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Animal and Plant
Health Inspection
Service

Asian Giant Hornet Control Program in Washington State

Final Environmental Assessment—July 2020

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Final Environmental Assessment—July 2020

I. Introduction

A. Background

The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), in cooperation with the Washington State Department of Agriculture (WSDA), is considering actions to eradicate the invasive Asian giant hornet (AGH) (*Vespa mandarinia* Smith (Hymenoptera:Vespidae)). The AGH is the world's largest hornet and is an insect native to Asia. The hornet is a pest of *Apis mellifera* L., the European honey bee, and causes losses to beekeepers in its native range. The AGH was first detected in December 2019 by a resident of Blaine in the northwest portion of Washington State in Whatcom County. In May 2020 another AGH was confirmed near the town of Custer also located in Whatcom County. The detection in the United States followed an eradication of an AGH nest on Vancouver Island in British Columbia in September 2019. Since the detection of AGH in Washington there have been other unconfirmed reports of AGH in Washington through outreach efforts, suggesting that other nests may be present.

The AGH is a large bodied hornet (approximately 1.5–2 inches long) with a large orange and yellow head, prominent eyes, and a yellow and black striped abdomen. The AGH is a social wasp that typically nests in pre-existing ground burrows. They may also build nests in decayed trunks and roots near the ground (USDA-APHIS, 2020). AGH typically occupies nests in forested areas or urban green spaces. Aerial nests are rare but can occur in man-made structures (Matsuura and Koike, 2002).

Adult AGH females are divided into two castes; the first are the queens that initiate the colony and lay eggs and the second caste are the sterile workers who collect food and rear larvae (USDA-APHIS, 2020). Queens emerge in the spring and look for suitable nesting sites. Once the queen finds a suitable site she will build a nest, forage, lay eggs, and care for her young until they can become workers. When the nest size reaches approximately 40 workers the queen will remain in the nest while the workers forage and care for the larvae. In the fall when the nest has a high number of workers the colony will begin producing males and the next year's queens. Male AGH will leave the nest before females and will perch at the entrance of a nest waiting for the new queens to emerge. After mating at the nest entrance the males will leave the nest and feed on flower nectar, tree sap, and mushrooms, and then die before winter. Mated female AGHs will

overwinter in sheltered areas on the ground and emerge the following spring to complete the life cycle (USDA-APHIS, 2020).

AGH is a predatory wasp that typically feeds on a variety of terrestrial invertebrates including beetles, mantids, caterpillars, and spiders. This type of predation is typically solitary; however, late in the season, hornets will conduct mass attacks against other social Hymenoptera, the group of insects that includes other bees and wasps. AGH will conduct mass attacks against other species of *Vespa*, yellowjackets (*Vespula* spp.), various paper wasps (*Polistes* spp.), and honey bees (*Apis* spp.) (Lee, 2010; Matsuura and Sakagami, 1973). Mass attacks occur when a worker locates a nest and releases a pheromone attracting more hornets. AGH typically targets colonies that are within one kilometer (km) of their nest. Commercial bee colonies are typically lost when these attacks occur and are especially vulnerable because they are more concentrated than wild bee colonies (USDA-APHIS, 2020).

Commercial bee colonies are important for honey production and provide pollination services for a variety of fruits and vegetables in Washington and the United States (Ferrier et al., 2018). Commercial and native bees pollinate a variety of crops grown in Washington including but not limited to apples, cherries, and other fruits and vegetables. Recent economic data from 2018 shows that honey production in the state is valued at over 6 million dollars from approximately 81,000 colonies (USDA-NASS, 2020). Native pollinators are also at risk from attack by AGH and could result in negative impacts to native plants in Washington.

B. Purpose and Need

USDA-APHIS has the responsibility to take actions that exclude, eradicate, and control plant pests under the Plant Protection Act of 2000 (7 United States Code (U.S.C.) 7701 et seq.). The purpose of the AGH program is to work cooperatively with the WSDA to detect and eradicate AGH. Due to the potential effects of AGH to honey bees and other pollinators USDA-APHIS and the WSDA need to be able to detect and eradicate AGH to prevent further spread in Washington and into other regions of the United States.

WSDA has authority under Chapter 17.24 of the Revised Code of Washington, Insect Pests and Plant Diseases, to eradicate or control insect pests that may endanger the agricultural and horticultural industries in the state of Washington. Revised Code of Washington (RCW) Chapter 17.24.101 Statewide Survey and Control Activity states: If there is reason to believe that a plant or bee pest may adversely impact the forestry, agricultural, horticultural, floricultural, or related industries of the state; or may cause harm to the environment of the state; or such information is needed to facilitate or allow the movement of forestry, agricultural, horticultural, or related products to out-of-state, foreign and domestic markets, the director may conduct, or cause to be conducted, surveys to determine the presence, absence, or distribution of a pest. The director

may take such measures as may be required to control or eradicate such pests where such measures are determined to be in the public interest, are technically feasible, and for which funds are appropriated or provided through cooperative agreements.

This EA considers AGH detection and eradication efforts throughout Washington State wherever AGH is detected. This EA was prepared consistent with the National Environmental Policy Act of 1969 (NEPA) and the USDA-APHIS NEPA implementing procedures (7 Code of Federal Regulations (CFR) part 372) for the purpose of evaluating how the proposed action, if implemented, may affect the quality of the human environment. The proposed action does not meet the criteria for actions normally requiring an environmental impact statement (7 CFR § 372.5(a)) based on the lack of significant impacts to the human environment associated with the proposed detection and control program actions.

II. Alternatives

NEPA regulations (40 CFR §§ 1508.25) require the scope of analysis to include a no action alternative in comparison to other reasonable courses of action.

A. No Action Alternative

Under the no action alternative, USDA-APHIS would not provide assistance to the WSDA to detect and control AGH in Washington State. Other government agencies and private landowners may work to eradicate AGH; however, there will be no cooperative or coordinated efforts among USDA-APHIS and other stakeholders.

B. Preferred Alternative

Under the preferred alternative, USDA-APHIS is proposing to fund activities to detect and eradicate AGH throughout Washington State wherever it is detected.

Detection:

The primary means for detecting AGH is by using two types of traps; one to detect queens and the other to detect adults. The sap trap will be used to detect queens and is designed to take advantage of their preference for oak tree sap as a food source (Figure 1). Other tree species such as maple and alder may also be used. A tree is selected that is 10 inches in diameter at breast height (dbh). The selected tree should be located along a trail or at the edge of a field. A one-inch patch of bark should be removed to expose the sap of the tree. A glue board with a hole in it to go over where the bark has been removed is attached to the tree using stick pins. A wire mesh is placed over the glue board to prevent birds from coming into contact with the glue board. The glue board will be checked and replaced every two weeks preferably between April 1st and June 1st although these time frames may vary based on site conditions and effectiveness.

