



DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R1–ES–2018–0044; FF09E21000 FXES11110900000 212]

RIN 1018–BD25

Endangered and Threatened Wildlife and Plants; Endangered Species Status for Franklin’s Bumble Bee

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), are listing the Franklin’s bumble bee (*Bombus franklini*), an invertebrate species from Douglas, Jackson, and Josephine Counties in Oregon, and Siskiyou and Trinity Counties in California, as an endangered species under the Endangered Species Act of 1973, as amended (Act). This rule adds this species to the Federal List of Endangered and Threatened Wildlife and applies the protections of the Act to this species. We are not designating critical habitat for the Franklin’s bumble bee because we determined that such a designation would not be beneficial to the species.

DATES: This rule is effective [INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: This final rule and supporting documents are available on the Internet at <http://www.regulations.gov> in Docket No. FWS–R1–ES–2018–0044, or at <https://ecos.fws.gov>.

FOR FURTHER INFORMATION CONTACT: Paul Henson, Field Supervisor, U.S. Fish and Wildlife Service, Oregon Fish and Wildlife Office, 2600 SE 98th Ave., Suite 100, Portland, OR 97266; telephone 503-231-6179. Persons who use a

telecommunications device for the deaf (TDD) may call the Federal Relay Service at 800-877-8339.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. Under the Act, if we determine that a species may be an endangered or threatened species throughout all or a significant portion of its range, we are required to promptly publish a proposal in the *Federal Register* and make a determination on our proposal within 1 year. To the maximum extent prudent and determinable, we must designate critical habitat for any species that we determine to be an endangered or threatened species under the Act. Listing a species as an endangered or threatened species and designation of critical habitat can only be completed by issuing a rule.

What this document does. This rule lists Franklin's bumble bee (*Bombus franklini*) as an endangered species under the Act. We are not designating critical habitat because we determined that a designation is not prudent for this species.

The basis for our action. Under the Act, we may determine that a species is an endangered or threatened species because of any of five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. We have determined that Franklin's bumble bee meets the definition of an endangered species and therefore warrants protection under the Act. The threats to the species of pathogens, pesticides, and small population size are ongoing and rangewide; they are likely to continue to act individually and in combination to decrease the viability of the Franklin's bumble bee. The risk of extinction is high, the suspected threats to the species persist, and the number

of remaining Franklin's bumble bees is presumably very small, as the species has not been observed since 2006. Existing regulatory mechanisms or conservation measures in place do not appreciably reduce or ameliorate the existing threats to the species, as evidenced by the species' acute and rangewide decline. Therefore, on the basis of the best available scientific and commercial information, we are listing the Franklin's bumble bee as endangered in accordance with sections 3(6) and 4(a)(1) of the Act.

Section 4(a)(3) of the Act requires the Secretary of the Interior (Secretary) to designate critical habitat concurrent with listing to the maximum extent prudent and determinable. Section 3(5)(A) of the Act defines critical habitat as (i) the specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protections; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination by the Secretary that such areas are essential for the conservation of the species. Section 4(b)(2) of the Act states that the Secretary must make the designation on the basis of the best scientific data available and after taking into consideration the economic impact, the impact on national security, and any other relevant impacts of specifying any particular area as critical habitat. Because the present or threatened destruction, modification, or curtailment of habitat is not a threat to the Franklin's bumble bee (disease and other manmade factors are likely the primary threat to the species within its habitat), in accordance with 50 CFR 424.12(a)(1), we determine that designating critical habitat is not prudent for Franklin's bumble bee.

Peer review and public comment. We sought the expert opinions of 10 appropriate and independent specialists regarding the species status assessment report. We received responses from 5 specialists, which informed our determination. We also considered all 53 comments and information received from the public during the

comment period.

Previous Federal Actions

Please refer to the proposed rule (84 FR 40006) for Franklin's bumble bee published on August 13, 2019, for a detailed description of previous Federal actions concerning this species.

