducted at two locations, one in California and one in North Carolina (Norris 1991). Data showed that most residues remain in the first 0–0.15 meters (m) of soil, with only one finding in the layer of 0.3–0.45 m. The dissipation half-lives of carbaryl were estimated to be from 0.76 to 10.9 days. In a forestry dissipation study, half-lives ranged from 21 days on foliage to 75 days in leaf litter (USDA FS 2008). Terrestrial field dissipation data show carbaryl dissipation half-lives of 62 to 116 days in the upper 30 cm of the soil profile (USEPA 2017h).

Temperature, pH, light, oxygen, and the presence of microorganisms and organic material are factors that contribute to how quickly carbaryl will degrade in water. Carbaryl has moderate water solubility (NPIC 2016). Carbaryl degrades fairly rapidly in aerobic aquatic systems with a half-life of 4.9 days. However, carbaryl degrades relatively slowly under anaerobic aquatic conditions with a half-life of 68.9 days. The hydrolysis (the breaking of a chemical bond in water) of carbaryl is pH dependent with half-lives of 3.2 hours at pH 9, 12 days at pH 7, and no evidence of degradation at pH 5. In natural water, carbaryl is expected to degrade faster than in laboratory settings due to the presence of microorganisms. The half-lives of carbaryl in streams, rivers, and brooks, as a result of forest spraying, are 25, 28, and 23 hours, respectively (Stanley and Trial 1980). Bonderenko et al. (2004) reported aqueous half-lives of carbaryl in natural waters from California and Washington State ranging from 0.3 to 4.7 days. The USEPA (2021b) indicates the potential for carbaryl to contaminate groundwater.

1-naphthol is the major degradate under both aerobic and anaerobic conditions in soil and water. Limited data indicate that 1-naphthol appears to be less mobile and more volatile than carbaryl.
Carbaryl degrades rapidly to 1-naphthol through aqueous photolysis with half-life values ranging from 5 hours to 1.8 days (USEPA 2010c). The half-life of carbaryl for foliar degradation is 3.71 days and the foliar wash off rate is 0.91 cm⁻¹. 1-naphthol is expected to be less persistent in the field than carbaryl but may transport farther in air because of its greater volatility (USEPA 2017h).

The bioaccumulation potential for carbaryl is expected to be low based on its low Kow of 229 (USEPA 2010c). Carbaryl is not expected to bioconcentrate significantly with bioconcentration factors in fish of 14x in edible tissue, 45x in whole fish, and 75x in visceral tissues (USEPA 2007).

**Ecological Resources**

The Program would make aerial or ground applications of carbaryl to commercial cherry orchards to control the ECFF. Nontarget species present in the cherry orchards during applications would be exposed to carbaryl. Runoff and spray drift are the primary routes of movement off a treated area (USEPA 2021b) and could lead to exposure of nontarget species off site.

The USEPA (USEPA 2021b) estimated acute and chronic exposure potential for the use of carbaryl on stone fruit crops (maximum annual application rate of 9 and 14 lb a.i./A/year applied post-emergence/foliar and dormant/delayed dormant foliar, respectively, through aerial, ground, and airblast application methods) for nontarget terrestrial birds and mammals. In its estimates, USEPA considered small, medium, and large sized birds and mammals within several dietary categories (e.g., grass height, insectivores, herbivores, etc.) in their scenario models. In general, at the upper bound estimates, the exposure potential for birds and mammals in the three size classes and dietary types exceeds USEPA’s level of concern. This screening level risk assessment assumed maximum application rates and that birds and mammals would forage exclusively on prey and plant materials that were directly treated with carbaryl.

Carbaryl is practically nontoxic to birds (which are surrogates for reptiles and terrestrial-phase amphibians) (USEPA 2010c). Although carbaryl is characterized at practically non-toxic to birds, there are potential exposure effects. In their exposure estimates on carbaryl use on stone crops, USEPA used a conservative endpoint in their exposure estimate for birds; the Agency used the passerine canary’s (*Serinus canaria*) no-observable-adverse-effect-level of 250 mg/ai/kg bw instead of the LD₅₀ of 783 mg ai/kg bw. Acute dietary exposure for birds at both the mean and upper-bound exposure estimates for stone crop applications did not exceed USEPA’s level of concern (USEPA 2021b). In contrast, the acute dose-based exposure did result in exceedance in small-to-medium sized birds and some large birds and at the maximum use rate. In birds, chronic exposure caused a decrease in the number of eggs produced (USEPA 2021b). The chronic dietary-based mean and upper bound exposure estimates for small birds and
insectivorous birds exceeded USEPA’s level of concern. At the upper bound estimate, large birds also exceeded USEPA’s level of concern for chronic dietary exposure.

Carbaryl is moderately toxic to mammals (USEPA 2010c). Acute dose-based exposure estimates resulted in exceedance of USEPA’s level of concern for mammals at the upper-bound exposure estimate; at the mean exposure estimate, exposure of small mammals exceeded the level of concern. In mammals, chronic exposure caused a decrease in pup survival. In general, chronic exposure at the upper and mean exposure estimates exceeded the level of concern for mammals.

Based on carbaryl’s environmental fate properties, toxicity effects, and the Program’s use pattern, the Program anticipates some effects to birds and mammals that occupy, or access cherry orchards treated for ECFF. The Program does not anticipate long term impacts or significant bird, or mammal population decline because 1) The Program’s treatment area is primarily to cherry orchards with ECFF; 3) the label’s application rate for cherry is much less than the application rate USEPA used in their exposure estimates; and 3) the Program has several insecticide options and not all growers will choose to use carbaryl in their insecticide treatments. Carbaryl applications will cause a decrease in invertebrate populations in commercial cherry orchards. This reduction would reduce food availability to birds and mammals that rely on invertebrates for their diet. However, this temporary reduction in food availability is not expected to significantly impact birds or mammals as they would find food items outside of treatment areas.

Carbaryl is an insecticide and is highly toxic to terrestrial invertebrates, including adult and larval bees (USEPA 2021b). To reduce exposure to bees, the label instructs not to apply carbaryl when the crop is in bloom. If weeds or cover crop on the orchard floor or between rows are blooming, the label instructs to mow prior to application (NovaSource 2012). Terrestrial invertebrates can be sensitive to contact toxicity. Carbaryl has a short residual half-life on plant surfaces; USEPA reports a foliar dissipation half-life of 3.71 days (USEPA 2010d). Insecticidal properties are retained for 3 to 10 days (USEPA 1985). This fate property would reduce exposure potential over time to non-target invertebrates that enter an orchard after application. Although following label requirements minimizes exposure to pollinators, the Program expects some impacts to terrestrial invertebrates that are sensitive to carbaryl.

Carbaryl is highly toxic to fish, very highly toxic to freshwater invertebrates, and moderately toxic to estuarine/marine invertebrates (USEPA 2021b). Aquatic-phase amphibians are less sensitive to carbaryl exposure than fish (USEPA 2021b). Chronic exposure caused a decrease in growth in freshwater fish and decreased reproduction in freshwater invertebrates (USEPA 2021b). The label does not allow carbaryl applications directly to water, or to areas where surface water is present or to intertidal areas below the mean high-water mark (NovaSource 2012). The Program does not anticipate harmful effects to aquatic species because it follows label requirements to minimize drift and runoff, which reduces the exposure potential of aquatic
resources. Should carbaryl move into aquatic resources from Program applications, the Program anticipates the amount would be minimal and would not cause significant population effects.

Carbaryl is expected to pose minimal risk to aquatic and terrestrial plants. Carbaryl has a short residual half-life on plant surfaces. USEPA reports a foliar dissipation half-life of 3.71 days (USEPA 2010d). Insecticidal properties are retained for 3 to 10 days (USEPA 1985). The major metabolite is 1-naphthol. Bioconcentration of carbaryl in plants is not of concern due to limited plant uptake related to low water solubility and rapid degradation (Nash 1974). Based on forestry field dissipation studies, foliar half-lives of 21 days have been reported with a leaf litter half-life of 75 days (USEPA 2003). Toxicity to terrestrial plants has been evaluated for several agronomic crops using the formulation of Sevin® XLR Plus. The plants tested that showed no effects at a rate of 0.803 pound (lb) active ingredient (a.i.)/ acre (ac) were cabbage, cucumber, onion, ryegrass, soybean, and tomato (USEPA 2003). Several terrestrial plant incident reports have been filed with USEPA under FIFRA Section 6(a)2; however, for most of the cases, the doses used were well above those proposed in the Program and involved potential misuse in home lawn applications (USDA APHIS 2019c). USEPA-registered carbaryl spray label, Sevin® XLR Plus, indicates application of the insecticide to wet foliage or during periods of high humidity may cause injury to tender foliage. The product label indicates not to use the insecticide on Boston ivy, Virginia creeper, maidenhair ferns, and Virginia and sand pines because these plants may be injured (NovaSource 2012). Carbaryl is used to thin fruit in orchards by abscission of flower buds (USEPA 2021b). Carbaryl treatments should greatly reduce ECFF populations and subsequent damage to cherry trees. The Program does not anticipate significant population effects to pollinators, birds, or mammals (see above) that may be important for pollination and seed dispersal.

**Human Health**

Carbaryl had moderate acute oral toxicity (Toxicity Category II) and low acute toxicity by the dermal (Toxicity Category III) and inhalation (Toxicity Category IV) routes (USEPA 2021a). In animal studies, carbaryl was not a dermal irritant or sensitizer; however, there were reports of dermal irritation or dermal allergic response in humans (USEPA 2021a). Carbaryl is not an eye irritant (USEPA 2021a). Carbaryl is classified as “likely to be carcinogenic to humans” (USEPA 2021a). Common symptoms of carbaryl poisoning are nausea, vomiting, diarrhea, headache, dizziness, and eye pain/irritation (USEPA 2021a).

Exposure of the public to carbaryl applications in commercial cherry orchards could occur through eating fruit with carbaryl residues or in drinking water if carbaryl reaches surface and ground water sources of drinking water. The label does not allow applications within 3 days of harvest (NovaSource 2012). The USEPA (2021a) found the acute dietary risk for exposure of carbaryl through the intake of food and water alone or added together were not a concern. The USEPA (2021a) evaluated the exposure risk to residential properties next to a field treated with carbaryl, including distances 300 feet downwind of a treated field. USEPA did not find aerial or
groundboom applications were a concern for any subpopulation of the general public; this included dermal and incidental oral risk to children ages 1 to less than 2 years old.