Figure 1. Sap trap for capturing AGH queens.

The other detection or trapping method is the bottle trap (Figure 2). The bottle trap is designed to trap AGH workers in the summer and fall but may also trap queens in the spring and fall. The bottle trap is a 2-liter or 64-ounce plastic bottle that contains a solution of rice cooking wine and orange juice. The rice wine is added to discourage honey bees from visiting the trap. The traps will hang from trees at least six feet high and spaced at least 50 feet apart. A string or wire is attached to the top of the bottle and hung from a tree. A second string or wire is used to secure the bottle against the side of the tree.

Figure 2. Bottle trap for collecting AGH.

Around confirmed 2019 detections, bottle traps will be placed and serviced weekly by workers from April through October. In 1 km x 1 km grids, traps will be placed at a density of three traps per grid for 2 km around the detections. Traps will be placed at a density of up to three traps per grid between 2 km and 8 km from the confirmed detections in 2019 for a minimum of 300 traps. Traps will be weekly and replenished with attractant.

USDA-APHIS and WSDA are also assessing other lures that are designed to collect AGH workers or queens. If proven effective these traps and lures may be incorporated into the program. Other lures that may be used in bottle traps include isobutanol + acetic acid, heptyl butyrate + acetic acid and 2-methyl-1-butanol + acetic. These compounds mimic natural volatiles that are released from the fermentation of certain foods. These compounds have been shown to be effective at attracting similar wasps and hornets to the AGH. With these lures, a drowning solution composed of water, boric acid, and dish soap (fragrance free) will be used in each trap.

Treatment:

AGH-confirmed ground nests will be eradicated using two insecticides. Cyfluthrin will be applied as a formulated powder using a telescopic duster to the interior of the nest. The primary formulation will be Tempo® 1% (EPA Reg. No. 431-1373); however, other registered formulations with the same insecticide may also be used. The labeled use rate for Tempo® 1% is 0.5 to 1.0 lb/1,000 square feet (sq. ft.); however, dusting in the AGH program will be to less than 30 sq. ft. and focused on the interior of the nest. Fire extinguishers or other tank delivery systems using carbon dioxide may be used to sedate AGH in emergency situations. Carbon dioxide may also be used instead of cyfluthrin to treat AGH ground nests where practical. When using carbon dioxide as the sole treatment method all hornets would be collected from the nest and placed in ethanol.

Bait stations will also be used at AGH-confirmed ground nests using the insecticide fipronil. The bait stations are water resistant plastic containers that will have approximately 3–9 grams of bait (10% fipronil) added to each station. The bait stations will be placed 5–6 feet in the air and checked every 3–5 days. Three to six bait stations will be deployed within a 150-foot radius around an AGH nest. AGH will collect the bait from the bait stations, returning to the nests for consumption of the bait by workers and queens. All pesticides will be applied according to label requirements consistent with applicable Federal and State regulations.

Ground nests are removed after each cyfluthrin or carbon dioxide treatment. A typical area of 2 meters (m) by 2 m of soil will be excavated to remove the entire nest. Nests can be removed using a pneumatic method or by using hand equipment such as a shovel. Nests are typically located at the base of trees so removal method will be site-specific depending on soil conditions and presence of roots and other plant material. All efforts will be made to prevent runoff of loose soil into surface water, and to return loose soil back into the remaining hole. Approximately 24 hours after each nest removal, program personnel will revisit the nest removal site. Any remaining AGH will be removed using bait stations and traps that can be deployed throughout the area.

III. Potential Environmental Consequences

The sections below consider the potential environmental consequences under the no action and preferred alternatives by summarizing information associated with the physical environment, biological resources (including nontarget species), human health and safety, environmental justice, Tribal consultation, and any potential historic and cultural resources. The no action alternative presents a description of the environmental baseline, the current situation, for each environmental resource analyzed, followed by an analysis of the potential environmental impacts of the preferred alternative to those resources. The potential impacts may be direct, indirect, or cumulative, and of short or long duration. The impacts may also be either beneficial or adverse.

The affected environment is Washington State wherever AGH is detected. The AGH prefers to build nests in forested habitats throughout their natural range, and their abundance is associated with forests and urban green spaces (Azmy et al., 2016; Choi et al., 2012). Forested lands are the predominant vegetation type in the central portion of Washington west to the Pacific Ocean. These forested areas are also interspersed with urban development ranging from small residential communities to large urban and industrial areas, in particular inland along the coast. Forested areas are also present in the northeast section of the State and to a lesser extent in the southeastern section of the State. Urban green spaces in Washington occur throughout the State. These habitats are represented in neighborhoods, cities, and counties as well as State and Federally managed lands and parks. Urban green spaces that interface or are in proximity to forested habitats may be more prone to AGH establishment and spread.

A. No Action Alternative

Under the no action alternative, USDA-APHIS will not provide assistance to the WSDA to detect and eradicate the AGH. Other government agencies and private landowners may work to eradicate AGH; however, there will be no cooperative or coordinated efforts among USDA-APHIS and other stakeholders. The no action alternative would result in the spread of AGH to other parts of Washington, and the United States. USDA-APHIS (2020) compared plant hardiness zones from the native range of AGH to those in the United States and determined that AGH could survive in all areas of the lower 48 States. Using plant hardiness zones alone overestimates the potential range of AGH in the United States but it does demonstrate that AGH could become established in other parts of the country without a successful detection and eradication program.

1. Physical Environment

Air

The U.S. Environmental Protection Agency (USEPA) uses Air Quality Index (AQI) values to indicate overall air quality. AQI takes into account all the air pollutants measured within a geographic area. In 2019, 21 cities within Washington where data is collected showed zero days where air quality was considered healthy or very unhealthy (USEPA, 2019). Areas in Washington with the highest number of moderate air quality days were in Yakima, Seattle-Tacoma-Bellevue, Spokane-Spokane Valley, and Bellingham. Small particulate matter and ozone are the primary air pollutants that result in air quality impacts in Washington. Air quality data for Washington and other States are located at: https://www.epa.gov/outdoor-air-quality-data/air-quality-index-report.

The Clean Air Act (CAA) is the primary Federal law that protects the Nation's air quality for the purposes of public health and welfare. The CAA requires the USEPA to establish National Ambient Air Quality Standards (NAAQS) for specific pollutants. These pollutants are known as criteria pollutants, and they include ozone, particulate matter, carbon monoxide (CO), nitrogen dioxide, sulfur dioxide (SO_2), and lead. The NAAQS are intended to represent the maximum concentration of a particular pollutant in the ambient air that will not adversely impact public health or welfare. The stringency of air pollution regulations in a particular area is based upon whether that area is in attainment (e.g., compliance) or nonattainment (e.g., not in compliance) with the NAAQS. Greenhouse gases impact air quality; these gases include carbon dioxide (CO_2), methane, nitrous oxide, and fluorinated gases.