On August 27, 2019, the Service published a final rule (84 FR 45020) revising the regulations at 50 CFR part 424 for listing species and designating critical habitat. However, the revisions apply only to relevant rulemakings for which the proposed rule is published after September 26, 2019, the effective date of the final rule. Thus, the prior version of the regulations at 50 CFR part 424 continues to apply to any rulemakings for which a proposed rule was published before September 26, 2019, including this final rule for Franklin's bumble bee.

Summary of Changes from the Proposed Rule

We considered all comments and information we received during the comment period for the proposed rule to list the Franklin's bumble bee (84 FR 40006; August 13, 2019). Based on these comments and additional internal review, we made the following changes from the proposed rule in this final rule:

- Added to this rule and the SSA report additional climate change information and analysis, as well as discussion on the likely effects of other potential threats in the future;
- Updated this rule and the SSA report with information from the 2019 survey season;
- Corrected a mathematical error in our presentation of neonicotinoid pesticide applications in the historical range of the species in this rule and in the SSA report;
- Added information from the SSA report to this rule regarding nectaring behavior, as well as the commercialization of bumble bees for pollination;

- Updated information in this rule on pesticide regulation on National Wildlife Refuge System lands;
- Added further detail in the rule on Tribal notifications;
- Added several citations and clarifications to the rule to further support content; and
- Made minor editorial changes to the rule to improve readability.

We carefully considered the additional information we received during the comment period, and while much of this information was helpful, it did not result in any further changes from our proposal to this final rule to list Franklin's bumble bee as endangered, nor did it result in a change to our determination that designation of critical habitat is not prudent at this time.

Supporting Documents

A species status assessment (SSA) team prepared an SSA report for Franklin's bumble bee. The SSA team was composed of Service biologists, in consultation with other species experts. The SSA report represents a compilation of the best scientific and commercial data available concerning the status of the species, including the impacts of past, present, and future factors (both negative and beneficial) affecting the species.

In accordance with our joint policy on peer review published in the *Federal Register* on July 1, 1994 (59 FR 34270), we sought the expert opinions of 10 appropriate and independent specialists regarding the scientific basis for this proposed rule, detailed in the Franklin's Bumble Bee Species Status Assessment report (SSA report) (Service 2018a, entire). We received five reviews. The purpose of peer review is to ensure that our listing and critical habitat determinations are based on scientifically sound data, assumptions, and analyses. The peer reviewers have expertise in Franklin's bumble bee or *Bombus* biology and habitat, and their comments helped inform our determinations. We also invited comment on the SSA report from our partner agencies; the U.S. Forest

Service, the Bureau of Land Management, and the Oregon Department of Agriculture provided us with comments. The comments from peer and partner reviews were carefully considered in the process of finalizing the SSA report that provided the scientific basis for both the proposed rule and this final rule. These comments, along with other public comments on our proposed rule, are available in the docket for this final rule (<http://www.regulations.gov> in Docket No. FWS–R1–ES–2018–0044).

I. Final Listing Determination

Background

A thorough review of the taxonomy, life history, and ecology of Franklin’s bumble bee is presented in the SSA report (Service 2018a, entire) on <http://www.regulations.gov> under Docket No. FWS–R1–ES–2018–0044. Franklin’s bumble bee is thought to have the most limited distribution of all known North American bumble bee species (Plowright and Stephen 1980, p. 479; Xerces Society and Thorp 2010, p. 6), and one of the most limited geographic distributions of any bumble bee in the world (Frison 1922, p. 315; Williams 1998, p. 129). The species has been recorded from the Umpqua and Rogue River Valleys in Oregon (Stephen 1957, p. 81) and from northern California, suggesting its restriction to the Klamath Mountain region of southern Oregon and northern California (Thorp *et al.* 1983, p. 8). Elevations where it has been observed range from 162 meters (m) (540 feet (ft)) in the northern part of its range, to over 2,340 m (7,800 ft) in the southern part of its range. All confirmed specimens have been found in an area about 306 kilometers (km) (190 miles (mi)) to the north and south, and 113 km (70 mi) east to west, between 122° to 124° west longitude and 40° 58’ to 43° 30’ north latitude in Douglas, Jackson, and Josephine Counties in southern Oregon, and Siskiyou and Trinity Counties in northern California (Thorp 1999, p. 3; Thorp 2005, p. 1; International Union for Conservation of Nature 2009, p. 1).