Occupational workers handling the pesticide may be exposed through dermal and inhalation routes prior to and during application. The label requires occupational workers wear PPE, including long-sleeved shirt, long pants, shoes and socks, and chemical-resistant gloves. The label requires workers that mix, load, or clean up spills or equipment to wear a chemical-resistant apron. Mixers and loaders supporting aerial applications are required to wear a NIOSH-approved respirator, as specified on the label. Several of the USEPA’s (2021a) scenarios for orchard aerial applications did exceed its level of concern for mixing and loading liquids despite following the label’s required PPE, mostly due to dermal exposure. Similarly, two orchard scenarios involving airblast broadcast applications resulted in an exceedance in the level of concern, again due to dermal exposure. Post-application, workers may be exposed through dermal routes, and possibly through inhalation if particulates contaminated with carbaryl are airborne. The label specifies a 12-hour post-application re-entry period, based on the acute toxicity categories for carbaryl (see above) (NovaSource 2012). The USEPA’s post-application exposure scenario in a stone fruit orchard did not result in a cause for concern; this considered activities such as orchard maintenance, thinning of fruit, and had harvesting.

Cyantraniliprole (Exirel®)

Environmental Quality

Cyantraniliprole is not volatile and is unlikely to impact air quality due to its low vapor pressure and Henry’s Law constant (USEPA 2013d). Cyantraniliprole’s dissipation half-life in aerobic soil ranges from 16 days to 89 days (depends on soil type and pH) and in anerobic soil is about 4 days (USEPA 2013d). Cyantraniliprole is moderately mobile in soil and is unlikely to bioaccumulate (USEPA 2013d). Several of its degradates are more mobile or less mobile. In field dissipation studies, cyantraniliprole and its degradates had dissipation half-lives ranging from 3 to 44 days (USEPA 2013d). Some of cyantraniliprole’s degradates are more mobile in soil than the parent compound. A small amount of the parent cyantraniliprole or degradates were detected below the 12-inch soil layer, but the majority of the residues remained in the uppermost soil layers, indicating a lack of downward mobility or leaching (USEPA 2013d). Based on the dissipation half-lives and mobility of cyantraniliprole and its degradates, the Program does not anticipate impacts to soil quality from its use of cyantraniliprole. Impacts to water quality may occur as the label indicates cyantraniliprole may leach into ground water in areas where soils are permeable and where the water table is shallow. The label has a surface water advisory as the product is prone to runoff during rain events for several weeks after application. The label recommends growers maintain a vegetative buffer strip between application areas and surface water to reduce the potential loading of cyantraniliprole from runoff water and sediment. The label requires 25 foot and 50-foot buffers from aquatic resources for ground and aerial
applications, respectively. The label’s requirements and recommendations would reduce impacts
to water resources.

Ecological Resources

The USEPA (2013d) evaluated a range of application scenarios, including stone fruit/cherry
orchard applications, and the risk potential of cyantraniliprole to taxa. The application rate and
frequency used in their stone fruit scenario is similar to the label rate the Program would follow.
Below is a summary of cyantraniliprole’s acute and chronic toxicity to various taxa and
USEPA’s risk potential estimates based on the stone fruit orchard scenario.

Cyantraniliprole is slightly to moderately toxic to freshwater fish and slightly toxic to
estuarine/marine fish (USEPA 2013d). The USEPA (2013d) estimated a low likelihood of
adverse effects to freshwater fish (which are a surrogate for aquatic-phase amphibians) from
acute or chronic exposure to cyantraniliprole applications to stone fruit. Estuarine/marine fish
were also unlikely to have adverse effects from acute exposure, however the USEPA could not
conclude there are no risks from chronic exposure given growth parameters (length and weight)
were affected at the lowest concentration tested. Cyantraniliprole is slightly to very highly toxic
to freshwater invertebrates and moderately to highly toxic to estuarine/marine invertebrates
(USEPA 2013d). In its stone fruit scenarios, the USEPA (2013d) found freshwater invertebrates
were likely to have adverse effects from acute and chronic exposure to cyantraniliprole. For
estuarine/marine invertebrates, the likelihood of adverse effects from either acute or chronic
exposure to cyantraniliprole applications to stone fruit was low. The environmental fate
properties of cyantraniliprole indicate it is prone to runoff. To prevent exposure of aquatic
resources, the label does not allow ground applications within 25 feet or aerial applications
within 50 feet of water resources (FMC Corporation 2019). The label recommends a level,
vegetative buffer strip be between the treatment area and surface water resources to prevent
runoff. The label also recommends avoiding applications when rain is expected within 48 hours.
Although the Program adheres to label requirements, it acknowledges that there could be
negative impacts to sensitive species should cyantraniliprole enter an aquatic environment.
However, significant population effects are not expected.

Cyantraniliprole is practically non-toxic to mammals and birds (surrogates for reptiles and land-
phase amphibians) on an acute exposure basis (USEPA 2013d). In its stone fruit scenario, the
USEPA (2013d) considered the risk to be low for acute dose-based exposure to birds and
mammals. The USEPA (2013d) did not find a chronic dietary-based exposure risk for birds in its
stone fruit application scenario. However, it did find a chronic dietary-based exposure risk for
mammals. The Program follows label requirements to prevent drift or runoff, which would
reduce exposure to mammals located off-site. The Program anticipates a temporary reduction in
invertebrates within the orchard which would impact food availability to mammals that consume
invertebrates. However, mammals are not expected to limit their foraging range to just cherry
orchards and would find food resources outside of the treatment area. The limited number of
cyantraniliprole (and related pesticides) applications allowed per year and the maximum annual load are additional protections to non-target species. The Program expects cyantraniliprole would cause temporary impacts to mammals that inhabit a treated orchard but does not expect long-term population impacts.

Cyantraniliprole is highly to very highly toxic to terrestrial insects, including pollinators (USEPA 2013d). However, some invertebrates are not as sensitive to cyantraniliprole, particularly those that are in direct contact with the soil, like collembola and earthworms (USEPA 2013d). The USEPA (USEPA 2013d) summarized laboratory and field studies on honey bee exposure to cyantraniliprole. The agency found acute oral exposure is likely not a risk concern but there are risk concerns for contact toxicity. They also found an increased mortality for up to 5 days after application and reduced foraging for up to 6 days after applications at the application rate of 0.134 lb a.i./A, which is higher than the maximum labeled rate of 0.11 lb a.i./A the Program would use. The observed effects did not cause long-lasting damage to the hives. The label does not allow applications or drift to blooming crops or weeds if bees are foraging in the treatment area unless the application is made after sunset or when temperatures are below 55°F (FMC Corporation 2019). This reduces exposure and risk to foraging pollinators but may not eliminate risk as pollinators search for food sources in treated orchards and rest on plant material with cyantraniliprole residues.

**Human Health**

Cyantraniliprole is classified as “Not Likely to be Carcinogenic to Humans” based on the absence of increased tumor incidence in acceptable/guideline carcinogenicity laboratory studies. In addition, there are no genotoxicity, mutagenicity, neurotoxicity, or immunotoxicity concerns. Both acute and chronic estimated environmental concentrations were below the calculated levels of concern for drinking water; the EPA concluded that acute and chronic aggregate dietary (food and water) risks were below levels of concern (USEPA 2013a).

The Program does not anticipate exposure to the general public from treatments in commercial orchards where the general public typically does not enter, and the Program follows label requirements to prevent exposure to water resources and to minimize drift. Cyantraniliprole is classified as Toxicity Category IV via the dermal route. It is not irritating to the skin and is not a skin sensitizer. Cyantraniliprole does not demonstrate any appreciable toxicity via dermal exposure. Active ingredients in cyantraniliprole are classified as Acute III or IV for acute dermal, eye irritation, and primary skin irrigation and are assigned a 12-hour Restricted Entry Interval (REI). Label requirements for personal protective equipment (PPE) include coveralls, chemical-resistant gloves made of any waterproof material, and shoes plus socks (FMC Corporation 2019). Short and intermediate-term inhalation risk estimates for agricultural workers are not of concern. The USEPA found the level of clothing and PPE adequate for the protection of workers.
Incidental inhalation exposure risk assessment modeling was conducted for aerial, groundboom, and airblast applications for property directly adjoining treated fields and was determined to be protective of any incidental inhalation exposure of farm children via spray drift from agricultural cyantraniliprole applications (USEPA 2013b).

**Esfenvalerate (Asana XL)**

*Environmental Quality*

Esfenvalerate has low water solubility and preferentially binds to soil and sediment suggesting low mobility in runoff (USEPA 2016d). These chemical and fate characteristics suggest that esfenvalerate does not pose a threat to groundwater resources. Transport of esfenvalerate to surface water would be either from drift during application, or runoff which would be primarily as bound material to soil particles. Several label restrictions are in place to protect surface water resources from off-site transport of esfenvalerate (Dupont 2015). These restrictions are the same as those described for cyfluthrin to protect surface water from drift and runoff.

The persistence of esfenvalerate in the environment varies with half-life values generally longer in terrestrial environments when compared to aquatic environments, and under aerobic conditions compared to anaerobic conditions. The aerobic soil half-life value for esfenvalerate is 75 days compared to a range of 17.2 to 48.2 days and 11.5 to 73.7 days in aerobic aquatic and anaerobic aquatic metabolism studies, respectively (USEPA 2016d). Esfenvalerate exhibits minimal degradation through hydrolysis but is sensitive to light with photolysis half-lives in water ranging from 6 to 9 days.

Esfenvalerate has low volatility from soil and water surfaces suggesting negligible impacts to air quality after applications. Any esfenvalerate present in the atmosphere will degrade quickly from photo-oxidation in the atmosphere.