USDA-APHIS will consider impacts to air resources as significant if they exceed the NAAQS for particulate matter, ozone precursors, and greenhouse gas emissions. The no action alternative is not expected to have any impacts to air quality standards and greenhouse emissions in Washington.

Water

The Clean Water Act, the Safe Drinking Water Act, and the Water Quality Act are the primary Federal laws protecting the Nation's waters. Federal activities also must seek to avoid or mitigate actions that will adversely affect areas immediately adjacent to wild and scenic rivers (National Wild and Scenic Rivers Act of 1968, as amended (16 U.S.C. §§ 1271-1287)).

Surface water runoff can affect surface water (e.g., streams) quality by depositing sediment, minerals, or contaminants into water bodies. Meteorological factors such as rainfall intensity and duration, and physical factors such as vegetation, soil type, and topography influence surface

water runoff (USGS, 2020a). Groundwater (e.g., aquifer) levels vary seasonally and annually depending on hydrologic conditions. Groundwater is ecologically important because it supplies water to wetlands, and through groundwater-surface water interaction, groundwater contributes flow to surface water bodies (USGS, 2020b).

Polluted runoff, known as nonpoint source pollution, occurs when rainfall picks up contaminants such as insecticides, sediment, nutrients, or bacteria on its way to lakes, rivers, wetlands, coastal waters, and ground water. Nonpoint source pollution occurs from activities such as fertilizing a lawn, road construction, pet waste, and improperly managed livestock, crop, and forest lands. Today, States report that nonpoint source pollution is the leading cause of water quality problems (USEPA, 2018). In Washington State the primary indicators for water impairment are dissolved oxygen and temperature (WSDE, 2020). Waterbodies that are impaired and do not meet water quality standards are listed under 303(d) of the Clean Water Act.

USDA-APHIS will consider impacts from the no action alternative to water resources as significant if they exceeded Federal or State water quality standards. The no action alternative is not expected to result in significant impacts to water quality standards in Washington. The spread of AGH would likely result in home and property owners making insecticide treatments for suspected AGHs on their property. Increased pesticide use would be expected to be minor relative to other registered uses but could result in increased risk to water quality, in particular under misuse.

Soil

Soil health or soil quality is the ability of soil to function as a vital ecosystem, sustaining plants, animals, and humans (USDA-NRCS, 2020). Soil is an ecosystem that provides nutrients for plant growth, absorbs and holds rainwater, filters and buffers potential pollutants, serves as a foundation for agricultural activities, and provides habitat for soil microbes to flourish (USDA-NRCS, 2020). It is important to manage soils so they are sustainable for future generations.

Washington has a diverse range of soil types due to variations in climate and glaciation. The Cascade Mountains result in wet conditions in the western part of the state and dry conditions in the eastern portion. Glaciers occurred in the northern part of the state that also impact the range of soil types. Soils in the Cascade Mountains are dominated by volcanic soils. Diverse land regions occur throughout Washington supported by various soil orders (USDA-NRCS, 2011). The predominant land region in Washington is the Northwest Forest, Forage and Specialty Crop Region. This region includes central Washington west to the coast. Soil orders in this region include alfisol, andisol, entisol, inceptisol, spodosol and ultisol. The second most common land region in Washington is the Northwestern Wheat and Range Region. This region includes central Washington to the eastern border of the state with the exception of the southeast and northeast

sections of the state. Those areas are part of the Rocky Mountain Range and Forest Region. The Northwestern Wheat and Range Region includes the following soil orders: mollisol, aridisol, alfisol, andisol, entisol and inceptisol. The Rocky Mountain Range and Forest Region includes the alfisol, entisol, inceptisol and mollisol soil orders. USDA-NRCS provides detailed information regarding the characteristics of the various soil orders in Washington State (USDA-NRCS-2011; 2015).

USDA-APHIS considers impacts from the no action alternative to soil resources as significant if proposed activities result in substantially increased erosion and sedimentation or adversely affected unique soil conditions. AGH predominantly uses natural ground burrows created by small mammals and does not prey on soil invertebrates. Therefore, no impacts to soil quality are expected under the no action alternative.

2. Biological Resources

Biological resources include plant and animal species and the habitats where they live. For this EA, biological resources will focus on plants, wildlife, and protected species. The plant and wildlife subsections include both native and non-native species. Protected species refers to Bald and Golden eagles protected under the Bald and Golden Eagle Protection Act (BGEPA), migratory birds protected under the Migratory Bird Treaty Act of 1918 (MBTA), as amended, and threatened and endangered species and their critical habitats as protected under the Endangered Species Act (ESA).

Vegetation

Washington hosts a wide diversity of plants due to its varied ecosystems throughout the State. The various ecoregions support a diversity of aquatic and terrestrial plants. WDFW (2020) summarizes the various ecological and vegetation systems throughout Washington. Upland forested ecosystems include dry forests and woodlands, lowland and foothill mesic forests and woodlands, and subalpine-montane mesic forests and woodlands. Wetland ecological systems also include forested areas such as forested and shrub swamps that could serve as nesting sites for AGH. These areas may also be prone to water inundation making them less likely to support AGH compared to more upland areas. Under the no action alternative the presence of AGH is not expected to have significant direct effects to aquatic plants. AGH does attack terrestrial invertebrates so any plant species that is dependent upon pollination by invertebrates that can be attacked by AGH may be impacted. The impact to terrestrial plants would be increased for those species that are insect pollinated, in particular by wasps and bees that form colonies, and are subject to mass attacks by AGH (Beggs et al., 2011). Other terrestrial plant species are not expected to be significantly impacted by the presence of AGH.

Wildlife

The diversity of ecosystems in Washington support a variety of aquatic and terrestrial fish and wildlife. Freshwater and marine ecosystems are not expected to be impacted by the presence of AGH based on the life history requirements for AGH. Impacts to terrestrial wildlife will depend on whether native wildlife species can serve as a food source for AGH and whether habitat requirements for native wildlife overlap with those for AGH. Native wildlife that use dens or burrows as habitat may be impacted by the presence of AGH. Native wildlife, such as badgers, marmots, ground squirrels, and various small mammals are examples of wildlife that occur in Washington that would be vulnerable to den or burrow disturbance and attack by AGH. AGH will use ground burrows up to 60 centimeters (cm) in diameter as nesting habitat (USDA-APHIS, 2020). AGH will also use dead tree trunks and roots that also serve as habitat for wildlife such as small mammals and some bird species. AGH nests are not considered habitat for native small mammals or other wildlife due to disturbance and the threat of attack by AGH. Small mammals and other animals that use these types of burrows would be displaced and could be subject to stings from AGH resulting in adverse effects.