Franklin's bumble bee was first observed in 1917, and first described in 1921, and limited occurrence and observation data exist for Franklin's bumble bee prior to 1998. The species has been found on many privately owned sites as well as municipal, State, and Federal land. Historical observations and occurrence data for Franklin's bumble bee prior to 1998 include opportunistic observations, student collections, and museum specimens, as well as the collections and notes of interested parties, natural resource managers, and university staff (Xerces Society and Thorp 2010, pp. 34–40). A more intensive and targeted search effort for the species began in 1998, in areas thought to have the highest likelihood of Franklin's bumble bee presence. There was initial success at finding a higher abundance of the species than ever previously reported; in one year (1998), 98 Franklin's bumble bees were observed (mostly from two sites). However, in subsequent years, searchers found fewer and fewer Franklin's bumble bees, and none have been found since the last sighting of a single individual in Oregon in 2006. The variations in timing, scope, intensity, and methodology of search efforts (including those since 1998) and the lack of observations since 2006 prevent the identification of any population trends. Many of the occurrence records provide only point data for an occurrence, with no details on the size of the area searched or whether or not the record reflected a comprehensive search of an area. Many records also lack details on the level of survey effort per location (number of searchers, hours of search effort per day, number of days per search effort).

The lack of systematic surveys across the historical range of the species over time prevents us from using occurrence records to extrapolate reasonable estimates of species abundance or distribution or from concluding that the species is extinct. Even though none have been seen since 2006, Franklin's bumble bee populations could potentially persist undetected. The areas chosen for survey were selected due to a combination of abundance of floral resources throughout the colony cycle, relatively recent historical

occurrence of the species, and accessibility to surveyors. However, the surveyed area represents a relatively small percentage of the historical range of the Franklin's bumble bee; therefore, it is possible the species may persist in other areas of the range. There are numerous instances of species rediscovered after many years, even decades, of having been believed extinct (e.g., Scheffers *et al.* 2011, entire). As one example of such a case, the Fender's blue butterfly (*Icaricia icarioides fenderi*) of Oregon was believed extinct after the last recorded observation in 1937, until it was rediscovered in 1989, 52 years later (Hammond and Wilson 1992, p. 175; Hammond and Wilson 1993, p. 2). Recent approaches to evaluating extinction likelihood place increased emphasis on the extensiveness and adequacy of survey effort (Keith *et al.* 2017, p. 321; Thompson *et al.* 2017, p. 328), and caution against declaring a species as extinct in the face of uncertainty (Akçakaya *et al.* 2017, p. 340).

The specific life-history characteristics and behavior of this rare species have not been studied; much of the information presented in the SSA report (Service 2018a, entire) is inferred from information on *Bombus* in general and some closely related species (western bumble bee (*B. occidentalis*), rusty patched bumble bee (*B. affinis*), and yellow-faced bumble bee (*B. vosnesenskii*), among others). The report also relied heavily on information from species experts (Service 2018a, entire).

Franklin's bumble bee is a primitively eusocial bumble bee, meaning they are highly social and adults have flexible roles in their social order. They live in colonies made up of a queen and her male and worker offspring, and adult females can switch from worker to queen roles. Like other eusocial *Bombus* species, Franklin's bumble bee typically nests underground in abandoned rodent burrows or other cavities that offer resting and sheltering places, food storage, nesting, and room for the colony to grow (Plath 1927, pp. 122–128; Hobbs 1968, p. 157; Thorp *et al.* 1983, p. 1; Thorp 1999, p. 5). The species may also occasionally nest on the ground (Thorp *et al.* 1983, p. 1) or in rock

piles (Plowright and Stephen 1980, p. 475). It has even been found nesting in a residential garage in the city limits of Medford, Oregon (Thorp 2017, pers. comm.).