*Ecological Resources*

Esfenvalerate is considered moderately toxic to wild mammals and moderately toxic to practically non-toxic to birds in acute oral and dietary exposures (USEPA 2009c). Representative bird species used in toxicity testing for registering pesticides show the mallard duck to be more sensitive to esfenvalerate exposure compared to the bobwhite quail. The USEPA evaluated the direct risk to wild mammals and birds under a range of esfenvalerate use patterns, including applications to cherry trees (USEPA 2008). The screening level risk assessment showed direct acute risk to small birds (20 g) and wild mammals at the upper end of the application rates for esfenvalerate use on stone fruit. The direct risks to small birds and wild mammals assume that these nontarget species feed exclusively on plant and prey items that have been treated with the maximum application of esfenvalerate. The risk to these non-target species would be reduced in cases where lower application rates are used and for those species that forage on other plant and prey food items that do not have esfenvalerate residues. Indirect risks to terrestrial vertebrates are
not anticipated for those species that feed exclusively on plant material. Esfenvalerate does not affect terrestrial plants at the proposed application rates for stone fruit. Nontarget vertebrates that obtain part or all their diet from terrestrial invertebrates would be at greater indirect risk from the proposed applications of esfenvalerate. Reductions in sensitive terrestrial plant and soil invertebrates within cherry orchards are anticipated after application. Indirect impacts to vertebrate prey items may occur over multiple applications of esfenvalerate which are allowed on the label. Terrestrial invertebrates serve as prey items for terrestrial and aquatic vertebrates. Terrestrial vertebrates typically have foraging ranges that are greater than the size of the cherry orchards and are able to forage for prey items outside of the cherry orchards. The ability to forage for prey items outside of the orchards reduces the direct and indirect risk to terrestrial vertebrates the are insectivores or omnivores.

Esfenvalerate is considered highly toxic to most invertebrate pollinators, including the honeybee. Esfenvalerate is also toxic to many soil invertebrates. Pollinators and other sensitive invertebrates within cherry orchards and those immediately adjacent to orchards are at risk from esfenvalerate exposure during application and to residues post application. Label restrictions to reduce these risks include avoiding applications to blooming crops or allow it to drift to blooming crops if bees are visiting the treatment area.

Esfenvalerate is considered highly toxic to most aquatic vertebrates and invertebrates in acute and chronic exposures. Acute median lethality values for fish range from less than 1 part per billion (ppb) in freshwater fish to greater than 6 ppb in marine fish, which is greater than the solubility of esfenvalerate in water (USEPA 2016b). Freshwater fish species appear to be more sensitive to esfenvalerate compared to marine fish species. Esfenvalerate is also considered highly toxic to most aquatic invertebrates in acute and chronic exposures. Effects have been measured in the low parts per trillion (ppt) to ppb range for a range of test species. High toxicity is observed in freshwater and marine invertebrate test species including those present in the water column or in sediments. The high toxicity of esfenvalerate and estimates of water residues from the proposed application demonstrates acute and chronic risk to aquatic vertebrates and invertebrates from the proposed treatments at labeled rates (USEPA 2016b). The risk to aquatic nontarget species is reduced through multiple label restrictions that are required for all esfenvalerate uses, including stone fruit applications. This includes prohibitions from applying esfenvalerate directly to water or intertidal areas below the mean water mark, aerial and ground no treatment buffers adjacent to water bodies, vegetative filter strips adjacent to water bodies, wind speed and direction restrictions during application, and other restrictions designed to mitigate off-site transport of esfenvalerate from spray drift.

**Human Health**

The Program’s use pattern for esfenvalerate is ground or aerial applications in commercial cherry orchards with ECFF. Esfenvalerate is classified in group E “no evidence of carcinogenicity to humans” (USEPA 2020c). Esfenvalerate exhibits moderate acute toxicity via the oral and
inhalation route (Category II). Esfenvalerate is exhibits low dermal acute toxicity and causes mild eye irritation (Category III) (USEPA 2020c). Esfenvalerate is also mildly irritating to the skin (Category IV) and is not a skin sensitizer. Negative potential exposure to people makes adverse health and safety risks unlikely.

The Program does not anticipate exposure to the public from treatments in commercial orchards where they would not be present during application In addition the Program follows label requirements to prevent exposure to water resources and to minimize drift that could result in exposure to the public. USEPA (2017) conducted a spray drift assessment resulting from the highest agricultural application rates. Due to lack of dermal hazard in the esfenvalerate toxicological database, only incidental oral exposure and risk assessment was conducted for spray drift. The incidental oral risk of estimates from indirect exposure to esfenvalerate related to spray drift result in no risks of concern at the field edge (USEPA 2017f). The USEPA found applicators and workers are the main group of people with potential dermal and inhalation exposure. The USEPA (2017f) conducted a risk evaluation for esfenvalerate acute and chronic dietary exposure from food and drinking water and found no risks of concern when the esfenvalerate formulations are used according to label instructions.

The Asana® XL label requires applicators and other handlers to wear PPE including long-sleeved shirts, long pants, shoes plus socks, protective eyewear, respirator, and chemical resistant and waterproof gloves (indicates the type and thickness of the glove material) (Dupont 2015). The majority of occupational handler inhalation risk assessments did not result in risk estimates of concern. A quantitative dermal assessment was not conducted. For those scenarios that did result in risk assessments of concern with baseline attire, additional PPE was assessed. The USEPA (2017f) found the handler inhalation exposure estimates during application would be protective of most occupational post-application inhalation exposure scenarios. Dermal and inhalation post-application exposure are anticipated based on registered uses of esfenvalerate. However, repeat exposure resulted in either decreased or very similar toxicity and thus was not a concern (USEPA 2017f).

The reentry period for workers is 12 hours (Dupont 2015); the USEPA (2017f) found this to be adequate to protect agricultural workers based on the acute toxicity of esfenvalerate. The USEPA (2017f) reviewed reports of incidents associated with esfenvalerate in the IDS and SENSOR-Pesticides; the Agency found a total of 1404 cases involving esfenvalerate, 1322 (or 95 percent) of which were minor in severity, and 82 were moderate severity. There were not fatal or major severity incidents involving esfenvalerate products. High number of reported incidents in IDS and Sensor-Pesticides might be related to the fact that pyrethroids are now among the most commonly used pesticides in residential settings, which replaced more toxic organophosphates after residential organophosphates were phased out.
**Lambda-cyhalothrin (Warrior II®)**

**Environmental Quality**

Lambda-cyhalothrin has low water solubility and preferentially binds to soil and sediment suggesting low mobility in runoff (USEPA 2016d). Very low water solubility and a high affinity to bind to soil particles suggests that lambda-cyhalothrin does not pose a threat to groundwater resources. Lambda-cyhalothrin can be transported to surface water by drift during application, or runoff after application but would be mostly adsorbed to soil particles when present in runoff. Several label restrictions are in place to protect surface water resources from off-site transport of lambda-cyhalothrin (Syngenta 2014). These restrictions are the same as those described for cyfluthrin to protect surface water from drift and runoff.

The persistence of lambda-cyhalothrin in the environment varies with half-life values generally much longer in anaerobic conditions compared to terrestrial and aquatic aerobic conditions. The anaerobic aquatic half-life value for lambda-cyhalothrin is 57.7 to 6320 days compared to a range of 28.2 to 60.5 days and 21.1 to 52.9 days in aerobic soil and aerobic aquatic metabolism studies, respectively (USEPA 2016d). Lambda-cyhalothrin is stable to hydrolysis at water pH values of 5 and 7 but is susceptible to hydrolysis at alkaline pH values (pH = 9) with a half-life of 13 days. Lambda-cyhalothrin is less susceptible to photolysis when compared to other pyrethroid insecticides proposed for this program. Lambda-cyhalothrin is stable to soil photolysis but degrades more quickly in the presence of water and light with a reported aqueous photolysis half-life of 29.5 days (USEPA 2016d).

Lambda-cyhalothrin does not have the potential to volatilize from soil or water surfaces and impact air quality. Laboratory studies designed to measure the tendency of a chemical to move from dry and water surfaces into the air demonstrate low volatility.

**Ecological Resources**

Lambda-cyhalothrin is highly toxic to honeybees in acute exposures Contact toxicity is approximately an order of magnitude greater than oral exposures to lambda-cyhalothrin. Laboratory and field studies have shown that residual toxicity on treated plants can occur one to three days post treatment (USEPA 2011). The label for lambda-cyhalothrin includes use restrictions to reduce risks to pollinators, including avoiding applications to blooming crops or allowing pesticides to drift to blooming crops if bees are visiting the treatment area. Terrestrial invertebrates within the cherry orchard during and post treatment are expected to be impacted using lambda-cyhalothrin. The impacts will be greatest for those terrestrial invertebrates that are sensitive to lambda-cyhalothrin and are exposed to drift during application or to residues post application.

Lambda-cyhalothrin is considered practically non-toxic to waterfowl and slightly toxic to the bobwhite quail in acute exposures. Chronic toxicity to birds is considered low based on the
reproduction study using the mallard duck. Lambda-cyhalothrin is considered toxic to mammals based on acute oral dosing studies. Based on lambda-cyhalothrin's fate properties and toxicity profile using maximum application rates, acute risk to non-target mammals, and chronic risks to birds and reptiles have been identified (USEPA 2011). A primary concern with lambda-cyhalothrin is that birds and mammals may be exposed shortly after application through oral or dietary exposure to vegetable plant material or insects when foraging in treated fields and drift deposition areas for food or nesting material. These risks are minimized by following label instructions for application rates and spray drift mitigation (USEPA 2011).

Acute toxicity studies testing using fish and lambda-cyhalothrin indicate that the technical active ingredient and formulations are highly toxic to aquatic vertebrates. Toxicity studies testing the technical active ingredient report median lethality values of less than 1 ppb while formulation testing show median lethality values in the low ppb range (USEPA 2011). Chronic toxicity to freshwater and marine fish test species is high with adverse effects noted well below 0.5 ppb in longer exposures. Freshwater fish appear to be more sensitive to lambda-cyhalothrin than marine species based on acute and chronic testing. Lambda-cyhalothrin is also considered highly toxic to aquatic freshwater and marine invertebrates in acute and chronic exposures. Acute median lethality values for aquatic invertebrates are all below the mid ppt range except for the eastern oyster which is tolerant to high concentrations of lambda-cyhalothrin. Lambda-cyhalothrin is considered practically nontoxic to aquatic plants with no effects observed two orders of magnitude above solubility in water. USEPA estimated the risk of lambda-cyhalothrin applications to aquatic nontarget species under use patterns like the proposed applications for the Program. Acute and chronic risks were determined to be above levels of concern for aquatic vertebrates and invertebrates. These risk estimates assumed no mitigation measures to reduce offsite drift and runoff (USEPA 2011). To address the risk to aquatic species EPA has required multiple restrictions on the lambda-cyhalothrin label intended to reduce exposure and risk to aquatic nontarget species. Label restrictions include a prohibition from applying lambda-cyhalothrin directly to water or intertidal areas below the mean water mark, aerial and ground no treatment buffers adjacent to water bodies, vegetative filter strips adjacent to water bodies, wind speed and direction restrictions during application, and other restrictions designed to mitigate off-site transport of lambda-cyhalothrin from spray drift and runoff. These label restrictions are intended to minimize drift and runoff into water bodies and provide protection to aquatic vertebrates and invertebrates in various aquatic habitats.