Washington has several state species that are categorized as state endangered, threatened, sensitive, or are candidates for state-listing. Many of these species are also protected under the ESA. Sensitive state listed species that use ground burrows may be impacted by the presence of AGH. State-listed species such as the Washington ground squirrel (*Urocitellus washingtoni*), Townsends' ground squirrel (South of the Yakima River) (*U. townsendii townsendii*), Olympic marmot (*Marmota olympus*) and the Cascade red fox (*Vulpes vulpes cascadensis*) use ground burrows as habitat (WDFW, 2020). Olympic marmot and Cascade red fox occur in subalpine and alpine areas that may reduce the likelihood of AGH using their burrows as nest sites. The burrows made by State-listed species can serve as AGH ground nesting habitat and these species would be impacted by loss of habitat and potential direct effects from stings. Impacts to these species would be expected to increase if AGH becomes established and expands its range in Washington.

AGH would also attack native terrestrial invertebrates, including pollinators, some of which are state sensitive species such as butterflies and beetles (WDFW, 2020). Mass attacks similar to those described in honey bee colonies are not anticipated for invertebrates such as butterflies and beetles, but native wasps and bees that nest in colonies would be vulnerable to mass attacks by AGH resulting in colony loss. This would be the case for any native *Vespa* sp., yellow jackets (*Vespula* spp.), paper wasps (*Polistes* spp.), and honey bees (*Apis* spp.) that occur in Washington. Other invertebrate predators, parasites, and parasitoids may also be impacted by invasive hornets such as AGH, especially if they reach high numbers in an area (Beggs et al., 2011).

(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). Birds that nest or forage near AGH nests could be impacted by AGH but these impacts are expected to be negligible as birds can avoid nests.

(2) Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C. 668–668c) prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. During their breeding season, bald eagles are sensitive to a variety of human activities. Bald eagles are distributed throughout Washington with the majority of birds located in lowland areas west of the Cascades (Kalasz and Buchanan, 2016). Bald eagles would not be impacted by the presence of AGH due to habitat and dietary preferences of eagles that would not overlap with AGH.

(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 species, or result in the destruction or adverse modification of critical habitat. Federally listed species in the program area include several mammals, birds, fish, arthropods, and plants (Appendix 1). The impacts of AGH to Federally listed species is unknown but is expected to be negligible for most species. Federally-listed species that use or forage near burrows that could serve as AGH ground nests could be impacted by loss of habitat and potential direct effects from AGH stings. Four Federally listed pocket gophers; Olympia (*Thomomys mazama pugetensis*), Roy Prairie (*T. m. glacialis*), Tenino (*T. m. tumul*) and Yelm (*T. m. yelmensis*), and the American wolverine, *Gulo gulo luscus* occur in Washington, and all use ground burrows that could serve as nesting sites for AGH. Although AGH does not appear to be limited by elevation in its distribution it is detected more commonly at lower elevations (USDA-APHIS, 2020).

3. Human Health and Safety

Under the no action alternative, potential human health impacts are related to the effects of AGH stings to the public. AGH are aggressive insects that will defend nesting sites and can deliver a

large painful sting. The sting from an AGH can result in anaphylaxis and cardiac arrest which is a normal allergic reaction to bee and wasp stings. AGH stings can also result in complications affecting kidney, liver, respiratory, and circulatory function (Yanagawa et al., 2007; Liu et al., 2016). These effects are uncommon but have resulted in human mortalities in Japan and China and can occur in individuals who are not allergic to stings. Beekeepers are especially at risk because AGH attacks on colonies will include a large number of individuals that could result in multiple stings. Personal Protective Equipment (PPE) that is typically used when working with honey bee colonies is not protective to workers. Workers would be required to increase the level of PPE to provide adequate protection against AGH.

The spread of AGH would likely result in home and property owners making insecticide treatments for suspected AGHs on their property. Increased pesticide use would be expected to be minor but would result in increased exposure and risks to human health.

4. Environmental Justice

Federal agencies identify and address disproportionately high and adverse human health or environmental impacts of proposed activities, as described in Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. Federal agencies also comply with EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. This EO requires each Federal agency, consistent with its mission, to identify and assess environmental health and safety risks that may disproportionately affect children and to ensure its policies, programs, activities, and standards address the potential for disproportionate risks to children.

USDA-APHIS has considered the potential environmental impacts of implementing the no action alternative on minority and/or low-income communities. The impacts would be similar to those described under the human health and safety section of the no action alternative.

5. Tribal Consultation and Coordination

Executive Order 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. USDA-APHIS has provided the Federally-recognized Tribes with information about the program, and offered each Tribe the opportunity to consult with the Agency. Consultation with local Tribal representatives occurs prior to the onset of program activities to fully inform the Tribes of possible actions the Agency may take on or near Tribal lands. If

USDA-APHIS discovers any archaeological Tribal resources, it will notify the appropriate individuals. The no action alternative should not pose adverse effects to these resources.

6. Historic and Cultural Resources

The National Historic Preservation Act of 1966, as amended (16 U.S.C. §§ 470 et seq.), requires Federal agencies to consider the potential for impacts to properties included in, or eligible for inclusion in the National Register of Historic Places (36 CFR §§ 63 and 800) through consultation with interested parties where a proposed action may occur. This includes districts, buildings, structures, sites, and landscapes. The no action alternative should not pose adverse effects to these resources. Visitors to these sites could be impacted by AGH if nests are present.

B. Preferred Alternative

This section considers the potential environmental consequences for the preferred alternative by summarizing information associated with the physical environment, biological resources, human health and safety, environmental justice, Tribal consultation, and historic and cultural resources. The preferred alternative is expected to further reduce the likelihood of AGH populations becoming established when compared to the no action alternative, minimizing further impacts of AGH on the environment and the public.

Potential impacts from trapping and insecticide treatments using cyfluthrin and fipronil are discussed below.

Cyfluthrin

Cyfluthrin is a non-systemic, broad spectrum pyrethroid insecticide that is registered for a variety of agricultural and non-agricultural uses including residential indoor and outdoor applications (USEPA, 2019). Pyrethroid insecticides act by altering nerve function in target pests through oral or contact exposure. The ingestion, inhalation, and dermal toxicity of cyfluthrin in the Tempo® 1% formulation is low for mammals (Bayer, 2007). A recent evaluation of the human risk of cyfluthrin, including food uses and non-food uses, shows a low risk to the public, workers, and applicators who apply cyfluthrin (USEPA, 2019). The risks to human health from the proposed cyfluthrin use in the AGH program is expected to be negligible. Treatments are made directly to ground nests and adherence by applicators to label requirements reduces the risk to the public as well as to applicators.

Cyfluthrin has low toxicity to birds, mammals, and terrestrial plants. Cyfluthrin is considered highly toxic to aquatic vertebrates and invertebrates as well as terrestrial invertebrates (USEPA, 2013; 2016). This includes fish, amphibians, and aquatic- and sediment-dwelling invertebrates.