Colonies of Franklin's bumble bee have an annual cycle, initiated each spring when solitary queens emerge from hibernation and seek suitable nest sites (Thorp 2017, pers. comm.). Colonies may contain from 50 to 400 workers along with the founding queen (Plath 1927, pp. 123–124; Thorp *et al.* 1983, p. 2; Macfarlane *et al.* 1994, p. 7). Two colonies of Franklin's bumble bee that were initiated in the laboratory and set out to complete development in the field contained over 60 workers by early September, and likely produced over 100 workers by the end of the season (Plowright and Stephen 1980, p. 477). The flight season of Franklin's bumble bee is from mid-May to the end of September (Thorp *et al.* 1983, p. 30); a few individuals have been encountered in October (Southern Oregon University Bee Collection records, *in* Xerces Society and Thorp 2010, Appendix 1, p. 39). At the end of the colony cycle, all the workers and the males die along with the founding queen; only the inseminated hibernating females (gyenes) are left to carry on the genetic lineage into the following year (Duchateau and Velthuis 1988).

As with all *Bombus* species, Franklin's bumble bee has a unique genetic system called the haplodiploid sex determination system. In this system, unfertilized (haploid) eggs become males that carry a single set of chromosomes, and fertilized (diploid) eggs become females that carry two sets of chromosomes. This system may result in lower levels of genetic diversity than the more common diploid-diploid sex determination system, in which both males and females carry two sets of chromosomes. Haplodiploid organisms may be more prone to population extinction than diploid-diploid organisms, due to their susceptibility to low population levels and loss of genetic diversity (Service 2018a, p. 37). Inbreeding depression in bumble bees can lead to the production of sterile diploid males (Goulson *et al.* 2008, p. 11.7) and negatively affects bumble bee colony

size (Herrman *et al.* 2007, p. 1167), which are key factors in a colony's reproductive success.

As one of the rarest *Bombus* species, Franklin's bumble bees are somewhat enigmatic, and a specific habitat study for the species has not been completed. Such a study was initiated in 2006, when the Franklin's bumble bee was last seen, but could not continue due to the subsequent absence of the species (Thorp 2017, pers. comm.).

However, some general habitat associations of *Bombus* are known. Like all bumble bees, the Franklin's bumble bee requires a constant and diverse supply of flowers that bloom throughout the colony's life cycle, from spring to autumn (Xerces Society and Thorp 2010, p. 11); these resources would typically be found in open (non-forested) meadows in proximity to seeps and other wet meadow environments. The nectar from flowers provides carbohydrates, and the pollen provides protein. Franklin's bumble bee may have a foraging distance of up to 10 km (6.2 mi) (Thorp 2017, pers. comm.), but the species' typical dispersal distance is most likely 3 km (1.86 mi) or less (Hatfield 2017, pers. comm.; Goulson 2010, p. 96). Franklin's bumble bee have been observed collecting pollen from lupine (*Lupinus* spp.) and California poppy (*Eschscholzia californica*), and collecting nectar from horsemint or nettle-leaf giant hyssop (*Agastache urticifolia*) and mountain monardella (*Monardella odoratissima*) (Xerces Society and Thorp 2010, p. 11). Franklin's bumble bee may also collect both pollen and nectar from vetch (*Vicia* spp.), as well as rob nectar from it (Xerces Society and Thorp 2010, p. 11). Short-tongued species, including Franklin's bumble bee, sometimes visit flowers that are quite elongated and have difficulty reaching nectar deep in the flower. These bees can 'rob nectar' by chewing a hole on the outside of the flower at the base, through which they can easily reach the nectar with their tongues.

In summary, Franklin's bumble bee has been found in a wide array of sheltered and exposed habitat types at a broad elevational range, and the species appears to be a

generalist forager. Despite uncertainties regarding the species' habitat needs, we know they need (1) floral resources for nectaring throughout the colony cycle, and (2) relatively protected areas for breeding and shelter. The habitat elements that Franklin's bumble bee appears to prefer to fulfill those needs mentioned above are relatively plentiful and widely distributed.