Human Health

Lambda-cyhalothrin is classified as “not likely to be carcinogenic to humans” (USEPA 2017g). Lambda- and gamma-cyhalothrin are classified as Toxicity Category II via the dermal route and Toxicity Category IV for skin irritation potential. They are skin sensitizers. However, the negligible exposure potential when label requirements are adhered to people makes adverse health and safety risks unlikely.
The Program does not anticipate exposure to the general public from treatments in commercial orchards where the general public typically does not enter, and the Program follows label requirements to prevent exposure to water resources and to minimize drift. At the maximum registered application rates for both compounds, spray drift areas where risk is of concern range from 0 feet (i.e., edge of field) to greater than 300 feet depending on the application equipment and equipment parameters (i.e., nozzle configuration, boom height, droplet distribution, etc.).

There are risk estimates of concern at the edge of field for both adults and children 1 to < 2 years old for some of the maximum single application rates assessed and with various application equipment. The USEPA (2017g) evaluated the dietary and occupational risks to people. The USEPA found applicators and workers are the main group of people with potential dermal and inhalation exposure. The acute aggregate assessment is concerned with only dietary exposure (food and drinking water). The acute exposure estimates were not of concern to (USEPA 2017d).

The Warrior® II label require mixers, loaders, applicators, and other handlers to wear PPE including protective eyewear, coveralls, shoes plus socks, and category G waterproof gloves such as barrier laminate or Viton® ≥14mils (Syngenta 2014). Most of the handler exposure and risk estimates are below levels of concern. However, the USEPA (USEPA 2017g) found major risk concern from aerial applicators. Appropriate drift reduction technologies such as changing the spray type/nozzle configuration to coarser spray applications may result in less drift and reduced risk concerns from orchard/aerial applications. Similarly, using coarser sprays and lowering boom height sprayers reduces risk concerns.

The reentry period for workers 24 hours (Syngenta 2014); the USEPA (2020d) found this to be adequate to protect agricultural workers based on the acute toxicity of lambda-cyhalothrin. The USEPA (2017g) reviewed reports of incidents associated with lambda-cyhalothrin in the IDS and SENSOR-Pesticides; the Agency found minor severity in the majority (96% in IDS and 89% in SENSOR-Pesticides) and less than 1% of cases were of major severity with no deaths reported. Minor severity means that a person alleged or exhibited some symptoms, but they were minimally traumatic, the symptoms resolved rapidly and usually involved skin, eye or respiratory irritation.

Phosmet (Imidan®)

*Environmental Quality*

Phosmet is readily soluble in water, hydrolyzes rapidly (11.1, 0.5, and 0.02 days for pH 4, 7, and 9, respectively) and is classified as non-volatile under field conditions and non-volatile from water (USEPA 2010b). Phosmet is considered slightly to moderately mobile in soil, and depending on soil type, use site, and meteorological conditions, phosmet may be transported off-site via runoff, erosion, and spray drift. The octanol-water partition coefficient (log Kow) ranges from 602-1,096, (log Kow=2.2 to 3.0) also suggesting low potential for bioaccumulation.
Phosmet’s environmental fate properties and the Program’s use pattern make it unlikely to adversely impact air, soil, or water quality.

Phosmet is classified as slightly persistent in aerobic soil based on laboratory half-life of 27 days (USEPA 2020e). The only known degradate of toxicological concern from phosmet is phosmet oxon, which was identified in very minor amounts (≤ 0.5%) in aerobic and anaerobic soil metabolism studies. While oxon is a residue of concern, it was not observed in laboratory fate studies in significant amounts, so no modeling was conducted for this residue. Label restrictions are in place to protect surface water resources from off-site transport of phosmet (Gowan 2018).

Sampling of 2,084 surface water samples across the United States by U.S. Geological Service found a total of six phosmet oxon detections from 3 sites in Merced County, California (USEPA 2009d). One of the sites was reported as agricultural use, the other two were “other” land uses. Because phosmet degrades rapidly in water, it is unlikely to impact water quality outside of its area of use.

Ecological Resources

Phosmet is classified as very highly toxic to freshwater and estuarine/marine fish and invertebrates on an acute exposure basis. For both acute and chronic exposures, Levels of Concern were exceeded to varying degrees for all taxa evaluated in acute and chronic risk assessments. These taxa include freshwater fish and aquatic-phase amphibians, freshwater invertebrates, estuarine/marine invertebrates, and estuarine/marine fish (USEPA 2020e). Phosmet is considered moderately toxic and exceeds acute and chronic risk LOC’s of 0.5 and 1.0, respectively, for birds and mammals. Risk Quotient values exceed the chronic risk LOC for both birds and mammals at the lowest application rate evaluated, i.e., a single application of 1.0lb/ ai/A (USEPA 2020e). For bees, the acute risk (LOC) of 0.4 is exceeded across the maximum single application rates of all the uses evaluated. In-hive exposure values incident reports involving bee colonies indicate that exposure of bees is likely and can result in acute mortality.

Terrestrial ecosystems potentially at risk from phosmet applications include immediately adjacent areas that may receive drift or runoff. These could include fencerows, hedgerows, meadows, fallow fields, grasslands, woodlands, riparian habitats, and other uncultivated areas. Aquatic ecosystems potentially at risk could include water bodies adjacent to or downstream from treated fields. These could include ponds, lakes, reservoirs, or flowing waterways such as streams or rivers. In coastal areas, aquatic habitat also includes estuaries and marine ecosystems (USEPA 2009d). Phosmet is classified as very highly toxic to freshwater and estuarine/marine fish and invertebrates on an acute exposure basis (USEPA 2020e). There are no data on bioaccumulation potential for phosmet in fish. However, the octanol/water partition coefficient suggests low potential for bioaccumulation.
Label restrictions include a prohibition from applying phosmet directly to water or intertidal areas below the mean water mark, aerial and ground no treatment buffers adjacent to water bodies, vegetative filter strips adjacent to water bodies, wind speed and direction restrictions during application, and other restrictions designed to mitigate off-site transport of phosmet from spray drift and runoff. These label restrictions are intended to minimize drift and runoff into water bodies and provide protection to aquatic vertebrates and invertebrates in various aquatic habitats.

**Human Health**

The Program’s use pattern for phosmet is ground or aerial applications in commercial cherry orchards. The USEPA (2009b) found systemic effects in human dermal toxicity studies, with no concern for developmental toxicity. Phosmet is acutely toxic via the oral and inhalation routes (Toxicity Category II and I, respectively) of exposure, but is not acutely toxic via the dermal route, is non-irritating to the skin, and is not an eye irritant. Weight of evidence evaluations of phosmet suggest evidence of carcinogenicity but are not sufficient for quantification of cancer risk to humans (USEPA 2009b). Negative potential exposure to people makes adverse health and safety risks unlikely.

The Program does not anticipate exposure to the general public because treatments are in commercial orchards where the general public typically does not enter, and the Program follows label requirements to prevent exposure to water resources and to minimize drift. The USEPA (2016c) analyzed spray drift using AgDrift to model incidental human exposure to spray drift from aerial, groundboom, and airblast applications for residential and occupational exposure scenarios and found risk estimates of concern for groundboom and airblast applications, and risk estimates of major concern for aerial application. The USEPA also noted appropriate drift reduction technologies such as changing the spray type/nozzle configuration to coarser spray applications may result in less drift and reduced risk concerns from aerial application. Similarly, lowering boom height for groundboom sprayers reduces risk concerns. The USEPA also conducted an acute and steady state risk characterization of phosmet and phosmet residue, phosmet oxon. The USEPA (2016c) indicates acute risk assessments for food and drinking water exceed HED’s level of concern for all population subgroups, except for youth 13-19 years old and adults 50-99 years old. Steady state dietary exposure also exceeds HED’s level of concern, with higher risk estimates than for the acute scenario, where the only population subgroup that does not exceed HED’s level of concern is adults 50-99 years old. However, when phosmet is in water, it is not likely to persist because it is readily hydrolyzed (broken down), especially under alkaline conditions (USEPA 2016a). Surface and groundwater data from USGS’ NAWQA program (in (USEPA 2016a)) was analyzed for phosmet and its degradeate phosmet oxon, using a level of detection ranging from 0.006-0.02 micrograms/L. There were no positive detections above phosmet or phosmet oxon above levels of detection from 5,930 samples from across the United States.
The Imidan® label requires applicators and other handlers to wear PPE including long-sleeved shirts, long pants, shoes plus socks, and chemical resistant gloves as well as a chemical-resistant apron while mixing and loading. For those scenarios that did result in risk assessments of concern with baseline attire, additional PPE was assessed, including chemical resistant headgear for overhead exposure, and a respirator with an organic-vapor cartridge approved for pesticides by MSHA/NIOSH (Gowan 2018).

Spinetoram (Delegate®)

Environmental Quality

Spinetoram’s environmental fate properties and the Program’s use pattern make it unlikely to adversely impact air, soil, or water quality. Spinetoram is not volatile (USEPA 2009a) and is unlikely to cause air quality issues. In soil, spinetoram undergoes aerobic metabolism and photolysis with half-lives of 3-31 days and 19-88 days, respectively (USEPA 2016e). Spinetoram is immobile in soil and leaching is not significant under field conditions (USEPA 2016e), indicating it is unlikely to move into groundwater. In water/sediment aerobic and anaerobic systems, spinetoram rapidly associates with sediment where dissipation occurs slowly with half-lives of 116-124 days in aerobic environments and 385-1,386 days in anaerobic environments (USEPA 2016e). Because of its behavior in aquatic environments, the label does not allow applications directly to water, to areas where surface water is present or to intertidal areas below the mean high-water mark (Corteva Agriscience 2021a). The label also instructs applicators to avoid applications where runoff is likely to occur and to avoid applications when rain is predicted for the next 24 hours. Spinetoram does accumulate in fish, however, acute or chronic risk to mammals or birds through bioaccumulation is not a concern (USEPA 2016e).

Ecological Resources

The USEPA (2016e) estimated the risk potential from applications of spinetoram to stone fruit at a maximum single rate of 0.11 lb a.i./A, minimum of 4 applications, a maximum yearly rate of 0.44 lb a.i./A at a maximum application interval of 3 days. This is equivalent to the label use rate for ECFF on cherry except the maximum application interval is 7 days.