Exposure to nontarget terrestrial and aquatic organisms will be low based on the method of application in the program and label restrictions designed especially to protect aquatic resources. Similarly, impacts to terrestrial invertebrates will be low because applications are directed into the interior of nests where AGH is present. Impacts to terrestrial invertebrates such as pollinators would be negligible because they would not be exposed to these types of applications. Sensitive terrestrial soil invertebrates within the nest where treatments are made would be impacted by cyfluthrin but these impacts are localized.

Cyfluthrin has low water solubility and binds tightly to soil (USEPA, 2013). Cyfluthrin breaks down in the presence of light with photolysis half-lives of less than six days in soil and water. Half-life is defined as the amount of time it takes a chemical to decrease by half. Half-lives increase for cyfluthrin under low oxygen and oxygenated environments with aerobic and anaerobic half-lives in soil and water ranging from 30 to 73 days.

Fipronil

Fipronil is a broad spectrum pyrazole insecticide that is registered for agricultural and non-agricultural uses, including residential applications for fire ants and termites. Fipronil is also registered for use in pets. The proposed formulation to treat AGH is a bait containing 0.10% fipronil. The formulation has very low acute toxicity to mammals in ingestion and dermal studies (MGK, 2019). Inhalation toxicity is moderate for fipronil when tested alone and not in the proposed formulation (USEPA, 2009). The proposed formulation is not irritating to the skin or eyes. Fipronil is neurotoxic in acute and chronic exposures and is classified as a possible human carcinogen (USEPA, 2009). Acute and chronic risks to human health, including workers and applicators, are below levels of concern for the various currently labelled agriculture and non-agriculture uses (USEPA, 2009). The risks to the public from fipronil use in bait stations will be lower because there is no dietary exposure based on the method of application. Signage on the bait stations will notify the public of their placement, reducing exposure from tampering. Labeled requirements for PPE will reduce the exposure and risk to workers who are applying the bait into the bait stations.

Fipronil has variable toxicity to birds, mammals, and terrestrial plants. The technical active ingredient of fipronil is toxic to mammals in acute toxicity studies. Fipronil formulated into the bait product proposed for use in the AGH program is practically non-toxic to mammals in acute toxicity studies. Fipronil is considered highly toxic to some bird species and practically non-toxic to others. Waterfowl such as the mallard have low acute toxicity to fipronil but it is considered highly toxic to bird species such as the northern bobwhite and pheasant (USEPA, 2011). Fipronil is also considered highly toxic to most terrestrial invertebrates, including pollinators. Fipronil is considered highly toxic to most aquatic vertebrates and invertebrates in acute and chronic studies (USEPA, 2011). Fipronil risks to nontarget fish and wildlife will be negligible based on the lack

of exposure with the use of bait stations. Bait stations prevent access to the bait by birds, reptiles, or mammals. The use of a water-resistant bait station will also eliminate drift and runoff potential to aquatic areas where fish, amphibians, and aquatic invertebrates would be exposed to fipronil residues. Bait stations are not placed over water bodies or immediately adjacent to water bodies where bait could be spilled resulting in aquatic exposure.

Sap and Bottle Traps

Sap traps rely on naturally produced volatiles that are present in wounded trees. The chemicals occur at very low concentrations, are not persistent, and would not result in adverse effects to human health or the environment.

Bottle traps contain lures that are attractive to various wasps and hornets. Heptyl butyrate is a common compound found in apples and plums and is registered by USEPA as an attractant for yellow jackets (USEPA, 2009). The other lure, 2-methyl-1-butanol, is also registered with USEPA as an attractant for wasps and hornets. 2-methyl-1-butanol is a naturally occurring volatile present in all fruits, wine, and beer (USEPA, 2010). Acetic acid is a fermentation product and is the primary constituent in common vinegar. Acetic acid is added to all three lures to improve lure performance. The lures used in bottle traps are not expected to result in any adverse impacts to human health or the environment. The lures are contained in traps and are intended for non-food uses mitigating exposure to the public. The lures contain volatiles that are commonly found in regularly consumed food items and pose negligible hazards to the public (USEPA, 2009; 2010). The attractants do not persist in the environment, occur at low concentrations, and would not be transported to aquatic habitats, suggesting negligible exposure and risk to the environment including non-target fish and wildlife.

1. Physical Environment

USDA-APHIS anticipates that the program's use of the insecticides cyfluthrin and fipronil will have minimal impacts on the physical environment, provided pesticide labels are followed for each chemical. The use of carbon dioxide in treating ground nests will also have minimal impacts to the physical environment. Sap and bottle traps are also anticipated to have minimal impacts to the physical environment due to their design and use in the AGH program.

Air

USDA-APHIS does not anticipate additional impacts to air when compared to the no action alternative. No impacts to air quality are anticipated for the proposed insecticide treatments. Drift is not anticipated based on the methods of application, and neither insecticide has chemical characteristics that could result in volatilization. Trapping and associated lures are not expected

to result in impacts to air quality. The volatile products that are released from the sap or bottle traps occur naturally at very low concentrations, are not persistent and would not impact air quality standards.

Water

USDA-APHIS does not anticipate additional impacts to water when compared to the no action alternative. USDA-APHIS will consider impacts from the preferred alternative to water resources as significant if they exceed Federal or State water quality standards. Pesticides, when used improperly, can end up in surrounding water bodies. The chemicals can reach waterways from spray drift, spills, or run-off either in solution or on soil particles that are moved by hydraulic forces. The risk of cyfluthrin to water quality is mitigated by label language intended to reduce contamination of water. Label language designed to protect water quality includes:

- No direct applications to water;
- No applications where surface water is present or to intertidal areas below the mean high water mark;
- No applications that allow cyfluthrin to enter or runoff into storm drains, ditches, gutters, or surface waters;
- No applications during rain events;
- No application to the point of runoff, and;
- No applications when rain is expected within 24 hours after application

Cyfluthrin has low solubility in water and binds tightly to soil reducing mobility and minimizing threats to surface and ground water quality. Nests will be removed after treatment, further mitigating the potential of cyfluthrin to runoff into surface water. Fipronil risks to water quality, including surface and ground water, are negligible due to its use in water-resistant bait stations that eliminate the possibility of drift and runoff.

Nest removal after cyfluthrin treatment will disturb soil that could result in erosion facilitating soil transport to waterbodies. Soil erosion into waterbodies can affect water quality by impacting water temperature, dissolved oxygen, and suspended solids. These impacts to water quality from the removal of nests as part of the AGH program are not expected to occur. All efforts will be made to prevent runoff of loose soil into surface water, and to return loose soil back into the remaining hole. The area of soil removed is localized to an area typically no greater than 2 m so the amount of soil available for erosion is negligible. In addition, burrows that could serve as successful AGH nests are not anticipated to occur immediately adjacent to waterbodies that would be subject to water inundation.