Regulatory and Analytical Framework

Regulatory Framework

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species is an "endangered species" or a "threatened species." The Act defines an endangered species as a species that is "in danger of extinction throughout all or a significant portion of its range," and a threatened species as a species that is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." The Act requires that we determine whether any species is an "endangered species" or a "threatened species" because of any of the following factors:

- (A) The present or threatened destruction, modification, or curtailment of its habitat or range;
- (B) Overutilization for commercial, recreational, scientific, or educational purposes;
- (C) Disease or predation;
- (D) The inadequacy of existing regulatory mechanisms; or
- (E) Other natural or manmade factors affecting its continued existence.

These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals

of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects.

We use the term “threat” to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term “threat” includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or required resources (stressors). The term “threat” may encompass—either together or separately—the source of the action or condition or the action or condition itself.

However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an “endangered species” or a “threatened species.” In determining whether a species meets either definition, we must evaluate all identified threats by considering the expected response by the species, and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species, such as any existing regulatory mechanisms or conservation efforts. The Secretary determines whether the species meets the definition of an “endangered species” or a “threatened species” only after conducting this cumulative analysis and describing the expected effect on the species now and in the foreseeable future.

Analytical Framework

The SSA report documents the results of our comprehensive biological review of the best available scientific and commercial data regarding the status of the species, including an assessment of the potential threats to the species. The SSA report does not represent a decision by the Service on whether the species should be listed as an

endangered or threatened species under the Act. It does, however, provide the scientific basis that informs our regulatory decisions, which involve the further application of standards within the Act and its implementing regulations and policies. The following is a summary of the key results and conclusions from the SSA report; the full SSA report can be found at Docket No. FWS–R1–ES–2018–0044 on <http://www.regulations.gov>.

To assess the viability of Franklin’s bumble bee, we used the three conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 306–310). Briefly, resiliency supports the ability of the species to withstand environmental and demographic stochasticity (for example, wet or dry, warm or cold years), redundancy supports the ability of the species to withstand catastrophic events (for example, droughts, large pollution events), and representation supports the ability of the species to adapt over time to long-term changes in the environment (for example, climate changes). In general, the more resilient and redundant a species is and the more representation it has, the more likely it is to sustain populations over time, even under changing environmental conditions. Using these principles, we identified the species’ ecological requirements for survival and reproduction at the individual, population, and species levels, and described the beneficial and risk factors influencing the species’ viability.

The SSA process can be categorized into three sequential stages. During the first stage, we evaluated the individual species’ life-history needs. The next stage involved an assessment of the historical and current condition of the species’ demographics and habitat characteristics, including an explanation of how the species arrived at its current condition. The final stage of the SSA involved making predictions about the species’ responses to positive and negative environmental and anthropogenic influences. Throughout all of these stages, we used the best available information to characterize

viability as the ability of a species to sustain populations in the wild over time. We use this information to inform our regulatory decision.

Summary of Biological Status and Threats

In this discussion, we review the biological condition of the species and its resources, and the threats that influence the species' current and future condition, in order to assess the species' overall viability and the risks to that viability.

To assess resiliency and redundancy, we evaluated the change in Franklin's bumble bee occurrences (populations) over time. To assess representation (as an indicator of adaptive capacity) of the Franklin's bumble bee, we evaluated the spatial extent of occurrences over time. We evaluated the change in resiliency, representation, and redundancy from the past until the present; however, due to the lack of observations of the species since 2006, we did not project anticipated future states of these conditions.