Spinetoram is moderately toxic to fish (freshwater and estuarine/marine) and highly toxic to aquatic invertebrates (freshwater and estuarine/marine) (USEPA 2016e). Freshwater fish and aquatic invertebrates are more sensitive to spinetoram on a chronic basis than they are on an acute basis (USEPA 2016e). The USEPA did not find adverse effects to fish (freshwater/estuarine fish) and amphibians (fish are a surrogate species for aquatic-phase amphibians) from spinetoram applications in their stone fruit scenario. The USEPA did not find acute risk to non-listed estuarine/marine invertebrates; however, there is acute risk to federally listed T&E estuarine/marine invertebrates. There were chronic exposure risks to freshwater and estuarine/marine invertebrates. The USEPA (2016e) concluded that chronic risk probably could
not be mitigated through implementing buffers because even with the absence of spray drift, runoff into aquatic habitats would likely be sufficient to cause impacts. This is because spinetoram is stable in aquatic environments and binds to sediments where it remains and can accumulate (USEPA 2016e). The USEPA (2016e) did not find adverse effects to non-listed aquatic plants in their stone fruit scenario; however, listed non-vascular plants did exceed the agency’s level of concern.

Spinetoram has low toxicity to birds and mammals from acute exposure; however, both birds and mammals are more sensitive to spinetoram on a chronic basis (USEPA 2016e). The USEPA (2016e) did not find risks of concern from either acute or chronic exposure to birds in their stone fruit exposure scenario. The USEPA concluded they did not anticipate any exposure risk to birds from spinetoram use, either direct impacts or indirect impacts through the consumption of contaminated fish. For mammals, there were no risks of concern for acute risk; however, chronic risks were a concern. The USEPA (2016e) estimated off-field drift of spinetoram from aerial and ground applications and found a chronic risk exposure to mammals within 26 feet and 7 feet from the field edge following aerial and ground applications, respectively. Terrestrial plants do not appear sensitive to spinetoram (USEPA 2016e).

Spinetoram is highly toxic to adult honey bees on an acute contact and oral basis (USEPA 2016e). The label’s application rate for stone fruit would trigger a risk to pollinating bees for contact and oral exposure (USEPA 2016e). The label has a warning statement that the product is highly toxic to bees but does not have any restrictions or guidance to minimize impact to pollinators. The Program anticipates impacts to pollinators that are present in or in vicinity of the orchard during and shortly after applications. The USEPA (2016e) calculated buffer distances from aerial applications using the labeled rate for stone fruit, and depending on the droplet size, found acute contact exposure risk within 62 feet and 141 feet and acute oral exposure risk within 115 feet and 295 feet for bees. For ground applications using the labeled rate for stone fruit, depending on the height of the boom, The USEPA (2016e) found acute contact exposure risk for bees within 7 feet and 39 feet and acute oral exposure risk within 10 feet and 82 feet of orchards.

*Human Health*

For the human health and safety review of spinetoram usage in the ECFF program, see the spinosad section immediately below.

**Spinosad (Entrust®, Entrust® SC, and GF-120® Naturalyte® Fruit Fly Bait)**

*Environmental Quality*

Spinosad’s environmental fate properties and the Program’s use pattern makes it unlikely to adversely impact water, air, or soil quality. Spinosad is not sensitive to hydrolysis but breaks down rapidly in water in the presence of light with reported photolytic half-lives of less than 1 day. The rapid photolytic breakdown of spinosad in laboratory studies has also been confirmed.
Spinosad moves rapidly from water to sediment and is highly persistent in sediment (USEPA 2016f). Spinosad is not considered mobile in soil based on the available soil adsorption (Koc) studies that have been conducted on a range of soil types. Degradation of spinosyn A and D in soil is rapid under aerobic conditions suggesting spinosad is susceptible to microbial degradation (Hale and Portwood 1996, USEPA 1998). These chemical fate properties indicate spinosad does not pose a threat to groundwater resources. The Entrust and GF-120 Naturalyte product labels do not allow application to water resources, reducing the exposure potential. Transport of spinosad to surface water would be either from drift during application, or runoff which would be primarily as bound material to soil particles. However, the Entrust labels requires applications to occur when runoff is unlikely, reducing this potential. GF-120 Naturalyte is resistant to washoff and the label recommends considering rain events and irrigation schedules when planning applications. The rapid breakdown of spinosad in soil further reduces its impacts should runoff occur post-application. Spinosad is not considered to be volatile based on the vapor pressure for both active ingredients (Cleveland et al. 2002). Spinosad degrades quickly on plant surfaces with reported half-lives ranging from 2.0 to 11.7 days (CDPR 2002).

**Ecological Resources**

The major route of exposure for terrestrial species from the Program’s use of spinosad is through the consumption of plant leaves and insects that contain spinosad residues from direct spray or spray drift. Spinosad has low to slight toxicity to wild mammals and birds (USEPA 2016f). Spinosad applications with aerial equipment could expose birds and mammals in the treatment area, and these animals may rapidly return to treated areas; however, the low toxicity to birds and mammals indicates even a direct spray is unlikely to cause harm. Birds and mammals may ingest insects containing spinosad residues, but harm is unlikely because of the number of insects they would need to consume to receive a harmful dose. Applications with ground equipment are even less likely to expose adult birds and mammals because they move away from disturbances. The USEPA (2016f) did not find spinosad applications a risk concern for acute exposure to birds (surrogates for reptiles and terrestrial-phase amphibians) and mammals; however, it did find foliar applications a risk concern for chronic dose-based exposure to mammals. In its spray drift model using maximum application rates, the USEPA (2016f) found the chronic risk of concern to mammals extends 62 feet out from the treated field for aerial applications and 7 feet for ground applications.

For aquatic species, the major route of exposure is through direct contact or through the consumption of plant parts and insects with residues. The labels instruct not to apply to water, to areas where surface water is present or to intertidal areas below the mean high-water mark. Spinosad toxicity to fish is moderate, while aquatic invertebrates are more sensitive in acute and chronic exposures (USEPA 2016f). The USEPA (2016f) did not find spinosad applications on stone fruit crops were a risk concern for acute or chronic exposure to freshwater or estuarine/marine fish. It did find chronic exposure was a risk concern for freshwater invertebrates.
and acute exposure a risk concern to estuarine/marine invertebrates. The Program expects minimal impacts to aquatic species based on its use pattern, adherence to product labels, and the toxicity profile of spinosad to aquatic taxa.

Toxicity to terrestrial invertebrates is variable; spinosad is considered highly toxic to honeybees. The Entrust labels specify not to apply the pesticide to blooming, pollen-shedding or nectar-producing parts if bees may forage on plants during application, which reduces exposure potential. The Program does expect some minor take of pollinators that pass through an orchard during or shortly after applications of Entrust formulations as well as from spinosad drift that falls onto flowering weeds adjacent to the orchard. The USEPA (2016f) estimated a distance from 138 feet to greater than 1,000 feet for acute contact exposure risk to bees from aerial spinosad applications, and 13 feet to 433 feet for ground applications, depending on the application rate and droplet size. The low application rate of spinosad in the bait formulation GF-120 Naturalyte does not pose risks to foraging honey bees, honey bee brood development, and hive condition (Burns et al. 2001, Mangan and Moreno 2009). While spinosad is toxic to invertebrates, GF-120 NF Naturalyte was specifically designed to reduce attractiveness to bees. Studies designed to test foraging for GF-120 and its components by honeybees during a period of high nutrient stress indicated the odors of the fruit fly attractants in the bait are effective at repelling bees (Mangan and Moreno 2009). Subsequently, APHIS determined GF-120 poses minimal risk to bees. The Program does not expect significant pollinator population affects based on its use pattern and adherence to label requirements.

Reptile toxicity data does not appear to be available for spinosad. The USEPA uses effects data for birds to represent sensitivity to reptiles. Based on the low toxicity of spinosad to birds, mammals, and aquatic vertebrates, toxicity to reptiles is expected to be low (USDA APHIS 2014).

Terrestrial plants are not sensitive to spinosad (USEPA 2016f). Aquatic non-vascular plants are more sensitive to spinosad than aquatic vascular plants (USEPA 2016f). The USEPA (2016f) did not find spinosad applications on stone fruit crops were a risk concern to terrestrial or aquatic plants.

*Human Health*

The USEPA (2016g) regards spinosad and spinetoram as toxicologically identical regarding human health based on their similar toxicological profiles. In this EA, these two chemicals are evaluated together.

Spinosad and spinetoram are classified as having low oral, dermal, and inhalation acute toxicity (Toxicity Category III or IV) (USEPA 2016g). They are not an eye or skin irritant. Spinetoram is a dermal sensitizer (USEPA 2016g). Spinosad and spinetoram are classified as not likely to be carcinogenic (USEPA 2016g).
The general public is not at risk from spinosad/spinetoram applications made to commercial cherry orchards as part of the ECFF program due to the low toxicity of the products and the USEPA-registered use patterns. The USEPA (2016g) evaluated the registered uses of spinosad and spinetoram and did not find any dietary (food and drinking water) risks of concern for both acute and chronic dietary exposure for all human subpopulations, including children ages 1-2 years old (USEPA 2016g).

The potential exposure routes for occupational workers are through dermal and inhalation routes. There is no dermal hazard associated with spinosad and spinetoram (USEPA 2016g). The labels for both Entrust products, GF-120 Naturalyte, and Delegate product require applicators and other handlers to wear a long-sleeved shirt, pants, shoes, and socks. The Entrust label requires mixers and loaders must wear an approved filtering respirator. The USEPA (2016g) did not find occupational inhalation risks of concern for the registered uses of spinosad and spinetoram; this included aerial, airblast, and groundboom applications in orchards. The reentry interval for spinosad/spinetoram is 4-hours.

**Zeta cypermethrin (Mustang Maxx®)**

*Environmental Quality*

Zeta cypermethrin also has low water solubility and preferentially binds to soil and sediment suggesting low mobility in runoff (USEPA 2016d). Zeta cypermethrin risks to groundwater are negligible due to low water solubility and a strong affinity to organic material and sediment. Zeta cypermethrin can be transported to surface water by drift during application, or runoff after application but would be mostly adsorbed to soil particles when present in runoff. Several label restrictions are in place to protect surface water resources from off-site transport of zeta cypermethrin (FMC Corporation 2021a, b). These restrictions are the same as those described above for cyfluthrin to protect surface water from drift and runoff. There is also a FIFRA 24(c) Special Local Need (SLN) registration in New York with additional restrictions, such as prohibition of ultra-low volume applications, that will provide additional protection to surface water (FMC Corporation 2021b).