The use of sap or bottle traps will not result in impacts to water quality. The traps are not placed over water bodies and are secured to prevent falling to the ground. The lures and other liquids

used in traps would not be in proximity to waterbodies and would not be in runoff from areas where they are placed.

Soil

USDA-APHIS does not anticipate additional impacts to soil when compared to the no action alternative. USDA-APHIS considers impacts from the preferred alternative to soil resources as significant if proposed activities result in substantially increased erosion and sedimentation or adversely affected soil fauna. USDA-APHIS does not expect the preferred alternative to have this type of impact.

Potential negative effects of insecticide treatments could include decreased or altered microbial and invertebrate populations in the soil (Adomako and Akyeampong, 2016); this potential negative effect is expected to be short-term and localized. Cyfluthrin effects to soil organisms would be confined to the small areas of treatment within each AGH-treated ground nest. Fipronil is located in bait stations and will not have contact with soil other than in cases where workers carry bait into AGH ground nests.

Activities associated with the program will result in temporary soil surface disturbance or compaction. The most frequent types of ground disturbance will be from workers placing traps and making insecticide treatments, checking bait stations, and removing the soil that contains AGH nests. Removing nests after insecticide treatment will have the greatest potential for soil disturbance but these impacts are localized and considered short-term.

2. Biological Resources

Vegetation

Similar to the no action alternative, potential impacts to vegetation from the preferred alternative are expected to be minimal. The use of cyfluthrin and fipronil will have no impacts to surrounding vegetation. The use of sap and bottle traps will have minimal impacts to plants where traps may be attached. Trees selected for sap traps will have a small wound where the trap is placed but these areas on the tree are expected to heal. In addition, the use of sap traps is not directed over large areas of the State but in areas where AGH is suspected to occur.

Wildlife

Potential impacts to fish and wildlife from the preferred alternative are expected to be minimal. Cyfluthrin and fipronil are considered toxic to biological resources such as aquatic vertebrates and invertebrates; however, exposure to fish and wildlife is expected to result in negligible risk

to aquatic organisms. The risk of cyfluthrin to water quality is mitigated by label language intended to reduce contamination of water. This includes but is not limited to: no applications below the mean high water mark, no application to the point of runoff, no applications when rain is expected within 24 hours after application, and other measures designed to protect water quality. Fipronil risk to aquatic resources such as fish, amphibians, aquatic invertebrates, and plants are negligible due to its use in bait stations that eliminate the possibility of drift and runoff.

Cyfluthrin and fipronil are toxic to most terrestrial invertebrates but the potential for exposure is low based on the methods of application for both insecticides. Toxicity to wild mammals is low to moderate for cyfluthrin. Technical fipronil is acutely toxic to mammals but the proposed bait formulation has low toxicity to mammals. Cyfluthrin has low toxicity to birds while the toxicity of fipronil to birds ranges from highly toxic to moderately toxic, depending on the test species. Exposure for birds and mammals from either insecticide is considered negligible when considering the methods of application. Mammals that use burrows or dens would be at the greatest risk of insecticide exposure but only nests containing AGH would be treated. Mammals would not be expected to occupy these nests during treatment because AGH-occupied ground nests would be a deterrent for mammals and other burrow inhabiting organisms. Long-term exposure to birds, mammals, reptiles, and terrestrial invertebrates is not anticipated for cyfluthrin because treated AGH nests are removed after insecticide treatment.

Trapping is expected to result in negligible risk to fish, amphibians, and aquatic invertebrates. Trapping will also have negligible impacts to wild mammals, birds, reptiles, and most terrestrial invertebrates. There is the potential for trapping to collect some non-target invertebrates that are attracted to the lures. The current lure that uses orange juice also uses rice wine to reduce attractiveness to honey bees. Other wasps or hornets, however, may be attracted to sap and bottle traps. The other lures under consideration, isobutanol, heptyl butyrate and 2-methyl-1-butanol, have been shown to be attractive to other wasps and hornets (Landolt et al., 2007; Landolt and Zhang, 2016). These impacts will be localized to areas where the traps are used and will be short term. Once AGH nests are located and destroyed, trapping may occur for a short period of time but will end once the area is confirmed free of AGH.

Actions associated with the preferred alternative will temporarily increase the presence or level of human activities (noise and visual disturbance) in the program area. Temporary adverse effects can include increased levels of stress hormones, disturbance or flushing of young broods, and decreased fitness. USDA-APHIS expects the adverse effects associated with this concern to be localized and temporary, and the use of mitigation measures will further reduce the risks of adverse effects.

(1) Migratory Bird Treaty Act

Potential impacts to migratory birds are not expected to increase when compared to the no action alternative. Cyfluthrin has low acute and chronic toxicity to birds based on available studies. Fipronil toxicity to birds is variable, with high toxicity to bird species such as the northern bobwhite, but low toxicity to waterfowl such as the mallard. Methods of application for both insecticides reduce the risks to migratory birds. This includes risk from exposure and impacts to food or habitat important for feeding and reproduction. Cyfluthrin treatments are directed into the interior of ground AGH nests where birds would not be exposed, and fipronil is held in a bait station that is not accessible to birds. Trapping is not anticipated to impact migratory birds. The traps are not accessible to birds. There may be some incidental collection of nontarget invertebrates that could serve as a food source for insectivorous birds using traps. The lures and traps are designed to be selective for AGH but other wasps or hornets could be attracted depending on the lure. The low density of trapping, selectivity of traps, and availability of other invertebrates will ensure that insectivorous migratory birds would not be impacted.

(2) Bald and Golden Eagle Protection Act

Potential impacts to bald and golden eagles are similar to the no action alternative. If bald or golden eagles were discovered near a program action area, the State agency responsible for the area will contact the U.S. Fish and Wildlife Service (USFWS) and implement recommendations for avoiding disturbance at nest sites. For bald eagles, USDA-APHIS will follow guidance as provided in the National Bald Eagle Management Guidelines (USFWS, 2007). USDA-APHIS expects the use treatments to eradicate AGH and trapping to pose a negligible risk and disturbance to bald eagles. The methods of application and trapping for AGH are not expected to result in risks to food or habitat important to bald eagles.

(3) Endangered Species Act

Section 7 of the ESA and its implementing regulations require Federal agencies to ensure that their actions are not likely to jeopardize the continued existence of Federally-listed threatened and endangered species, or result in the destruction or adverse modification of critical habitat. USDA-APHIS is conducting Section 7 consultation with the USFWS and National Marine Fisheries Service (NMFS) for AGH detection and treatment activities. USDA-APHIS submitted biological assessments to USFWS and NMFS on May 19, 2020 that consider the actions under the preferred alternative and is awaiting concurrence. USDA-APHIS received a concurrence letter from NMFS on June 3, 2020. USDA-APHIS received a concurrence letter from the USFWS on July 29, 2020.