Our analyses indicate that the resiliency, redundancy, and representation of the Franklin's bumble bee have all declined since the late 1990s. Historically, the species has always been rare and has one of the narrowest distributions of any *Bombus* species in the world. Even so, the abundance and distribution of Franklin's bumble bee has declined significantly (Service 2018a, pp. 10–14); the species has not been observed since 2006, despite intensive survey efforts in select portions of its historical range. Search efforts for the species have been varied in timing, scope, intensity, and methodology. During the more intensive surveys from 1998 until the last observation in 2006, the Franklin's bumble bee was observed at 14 locations, including 8 locations where it had not been previously documented. In 1998, 98 bees were found among 11 locations. Searchers found fewer and fewer bees after that year even though they continued extensive searches in multiple locations with the highest likelihood of finding the species. Twenty bees were located in 1999, nine individuals were observed in 2000, and one individual was observed in 2001. Although 20 Franklin's bumble bees were

observed in 2002, only 3 were observed in 2003 (all at a single locality), and a single worker bee was observed in 2006. Despite continued intensive search efforts in these areas through 2019, there have been no confirmed observations of the Franklin's bumble bee since 2006. Data allow us to estimate 43 potential populations of the species since 1921, when the first description of the species was published (Service 2018a, pp. 11). From 1998 to 2006, we identified 14 potential populations. Since 2006, no populations have been located.

The vulnerability resulting from the Franklin's bumble bee's haplodiploid genetic system, as well as the loss in the abundance and spatial extent of its populations, suggest the resiliency, representation, and redundancy of the Franklin's bumble bee have all declined significantly since the late 1990s. The losses in both the number of populations and their spatial extent render the Franklin's bumble bee vulnerable to extinction even without further external stressors (e.g., pathogens and insecticide exposure) acting upon the species.

As part of our status assessment of the Franklin's bumble bee, we looked at potential stressors affecting the species' viability (Service 2018a, pp. 23-40). Potential stressors that we analyzed for the Franklin's bumble bee generally fit into three groups that correspond with Factors A (habitat loss and fragmentation), C (pathogens), or E (pesticide use, competition with nonnative bees, and effects of small population size). No potential stressors of the Franklin's bumble bee correspond with Factor B. There has never been any indication that the Franklin's bumble bee was at risk of overutilization for commercial, recreational, scientific, or educational purposes, and we did not find any new information to suggest this has changed. Existing regulatory mechanisms (Factor D) are discussed below in the context of how they help to reduce or ameliorate stressors to the Franklin's bumble bee.

The 2010 petition identified destruction, degradation, and conversion of habitat as a threat to the Franklin's bumble bee. In our 90-day finding on the 2010 petition (76 FR 56381; September 13, 2011), we noted that the petitioners provided substantial information on threats to the Franklin's bumble bee from the destruction, modification, or curtailment of habitat, primarily due to the potential impacts of natural or prescribed fire. Because the loss and degradation of habitat has been shown to reduce both diversity and abundance in other *Bombus* species (Potts *et al.* 2010, pp. 348–349), we looked at the potential stressors of natural or prescribed fire, agricultural intensification, urban development, livestock grazing, and the effects of climate change (Service 2018a, pp. 23–40).

Although conversion of natural habitat appears to be the primary cause of bumble bee habitat loss throughout the world (Goulson *et al.* 2015, p. 2; Kosior *et al.* 2010, p. 81), many researchers believe it is unlikely to be a main driver of the recent, widespread North American bee declines (Szabo *et al.* 2012, p. 236; Colla and Packer 2008, p. 1388; Cameron *et al.* 2011, p. 665). Despite uncertainties regarding the Franklin's bumble bee's habitat needs, we know they need (1) floral resources for nectaring throughout the colony cycle, and (2) relatively protected areas for breeding and shelter. Furthermore, the available information regarding locations where the species has been found indicates that the Franklin's bumble bee is a generalist forager and that the species' specific needs and preferences for these habitat elements are relatively flexible, plentiful, and widely distributed. While we can say that *Bombus* species in general might prefer protected meadows with an abundance of wildflowers, the Franklin's bumble bee has been found in a wide array of sheltered and exposed habitat types at elevations ranging from 540 ft (162 m) to 7,800 ft (2,340 m) (Thorpe 2017, pers. comm.).