The persistence of zeta cypermethrin in the environment varies with half-life values longer in terrestrial environments when compared to aquatic environments. The aerobic soil half-life value for zeta-cypermethrin is 219 days compared to 9.5 days and 17.7 days in aerobic aquatic and anaerobic aquatic metabolism studies, respectively (USEPA 2016d). Zeta-cypermethrin is stable to hydrolysis at neutral and acidic pH values but will degrade with a half-life of 2.5 days under alkaline conditions. Soil and aqueous photolysis half-lives are 36.2 and 55 days, respectively (USEPA 2016d).
No effects to air quality are anticipated for the proposed use of zeta-cypermethrin post application. Chemical properties that measure the likelihood of a chemical to volatilize from dry and wet surfaces show that zeta cypermethrin is not likely to move into the surrounding air.

**Ecological Resources**

Zeta-cypermethrin is considered moderately toxic to wild mammals and practically nontoxic to slight toxic to birds and reptiles in acute and dietary exposure studies (USEPA 2013c). Chronic avian reproduction studies using the bobwhite quail and mallard show no effects on adults, eggs, or chicks at the highest concentrations tested. The available toxicity data suggests that there may be some direct risk to small mammals that forage in cherry orchards immediately after treatment using zeta-cypermethrin. The direct acute and chronic risks to birds are anticipated to be low. Zeta-cypermethrin toxicity is low to birds and they are also able to forage in areas outside of the cherry orchards foraging on plant materials and invertebrates without zeta-cypermethrin residues. Similarly, wild mammals that forage outside of the cherry orchards are at a reduced risk from exposure to zeta-cypermethrin residues on food items. Indirect risks to terrestrial vertebrates are not anticipated for those species that feed exclusively on plant material. Zeta-cypermethrin does not affect terrestrial plants at the proposed application rates for stone fruit. Nontarget vertebrates that obtain part or all their diet from terrestrial invertebrates would be at greater indirect risk from the proposed applications of zeta-cypermethrin. Reductions in sensitive terrestrial plant and soil invertebrates within cherry orchards are anticipated after application. Indirect impacts to vertebrate prey items may occur over multiple applications of esfenvalerate which are allowed on the label. Terrestrial invertebrates serve as prey items for terrestrial and aquatic vertebrates. Terrestrial vertebrates typically have foraging ranges that are greater than the size of the cherry orchards and are able to forage for prey items outside of the cherry orchards. The ability to forage for prey items outside of the orchards reduces the direct and indirect risk to terrestrial vertebrates that feed on insect or plant food items.

The toxicity of zeta-cypermethrin to terrestrial invertebrates such as the honeybee and the earthworm is high based on available laboratory toxicity studies (USEPA 2013c). Toxicity to honeybees is high in both oral and contact toxicity studies. Terrestrial invertebrates present in cherry orchards during and immediately after application will be impacted by zeta-cypermethrin applications. Some species may be more impacted by others due to a greater sensitivity to the effects of zeta-cypermethrin or differences in life history characteristics that could impact exposure. The label for zeta-cypermethrin has use restrictions to reduce risks to pollinators, including avoiding applications to blooming crops or allowing pesticides to drift to blooming crops if bees are visiting the treatment area.

Zeta-cypermethrin has very high toxicity to fish, amphibians, and aquatic invertebrates. Acute median lethality values range from less than 0.5 ppb for the rainbow trout to approximately 1 ppb for the sheepshead minnow. Effects to aquatic invertebrates is approximately two orders below values reported for fish. Acute median lethality values to freshwater amphipods and
marine mysid shrimp are below 5 ppt. Chronic toxicity to aquatic vertebrates and invertebrates is high based on available laboratory and field data (USEPA 2013c). No adverse effect concentrations in fish have been reported at concentrations in the low ppb range. Chronic no adverse effect concentrations in aquatic invertebrates are much lower with values as low 0.5 ppt. High toxicity has also been observed in aquatic invertebrates that are exposed to zeta-cypermethrin in sediment and porewater (USEPA 2013c). Porewater is defined as the water that occupies the interstitial areas between sediment particles. Applications of zeta-cypermethrin by ground or aerial equipment pose a risk to aquatic vertebrates and invertebrates in waterbodies in proximity to cherry orchards. The risk to aquatic organisms is significantly reduced by multiple label restrictions that are required as part of any applications of zeta-cypermethrin. This label restrictions include prohibitions from applying zeta-cypermethrin directly to water or intertidal areas below the mean water mark, aerial and ground no treatment buffers adjacent to water bodies, vegetative filter strips adjacent to water bodies, wind speed and direction restrictions during application, and other restrictions designed to mitigate off-site transport of zeta-cypermethrin from spray drift.

**Human Health**

The Program’s use pattern for zeta-cypermethrin is ground or aerial applications in commercial cherry orchards with ECFF. Zeta-cypermethrin is classified in group C “Possible human carcinogen” based on benign lung adenomas and adenomas plus carcinomas combined in females in a mouse carcinogenicity study (TXR# 0055252, J. Quest, 2/17/1988 in (USEPA 2017e)). No systemic effects were observed in dermal toxicity studies, and there is no concern for developmental toxicity. Acute lethality studies with the cypermethrins indicate moderate acute toxicity via the oral route (Toxicity Categories II and III) and low toxicity via the dermal and inhalation routes (Toxicity Categories III and IV). Additionally, mild irritation was seen in primary eye and skin irritation studies, but no dermal sensitization was observed (USEPA 2017e). Negative potential exposure to people makes adverse health and safety risks unlikely.

The Program does not anticipate exposure to the general public because treatments are in commercial orchards where the general public typically does not enter, and the Program follows label requirements to prevent exposure to water resources and to minimize drift. USEPA (USEPA 2017e) conducted a spray drift assessment resulting from the highest agricultural application rates. Incidental dermal and oral exposure risk assessment was conducted for spray drift from aerial, groundboom, and airblast applications for property directly adjoining treated fields and resulted in no risk estimates of concern associated with drift USEPA (USEPA 2017e). The USEPA (USEPA 2017e) conducted a risk evaluation for zeta-cypermethrin acute and chronic dietary exposure from food and drinking water and found no risks of concern when the zeta-cypermethrin formulations are used according to label instructions.

The Mustang® Maxx label requires applicators and other handlers to wear PPE including long-sleeved shirts, long pants, shoes plus socks, goggles, face shield or safety glasses, respirator, and
chemical resistant gloves such as nitrile, butyl, neoprene and or barrier laminate (FMC Corporation 2021a, b).

For those scenarios that did result in risk assessments of concern with baseline attire, additional PPE was assessed. The USEPA (2017e) airblast applicator scenario is believed to represent a reasonable worst case surrogate estimate of post-application inhalation exposure during these dusty mechanical harvesting activities. The USEPA (2017e) found the non-cancer inhalation risk estimate for commercial airblast application is not of concern, and the handler inhalation exposure estimates during application would be protective of most occupational post-application inhalation exposure scenarios. Repeat exposure resulted in either decreased or very similar toxicity and thus was not a concern (USEPA 2017e).

The reentry period for workers is 12 hours (FMC Corporation 2021b); the USEPA (2017e) found this to be adequate to protect agricultural workers based on the acute toxicity of zeta-cypermethrin. The current IDS analysis for cypermethrin and zeta-cypermethrin, from January 1, 2011, to December 8, 2015, found 771 cases in Main IDS and 5200 incidents in Aggregate IDS. In the Main IDS from 2012 to today, there are 3 single active ingredient incidents (moderate severity) and 1 multiple (minor severity reported to the database involving alpha-cypermethrin). A query of SENSOR-Pesticides from 1998-2012 identifies a total of 947 incidents involving cypermethrins. From January 1, 2010, to December 31, 2015, 94 human incidents involving cypermethrin were reported to NPIC, and 198 cases were reported to PISP between 2010 and 2013 that involve the active ingredient, cypermethrin (USEPA 2017e). The available incident data from IDS, NPIC, California PISP, and SENSOR-Pesticides report that the majority of cypermethrin incident cases are residential. These datasets suggest that most of the reported residential cypermethrin incidents involve the use of indoor foggers or indoor sprays. As such, incidents involving agricultural uses that adhere to label requirements for PPE and spray application rates in cherry orchards are not expected to be of concern.
# Table 2. Summary of the potential risks associated with pesticide active ingredients proposed for use in commercial cherry orchards when used according to label requirements in the Program.

<table>
<thead>
<tr>
<th>Active ingredient (registered pesticide)</th>
<th>Environmental Quality within Commercial Cherry Orchards</th>
<th>Ecological Resources Located within Commercial Cherry Orchards</th>
<th>Aquatic</th>
<th>Terrestrial</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Water quality</td>
<td>Air quality</td>
<td>Soil quality</td>
<td>Vertebrates</td>
</tr>
<tr>
<td>Acetamiprid (Assail 30SG, Assail 70WP)</td>
<td>Prone to runoff and leaching</td>
<td>Negligible</td>
<td>Moderately mobile</td>
<td>Minimal risk</td>
</tr>
<tr>
<td>Beta-cyfluthrin (Baythroid XL)</td>
<td>Risk minimized through label restrictions</td>
<td>Negligible</td>
<td>Low mobility</td>
<td>Moderate risk</td>
</tr>
<tr>
<td>Carbaryl (Sevin XLR Plus)</td>
<td>Prone to runoff; label restrictions minimize risk</td>
<td>Negligible</td>
<td>Moderately mobile</td>
<td>Minimal risk</td>
</tr>
<tr>
<td>Cyantraniliprole (Exirel)</td>
<td>Prone to runoff and leaching, label restrictions minimize risk</td>
<td>Negligible</td>
<td>Moderately mobile</td>
<td>Minimal risk</td>
</tr>
<tr>
<td>Esfenvalerate (Asana XL 0.66EC)</td>
<td>Low risk</td>
<td>Negligible</td>
<td>Slightly mobile</td>
<td>Moderate risk</td>
</tr>
<tr>
<td>Lambda-cyhalothrin (Warrior II 2.08CS)</td>
<td>Minimal risk</td>
<td>Negligible</td>
<td>Low mobility</td>
<td>Minimal risk</td>
</tr>
<tr>
<td>Phosmet (Imidan 70W)</td>
<td>Low risk</td>
<td>Negligible</td>
<td>Slightly mobile</td>
<td>Minimal risk</td>
</tr>
<tr>
<td>Active ingredient (registered pesticide)</td>
<td>Environmental Quality within Commercial Cherry Orchards</td>
<td>Ecological Resources Located within Commercial Cherry Orchards</td>
<td></td>
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<td>----------------------------------------</td>
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</tr>
<tr>
<td></td>
<td>Water quality</td>
<td>Air quality</td>
<td>Soil quality</td>
<td>Vertebrates</td>
</tr>
<tr>
<td>Spinetoram (Delegate WG)</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Immobile</td>
<td>Negligible risk</td>
</tr>
<tr>
<td>Spinosad (Entrust, Entrust SC, GF-120 Naturalyte)</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Immobile</td>
<td>Minimal risk</td>
</tr>
<tr>
<td>Zeta-cypermethrin (Mustang MAXX)</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Low mobility</td>
<td>Moderate risk</td>
</tr>
</tbody>
</table>