3. Human Health and Safety

Insecticide applications for AGH are conducted in a manner that minimizes significant exposure to soil, water, and air, which in turn will minimize subsequent exposure to the general public. Applicators in the AGH program are required to comply with all USEPA use requirements and meet all recommendations for PPE during pesticide application. The proposed methods of application for cyfluthrin and fipronil in the AGH program reduce the potential for exposure and risk to human health. Cyfluthrin applications are made using a dust formulation that is applied to the interior of AGH ground nests. The method of application minimizes potential for drift. The method of application and environmental fate of cyfluthrin will mitigate the potential for runoff. Transport of fipronil from drift or runoff is not expected based on the method of application. The lack of runoff and drift will protect surface and ground water that may serve as a source for drinking water. Signage informing the public about bait stations are placed on individual traps and will reduce the potential for tampering that could result in fipronil exposure. The stickers that are applied to individual traps provide WSDA contact and AGH information and "do not disturb" statements.

AGH trapping using bottle and sap traps are not expected to impact human health. The attractants are not toxic to human health at the amounts used for trapping. In addition, traps will be placed out of the reach of small children and signage will be used to minimize tampering. Individual traps will have stickers that provide WSDA contact and trap information along with English and Spanish language warnings to the public.

4. Environmental Justice

USDA-APHIS has considered the potential environmental impacts of implementing the preferred action alternative on minority and/or low-income communities. USDA-APHIS expects the distance from areas to environmental justice communities to influence if there are direct adverse impacts to those communities. In general, each State agency will reach out to landowners prior to implementing the program. USDA-APHIS will encourage local program personnel to engage with locally impacted people in collaborative decisions about the program whenever possible.

The preferred alternative is not likely to pose any highly disproportionate adverse effects to children because program activities will not occur when children are present in the immediate area. Program activities will not occur on, in, or near school properties, or while school buses are likely to be transiting around treatment areas. Any AGH nests discovered on school property would be treated and removed in coordination with the school district to minimize the potential of AGH stings to children and exposure to any trapping or treatment efforts.

Eradication of AGH will protect the public, including low-income communities and children, from adverse effects that have been associated with AGH stings.

5. Tribal Consultation and Coordination

USDA-APHIS will provide the Federally-recognized Tribes in the region with information about the preferred alternative actions and will offer each Tribe the opportunity to consult with the Agency. Consultation with local Tribal representatives occurs prior to the onset of program activities to fully inform the Tribes of possible actions the Agency may take on or near Tribal lands. If USDA-APHIS discovers any archaeological Tribal resources, it will notify the appropriate individuals. No treatments or trapping for AGH will occur on Tribal lands without coordination and approval.

6. Historic and Cultural Resources

USDA-APHIS expects that the preferred alternative will not alter, change, modify, relocate, abandon, or destroy any historic buildings, edifices, or nearby infrastructure. Insecticides will not be applied to historic buildings and other anticipated program actions will not directly affect the buildings or their properties. If AGH nests are found on historic or cultural properties covered under the National Historic Preservation Act (NHPA) no trapping or treatments would occur until the appropriate consultations are completed and any applicable mitigations applied. AGH nest removal on these properties would protect the public who may visit historic and cultural properties by removing the threat of attack by AGH.

C. Uncertainty and Potential Cumulative Impacts

Uncertainty in this evaluation arises whenever there is a lack of information about the effects of a pesticide's formulation, metabolites, and properties in mixtures that have the potential to impact non-target organisms in the environment. These uncertainties are not unique to this assessment, and are consistent with uncertainties in human health and ecological risk assessments with any environmental stressor. There is uncertainty in where AGH nests may be detected within Washington State. Currently the only positive detections are in one county but detections may increase as outreach and sampling is expanded to other areas of the State. Uncertainty arises from the potential for cumulative impacts from using multiple pesticides, having repeat exposures, and co-exposure to other chemicals with similar modes of action. Theoretically, cumulative impacts may result in synergism, potentiation, additive, or antagonistic effects.

Cumulative impacts on the environment result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of the entity

conducting those other actions (40 CFR § 1508.7). Cumulative effects most likely arise when a relationship exists between a proposed action and other actions expected to occur in a similar location or during a similar period in time. Cumulative effects may not be reasonably foreseeable until a variety of direct and indirect impacts interact with each other or over time.

Cumulative impacts to soil, water, and air quality are not expected for the no action alternative. There may be additional insecticide treatments as AGH becomes established and expands its range in Washington. Cumulative impacts are expected for commercial honey bee production. Honey bee populations are declining with multiple causal agents being implicated. Chemical and biological stressors are the primary reasons; however, loss of habitat, beekeeping practices, and climate change are all likely contributing to bee declines worldwide (Havard et al., 2020). The lack of a coordinated eradication program would likely allow the threat from AGH to expand and serve as an additional stressor to commercial bee colonies and some native pollinators.

Cumulative impacts to soil, water, and air quality are not expected to be significant for the preferred alternative. Pesticide use from the preferred alternative is minor and directed either to individual nests or is held in a bait station. Cyfluthrin treated soil will be removed as part of nest removal, reducing the possibility of cumulative impacts related to other pesticide applications or other activities that could occur in the area. Cyfluthrin and fipronil are registered in Washington for various agriculture and non-agriculture uses. Cyfluthrin is more widely distributed in its use pattern compared to fipronil. Environmental loading of cyfluthrin and fipronil will increase under the preferred alternative but the amount is incrementally negligible when compared to other uses in Washington. Soil containing any cyfluthrin residues will be removed during nest excavation. Fipronil bait stations will be removed once AGH are eliminated from an area. Survey and trapping are directed towards identifying AGH. AGH surveys are adaptive with trapping densities increasing when AGH are detected, and decreased or eliminated as areas are confirmed free of AGH. Some nontarget invertebrates may be captured in sap or bottle traps but these impacts will be reduced based on trap design and the lure which is designed to attract wasps and hornets such as AGH. Trapping would cease once AGHs have been eradicated and after three years of negative results; thus, any potential cumulative impacts would be short term. The impacts from the actions discussed in this EA are expected to result in only minor or transient impacts; therefore, any increase in cumulative impacts will be negligible.

Vehicle emissions associated with getting to and from project sites will be minor relative to the ongoing and future emissions from urbanization, highway traffic, and agricultural production. Any increases in air pollutants associated with program activities and vehicle emissions will cease upon completion of program activities at each site. Future actions that could increase emissions (e.g., housing developments and road expansions leading to more traffic) are difficult to quantify because emissions from mobile sources are subject to changing fuel mileage and

emissions standards and regulations. Nevertheless, the contribution from the preferred alternative will still remain minor compared to the overall emissions in the program area.