*Risk is reduced to pollinators through label restrictions.*
2. **Impacts from the Disposal of Fruit Waste and Water Waste**

The Program does not know the potential amount of fruit that would be disposed due to ECFF. The amount of waste fruit from the float test for ECFF depends on the number and size of commercial cherry orchards within the quarantine area that plan to distribute their fruit outside of the quarantine area. The minimum sample size of fruit for float testing is 4 pounds for orchards two acres or less in size and 2 pounds per acre for orchards greater than 2 acres in size. Entities that dispose less than 100 pounds of fresh cherry waste per day can use any legal disposal method, including standard landfill disposal. Entities that dispose of larger volumes of fresh cherry waste (more than 100 pounds per day) that are in high-risk areas must dispose of fruit following the approved disposal options that are intended to mitigate the risk of ECFF. These include deep burial, grinding and discharge into a sanitary sewer, disposing by legal disposal methods after heat treatment, submersion treatment, or freezing, or returning the waste to the quarantine zone. Water waste from the fruit test method and submersion treatments may contain pesticide residue.

**Environmental Quality**

The disposal of fruit onto fields in low-risk areas or buried would decompose and add organic matter to the soil. It is possible that pesticide residues on the fruit would dislodge and move into the soil or runoff or leach into water sources. Similarly, pesticide residue would wash off fruit during the float test and submersion treatments and end up in the water waste. The grinding of fruit and disposal into the sewer system could also result in pesticide residue possibly ending up in the environment. The pesticides’ environmental fate would be the same as described above under the section “Impacts of Program-recommended Pesticides” (summarized in Table 2). The amount of pesticide on the discarded fruit would be less than that found in an orchard after application and further breakdown of the pesticide will occur through biotic and abiotic processes between the time of last application to when the fruit and wastewater are disposed. As such, the impact to environmental quality from pesticide residue on discarded fruit would be less than the impact from pesticide applications to the orchard (described above). Fruit disposed of in landfills would not result in pesticide residues entering the environment because landfills are designed to prevent runoff and leachate. The Program does anticipate detectable levels of pesticide from disposed unprocessed fruit in fields and wastewater, but not at quantities sufficient to cause adverse impacts to environmental quality.

**Ecological Resources**

The Program does not expect direct or indirect impacts to terrestrial and aquatic species from the disposed fruit itself. The concern would be exposure to pesticide residues on the fruit. There is the possibility of pesticide residues dislodging from the fruit into the environment from discarded fruit spread in the field or disposed through deep burial, with for potential for leaching or runoff into water resources. Disposal of water used during the float test and submersion
treatments could result in exposure to terrestrial and aquatic species if the water is dumped directly into the environment instead of through the wastewater sewer system.

The impact to ecological resources from pesticide residue on discarded fruit or in wastewater from the float test and submersion treatments would be less than the impact from pesticide applications to the orchard (described above). This is because the amount of pesticide on the fruit would be less than that found in an orchard after application and further breakdown of the pesticide will occur through biotic and abiotic processes between the time of last application to when the fruit or wastewater are disposed. Also, several of the pesticides proposed for use in the Program have favorable environmental fate properties and toxicity profiles suggesting risk to nontarget species would be low.

Birds and mammals that feed on disposed fruit could ingest pesticide residues; however, the Program does not anticipate impacts because the residues would not be at levels that are toxic and species forage on other food items, not just disposed fruit. The Program does not anticipate significant exposure of water resources to pesticide residues and does not expect impacts to aquatic species. The amount of pesticide residue on waste fruit is a fraction of that found after the last application in the orchard, and further breakdown of the residues would occur in the field or deep burial. Landfills are designed to prevent runoff and leaching into the environment; therefore, the disposal of fruit in landfills would not result in contamination of water resources. Similarly, the Program does not anticipate impacts to terrestrial and aquatic species from the disposal of wastewater in the sewer system as these systems have their own engineered safeguards in place to reduce impacts of effluent to the environment.

**Human Health**

The Program does not anticipate human health impacts from the disposal of waste fruit or wastewater generated from the float test and submersion treatments. Waste fruit is not available for human consumption. Impacts to surface and groundwater from field and landfill disposal of waste fruit, and sewer system disposal of wastewater are not expected. Thus, dietary exposure through drinking water is unlikely.

3. **Impacts to Protected Species**

**Migratory Bird Treaty Act**

In the 2018 and 2019 EAs, APHIS evaluated the proposed ECFF program in terms of potential impact on migratory avian species, including migratory birds of conservation concern. In those EAs, the implementation of the preferred alternative was not expected to have any adverse effect on migratory birds, or their flight corridors associated with treatment areas. These findings apply to the current EA as the birds covered in the 2018/2019 EAs also occur in the other counties covered in this EA. As such, APHIS’ focuses its analysis on the impacts the new protocol for the distribution and sale of cherry fruit produced in the ECFF quarantine have to migratory birds.
Migratory birds may nest in or use commercial cherry orchards. Commercial cherry orchards are already disturbed sites and agricultural activities may impact directly or indirectly migratory birds. While ECFF control activities may temporarily disturb migratory birds, APHIS expects this disturbance to be localized and of short duration. Some examples of anticipated disturbance associated with program activities includes the use of vehicles and human noise. The Program-recommended pesticides are available to commercial growers and are labeled for use on cherries to control a range of insect pests and are not limited to ECFF. Some of the proposed insecticides used in the systems approach pose a greater risk of direct effects to birds than others (Table 2). The risk of direct effects is based on migratory birds that would only consume food items that have been treated within a cherry orchard. Migratory birds typically have foraging ranges that are greater than the cherry orchards that would be treated under the systems approach. The availability of plant and invertebrate prey items without residues would reduce risk to any migratory birds that forage in and around production cherry orchards. In addition, treatments in cherry orchards may occur outside of the time when some migratory bird species would be present in the area. Any indirect effects to migratory birds through loss of invertebrate prey items would be reduced for those birds that also forage outside of established cherry orchards.

The Program would not implement mitigation measures to reduce impacts to migratory birds in commercial cherry orchards. However, at locations outside of commercial cherry orchards, the Program could implement mitigation measures such as conducting as many activities as possible outside of the nesting season and setting buffer zones around ground-nesting breeding birds until nestlings have fledged or breeding behaviors are no longer observed. State agencies also may establish site-specific migratory bird conservation measures, as needed, prior to beginning any program activities.

Bald and Golden Eagle Protection Act
If bald or golden eagles were discovered near a program area, the State agency responsible for the area would contact the USFWS and implement recommendations to avoid disturbance at nest sites. For bald eagles, APHIS would follow guidance as provided in the National Bald Eagle Management Guidelines (USDOI 2007). These guidelines include a 330 to 660-foot buffer from an active nest, depending on the visibility and level of activity near the nest. APHIS expects pesticide exposure to terrestrial and aquatic nontarget organisms to be negligible, and subsequently, the direct and indirect risks to eagles is very low. APHIS expects disturbance from other activities such as survey or accessing treatment sites will be of short duration and have negligible impacts to eagles. Proposed use sites are commercial cherry orchards that are not where eagles forage or nest.

Endangered Species Act
Section 7 of the ESA and ESA’s implementing regulations require Federal agencies to ensure their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of critical habitat. APHIS has
considered the impacts of the proposed program regarding listed species in the proposed Program area.

APHIS has determined that ECFF program activities in New York will have no effect on piping plover, *Charadrius melodus*; and eastern massasauga, *Sistrurus catenatus*. APHIS has also determined that ECFF program activities in New York may affect but are not likely to adversely affect the Indiana bat, *Myotis sodalis*; northern long-eared bat, *Myotis septentrionalis*; and bog turtle, *Clemmys muhlenbergii*. APHIS is requesting U.S. Fish and Wildlife Service (USFWS) concurrence with these determinations. APHIS submitted a biological assessment (BA) to the USFWS on May 18th, 2022 for review and concurrence. The BA is included in the administrative record for this EA.

Contact and coordination between USFWS and treatment applicants would not be required for pesticide treatments occurring outside of habitats where listed species occur. If treatments occur in habitats where listed species may occur, then the Program will coordinate with USFWS personnel to ensure treatments do not affect listed species or critical habitats that are present in or near the treatment area. This process would only apply to listed species identified in the BA.

4. Impacts to the Commercial Cherry Industry

Commercial cherry growers with orchards in the quarantine area could experience economic losses if their fruit has ECFF and is unmarketable to domestic and export markets. Growers may also have an increase in costs associated with the control of ECFF; however, the increase in costs may be marginal as the pesticides recommended in the Program are labeled for use to control other insect pests on cherry and may already be part of the grower’s pest management program. The Program expects impacts will be the same for growers of conventional and organically grown cherries. One of the Program-recommended pesticides is approved for use in organic production. Growers may need to include additional recordkeeping or change their recordkeeping to document compliance with Program requirements and safeguards.