USDA-APHIS expects the potential human health impacts related to the preferred alternative to be minimal, and in the context of potential cumulative impacts to past, present, and future activities, these impacts will be incrementally minor. The greatest sector of the human population at risk of exposure to pesticides are program workers and applicators; however, these risks are minimized through the use of PPE. The lack of significant routes of exposure to human health and the environment, suggest cumulative impacts will not occur.

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

Washington State Department of Agriculture
Plant Protection Division
Pest Program
3939 Cleveland Ave. SE
Olympia, WA 98501

U.S. Fish and Wildlife Service
Washington Fish and Wildlife Office
510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263

NOAA West Coast Regional Office
510 Desmond Drive Southeast, Suite 103
Lacey, WA 98503

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Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*), California Tiger Salamander (*Ambystoma californiense*), Central California Distinct Population Segment, and Delta Smelt (*Hypomesus transpacificus*), and the Federally Endangered California Clapper Rail (*Rallus longirostris obsoletus*), California Freshwater Shrimp (*Syncaris pacificus*), California Tiger Salamander (*Ambystoma californiense*) Sonoma County Distinct Population Segment and Santa Barbara County Distinct Population Segment, San Francisco Garter Snake (*Thamnophis sirtalis tetrataenia*), and Tidewater Goby (*Eucyclogobius newberryi)*. 164 pp.

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Appendix 1. Federally listed animal and plant species that occur in Washington State.

Animals

Status*	Common Name	Scientific Name	Critical Habitat (Yes or No)
T	Canada lynx	*Lynx canadensis*	Yes
E	Columbia Basin pygmy rabbit	*Brachylagus idahoensis*	No
T	Columbian white-tailed deer (Columbia River Distinct Population Segment (DPS))	*Odocoileus virginianus leucurus*	No
PT	Fisher (West Coast DPS)	*Pekania pennanti*	No
PE	Gray wolf (Western DPS)	*Canis lupus*	No
E	Gray wolf (USA population)	*Canis lupus*	Yes
T	Grizzly bear	*Ursus arctos horribilis*	No (proposed)
PT	North American wolverine	*Gulo gulo luscus*	No
T	Olympia pocket gopher	*Thomomys mazama pugetensis*	Yes
T	Roy Prairie pocket gopher	*Thomomys mazama glacialis*	Yes
T	Tenino pocket gopher	*Thomomys mazama tumuli*	Yes
E	Woodland caribou	*Rangifer tarandus caribou*	Yes
T	Yelm pocket gopher	*Thomomys mazama yelmensis*	Yes
T	Marbled murrelet	*Brachyramphus marmoratus*	Yes
T	Northern spotted owl	*Strix occidentalis caurina*	Yes
E	Short-tailed albatross	*Phoebastria* (=*Diomedea*) *albatrus*	No
T	Streaked horned lark	*Eremophila alpestris strigata*	Yes
T	Western snowy plover (Pacific Coast population DPS)	*Charadrius nivosus nivosus*	Yes
T	Yellow-billed cuckoo (Western U.S. DPS)	*Coccyzus americanus*	No
T	Oregon spotted frog	*Rana pretiosa*	Yes

E	Bocaccio (Puget Sound/Georgia Basin DPS)	*Sebastes paucispinis*	Yes
T	Bull trout	*Salvelinus confluentus*	Yes
T	Columbia River chum salmon	*Oncorhynchus keta*	Yes
T	Eulachon (southern DPS)	*Thaleichthys pacificus*	Yes
T	Green sturgeon (southern DPS)	*Acipenser medirostris*	Yes
T	Hood Canal summer-run chum salmon	*Oncorhynchus keta*	Yes
T	Lake Ozette sockeye salmon	*Oncorhynchus* (=*Salmo*) *nerka*	Yes
T	Lower Columbia River chinook salmon	*Oncorhynchus* (=*Salmo*) *tshawytscha*	Yes
T	Lower Columbia River coho salmon	*Oncorhynchus* (=*Salmo*) *kisutch*	Yes
T	Lower Columbia River steelhead	*Oncorhynchus* (=*Salmo*) *mykiss*	Yes
T	Mid-Columbia River steelhead	*Oncorhynchus* (=*Salmo*) *mykiss*	Yes
T	Puget Sound chinook salmon	*Oncorhynchus* (=*Salmo*) *tshawytscha*	Yes
T	Puget Sound steelhead	*Oncorhynchus* (=*Salmo*) *mykiss*	Yes
T	Snake River Basin steelhead	*Oncorhynchus* (=*Salmo*) *mykiss*	Yes
T	Snake River fall-run chinook salmon	*Oncorhynchus* (=*Salmo*) *tshawytscha*	Yes
E	Snake River sockeye salmon	*Oncorhynchus* (=*Salmo*) *nerka*	Yes
T	Snake River spring/summer-run chinook salmon	*Oncorhynchus* (=*Salmo*) *tshawytscha*	Yes
E	Upper Columbia River spring-run chinook salmon	*Oncorhynchus* (=*Salmo*) *tshawytscha*	Yes
T	Upper Columbia River steelhead	*Oncorhynchus* (=*Salmo*) *mykiss*	Yes
T	Yelloweye rockfish (Puget Sound/Georgia Basin DPS)	*Sebastes ruberrimus*	Yes
PE	Island marble butterfly	*Euchloe ausonides insulanus*	No (proposed)

T	Oregon silverspot butterfly	*Speyeria zerene hippolyta*	Yes
E	Taylor's (=whulge) checkerspot	*Euphydryas editha taylori*	Yes

*E=Endangered, T=Threatened, PE=Proposed Endangered, PT=Proposed Threatened

Plants

Status*	**Common Name**	**Scientific Name**	**Critical Habitat (Yes or No)**
E	Bradshaw's desert-parsley	*Lomatium bradshawii*	No
T	Golden paintbrush	*Castilleja levisecta*	No
T	Kincaid's lupine	*Lupinus sulphureus* ssp. *kincaidii*	Yes
E	Marsh sandwort	*Arenaria paludicola*	No
T	Nelson's checker-mallow	*Sidalcea nelsoniana*	No
E	Showy stickseed	*Hackelia venusta*	No
T	Spaulding's catchfly	*Silene spaldingii*	No (proposed)
T	Umtanum desert buckwheat	*Eriogonum codium*	Yes
T	Ute Ladies'-tresses	*Spiranthes diluvialis*	No
T	Water howellia	*Howellia aquatilis*	No
E	Wenatchee Mountains checkermallow	*Sidalcea oregana* var. *calva*	Yes
T	White Bluffs Bladderpod	*Physaria douglasii* ssp. *tuplashensis*	Yes

*E=Endangered, T=Threatened