5. Cumulative Impacts

In terms of Federal and State program activities in the Program area, there are no significant cumulative impacts anticipated from implementing the preferred alternative. The use of pesticides as prescribed for this Program are not expected to result in cumulative impacts to the human environment. If the ECFF infestation expands, APHIS and NYS AGM may expand the Program to include new areas. Based on APHIS’ review of the context and intensity of the existing, ongoing, and potential future ECFF cooperative control program treatments, there will be no cumulative impacts to the human environment resulting from proper implementation of the preferred alternative. APHIS considered implementation of the preferred alternative in the context of, and in conjunction with, other pest control and quarantine programs occurring in the Niagara area of New York State (NYSDAM 2022). These programs target different pests by using pesticides with different mechanisms of toxic action. Additionally, the pesticides are
applied at different times. Such differences suggest there is limited potential for pesticide interaction or for multiple exposures. The potential total pesticide use by programs in the same location is, therefore, not expected to create significant cumulative impacts in the human environment. ECFF program chemical treatments and the disposal of waste fruit and water waste from float tests and submersion treatments are considered to pose minimal risk to the human environment, as determined in the 2018 and 2019 EAs and this EA (USDA APHIS 2018a, b, 2019b).

D. Other Aspects of the Human Environment

APHIS considered the potential environmental impacts of implementing the alternatives listed in chapter 2 on minority and/or low-income communities, Tribal interactions, and historical and culturally sensitive sites in the program area. A lack of Federal action could result in adverse economic and health impacts on the affected producers and consumers, such as decreased harvests, higher consumer prices, loss of local employment, loss of market share, loss of property, reduced nutritional options, and compromised mental and physical health. APHIS does not anticipate these types of adverse effects because of carrying out the existing program (alternative B) or the preferred alternative’s surveillance activities, trapping, and Program-recommended pesticide applications. On a case-by-case basis, APHIS accommodates special needs through the selection of specific control methods, or by modifying program operations. This minimizes the potential for impacts to those communities, locations, sensitive areas, or individuals.

Executive Order 12898—Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations and Executive Order 13985—Advancing Racial Equity and Support for Underserved Communities through the Federal Government

Executive Order (EO) 12898 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. EO 13985 “advances equity for all, including people of color and others who have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality”. It instructs Agencies “to assess whether, and to what extent, its programs and policies perpetuate systemic barriers to opportunities and benefits for people of color and other underserved groups”.

The 2018 and 2019 EAs evaluated census data for the Program area and did not find communities with environmental justice concerns (even though there may be clusters of minority
and low-income communities within cities) (USDA APHIS 2018a, b, 2019b). The same applies to those areas in the counties where the systems approach would be implemented to treat in cherry orchards. The Program does not anticipate needing to provide advance notice of ECFF program activities and potential exposure hazards in other languages to meet the needs of the population in the Program area.

Executive Order 13045—Protection of Children from Environmental Health Risks and Safety Risks
This EO acknowledges that children, as compared to adults, may suffer disproportionately from environmental health and safety risks because of their 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.

The proposed Program does not pose any disproportionately high adverse effects to children because they are unlikely to be present when program workers apply treatments in cherry orchards or maintain bait traps, and there is negligible exposure to pesticides once they are applied. The design of the traps allows placement beyond the reach of children, even though children are intermittently present at shelters, playgrounds, parks and picnic areas, religious centers, public/private campgrounds and trailer parks, athletic fields, bus depots, and outdoor community facilities where the program may place bait traps.

The number of schools within the quarantine areas and treatment zones will vary over time but, where possible the Program will not apply control treatments on school property. The Program will maintain traps and apply any pesticide applications only when children are not present in the immediate area. When pesticide applications are essential outside of cherry orchards, the Program would make ground applications with a backpack sprayer. Any exposure of children to applied products is negligible based on the program’s application methods and the product formulations.

Executive Order 14008—Tackling the Climate Crisis at Home and Abroad
Climate change (CC) refers to long-term shifts in average weather patterns that define the Earth’s local, regional, and global climates. This includes changes in average daytime and nighttime temperature, precipitation, drought periods, periodicity of tornadoes and rainfall, polar ice melting, and ocean/sea level rise. Human-produced impact on global temperature (also known as anthropogenic global warming) may be avoided or reduced by government agencies through consideration of CC during the NEPA process. NEPA requires U.S. federal agencies to examine the reasonably foreseeable effects of a proposed action on the human environment (40 CFR § 1508.1(g)). Federal agencies comply with EOs 13990 (“Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis”) and 14008 (“Tackling the Climate Crisis at Home and Abroad”) by considering:
• the effects of CC on a proposed action,
• the potential effects of a proposed action on CC, and
• potential mitigation measures that could be applied to the proposed action.

Direct effects of CC on the ECFF fruit fly program include increased likelihood of introduction and modification of the incidence, prevalence, persistence, and locations of fruit fly outbreaks. Over time, biological modifications to ECFF could lead to more generations per year, increased reproductive rates, and populations that survive over winter. Extreme precipitation and soil erosion coupled with overall drought increase the risk of crop exposure to heat events that reduce productivity. All these direct effects elevate risks to U.S. agricultural and natural resources.

Specific examples of impacts to program operations include: (1) extreme weather events may interfere with the servicing of traps and application of treatments, (2) higher temperatures and drought may reduce pesticide persistence in the traps triggering the need for shorter replacement intervals and increasing program costs, and (3) fruit fly program funding may be redirected to disaster relief and other emergency responses.

The USDA-APHIS Annual Energy Report for 2019 (USDA APHIS 2019a), the last “pre-COVID pandemic” year with available data on all USDA-APHIS activities, including contracted services, reports electricity use in all buildings totaled 14,275.1 megawatts (MWh). The combined agency total for Standard and Non-Standard Operations and Total Biogenic emissions is less than 40,000 metric tons (MT) CO₂ equivalent. Based on the number of USDA-APHIS programs, shared use of facilities, and assuming proportionate fleet uses, the fruit fly program emissions would be less than the former 25,000 MT CO₂ equivalent threshold for a quantitative analysis suggested by the President’s Council for Environmental Quality (USDA APHIS 2019a, USEPA 2020b).

Sources of GHG emissions inherent in fruit fly program activities include land vehicles used during program delivery and aircraft used during aerial applications. The Program mitigates its contribution of GHG emissions by efficiently combining vehicle trips by personnel. Efficient vehicle use and improvements in fleet efficiency appear to be the most promising measures that could reduce fruit fly program related GHG emissions.

Historical and Cultural Resources
EO 13175—Consultation and Coordination with Indian Tribal Governments, calls for agency communication and collaboration with Tribal officials for proposed Federal actions with potential Tribal implications. The Archaeological Resources Protection Act of 1979 (16 U.S.C. §§ 470aa-mm), secures the protection of archaeological resources and sites on public and Tribal lands. APHIS determined that there are five Tribes with land interests in the Program area: Seneca Nation of Indians, Onondaga Nation, Tonawanda Band of Seneca Indians, Seneca-Cayuga Tribe of Oklahoma and Tuscarora Nation (USDA FS 2022). The 2018 and 2019 EAs did not find impacts to Tribes. Those findings do not change in this current EA which adds the new
protocol for the movement of cherry fruit out of the quarantine area and applies to commercial cherry growers and producers on their privately owned property. The preferred alternative will not involve treatments that excavate soil or create fugitive dust, so program activities are unlikely to affect Native American artifacts. To the extent that treatments may occur on land where there are Tribal interests, the Program will contact representatives from the identified Tribes to ensure adequate notification and consultation in a timely manner. APHIS has contacted each of the five Tribes and provided the draft Federal Order and new systems approach for review. To date APHIS has received no comments from the Tribes. If the Program discovers any archaeological Tribal resources, it will notify the appropriate individuals.

The National Historic Preservation Act of 1966, as amended (16 United States Code (U.S.C.) §§ 470 et seq.), requires Federal agencies to consider the potential for impact to properties included in, or eligible for inclusion in the National Register of Historic Places (36 C.F.R. §§ 63 and 800) through consultation with interested parties where a proposed action may occur. This includes districts, buildings, structures, sites, and landscapes.

During 2018 consultations with both the New York State Office of Parks, Recreation and Historic Preservation and the New York State Historic Preservation Office (also known as New York State Parks, Recreation and Historic Preservation’s Division for Historic Preservation), these entities concurred with APHIS on the lack of potential for impact to historic facilities. APHIS submitted a project description on March 26, 2018; a second description for the expanded greater Niagara region was accepted by these New York offices on March 5, 2019.

Program actions will not disturb historic places because there will be no application of pesticides to buildings, and the application methodologies minimize the potential for drift. The new protocol for the distribution and sale of cherries produced in the ECFF quarantine applies to commercial cherry orchards and processing facilities, which are on privately owned properties. In other Program areas, the Program will discreetly integrate control activities into the site, without disrupting the viewseshd or create fugitive dust. All Program treatments are targeted to ECFF hosts (cherry trees), and do not alter, change (restore or rehabilitate), modify, relocate, abandon, or destroy any historic buildings, edifices, or nearby infrastructure. If the Program discovers any archaeological resources, it will notify the appropriate individuals.
IV. Listing of Agencies Consulted

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

Plant Protection and Quarantine
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
4700 River Road
Riverdale, MD 20737

State Plant Health Director
Plant Protection and Quarantine
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
500 New Karner Road, 2nd Floor
Albany, NY 12205

U.S. Fish and Wildlife Service
New York Field Office
3817 Luker Road
Cortland, NY 13045
Email: FW5ES_NYFO@fws.gov

New York Department of Agriculture and Marketing
10 Airline Drive, Suite B
Albany, New York 12205

New York State Historic Preservation Office
OPRHP
P.O. Box 189
Waterford, NY 12188
V. References

NYSDAM. 2022. Plants and Natural Resources. New York State, Department of Agriculture and Markets.


USEPA. 2010d. Risks of Carbaryl use to Federally Threatened Delta Smelt (Hypomesus transpacificus).


USEPA. 2013b. Cyantraniliprole: Chronic Aggregate Dietary (Food plus Drinking Water) Exposure and Risk Assessments for the First Food Uses in Support of a Section 3 Registration Action on Brassica (cole) Leafy Vegetables (Group 5), Bulb Vegetables (Group 3-07), Bushberries (Group 13-07B), Oilseed (Group 20), Citrus Fruit (Group 10-10), Cotton, Cucurbit Vegetables (Group 9), Fruiting Vegetables (Group 8-10), Leafy Vegetables (non-Brassica)(Group 4), Pome Fruit (Group 11-10), Stone Fruit (Group 12), Tree Nuts (Group 14), and Tuberous and Corm Vegetables (Subgroup 1 C). U.S. Environmental Protection Agency, Office of Chemical Safety and Pollution Prevention.


USEPA. 2017g. Lambda and Gamma-Cyhalothrin Human Health Draft Risk Assessment for Registration Review. U.S. Environmental Protection Agency.