Natural or Prescribed Fire

Fire caused by both natural and human-caused factors has been an important change on the landscape in the range of the Franklin's bumble bee. Because fire reduces natural succession of forests through the burning of encroaching woody plants, fire is a primary factor in the maintenance of grassland and meadow habitat that can support *Bombus* species (Shultz and Crone 1998, p. 244; Huntzinger 2003, p. 2). With the increase in human development came fire suppression to limit damage to manmade structures. Fire suppression allows woody encroachment to occur, and the diverse landscape created by fire (open areas mixed within forested areas) is slowly being replaced by increasing areas of denser forested habitat; the open areas that facilitated the growth of diverse understory plant communities are being reduced from their historical condition (Ruchty 2011, p. 26). Conifer species now cover some of the area that was previously open meadow habitat in the range of the Franklin's bumble bee (Panzer 2002, p. 1297; Shultz and Crone 1998, p. 244). Although this loss of habitat by fire suppression may have limited the availability and diversity of floral resources, as well as nest and overwintering habitat for the Franklin's bumble bee, healthy meadow habitat remains in areas where the Franklin's bumble bee was previously found (Godwin 2017, pers comm.; Colyer 2017, pers. comm.), and it is unlikely that loss of habitat from fire suppression was a factor in the decline of the species.

Increased fuel loads from fire suppression heighten the potential for catastrophic, large-scale, and high temperature wildfires. Any *Bombus* colonies in the path of this type of fire would be at risk of extirpation. Wildfire may have extirpated some historical populations of the Franklin's bumble bee, but we have no information suggesting that any known Franklin's bumble bee occurrence sites were in the path of catastrophic wildfires at the time the sites were occupied. Controlled burning became a management tool for reducing potential fuel loads for wildfire; controlled burning is carried out by Federal land management agencies including the U.S. Forest Service and Bureau of Land

Management in the range of the Franklin's bumble bee. The effects of fire on invertebrates depends greatly on the biology of the specific taxa (Gibson *et al.* 1992, p. 166), and in the case of the Franklin's bumble bee, controlled burns could certainly cause death of individual bees and negative effects to a colony. Prescribed fire is likely to continue to be used as a management tool on some Federal land; however, the practice is overall small in scale, opportunistic (depending on weather, funding, and a host of other factors), used to prevent catastrophic fire, and often a net benefit to pollinators as it opens habitat by decreasing canopy cover (U.S. Forest Service 1989, IV 87 to IV 90, IV-113 to IV-119; U.S. Forest Service 1990, pp 4-149 to 4-179). In summary, we have no information to indicate that controlled burns were a factor in the decline of the Franklin's bumble bee or will increase in the future to a degree that may affect the viability of the species.

Agricultural Intensification

Agricultural intensification can result in habitat loss for bumble bees, as these practices often result in the planting of monocultures that tend to provide floral resources for a limited period of time, rather than throughout the colony's life cycle. Agricultural intensification can negatively impact wild bees by reducing floral resource diversity and abundance (Service 2018a, p. 32). Agricultural intensification was determined to be a primary factor leading to the local extirpation and decline of bumble bees in Illinois (Grixti *et al.* 2009, p. 75). An increased use of herbicides often accompanies development and agricultural intensification, and the widespread use of herbicides in agricultural, urban, and even natural landscapes has led to decreases in flowering plants (Potts *et al.* 2010, p. 350).

Within the historical range of the Franklin's bumble bee, total acres in agricultural cropland decreased in all three counties in Oregon (Douglas, Jackson, and Josephine) by greater than 50 percent from 1997 to 2012 (U.S. Department of Agriculture—National

Agriculture Statistics Service 2017, pers. comm.; Service 2018a, p. 33). While the total number of acres of agricultural cropland is not synonymous with agricultural intensification (specifically, the expansion of monocultures), a decrease in total acres of agriculture leads us to conclude that agricultural intensification was not likely a factor in the decline of the Franklin's bumble bee. We have no documentation in our files or any direct evidence that agricultural intensification has contributed to the decline of the Franklin's bumble bee or will increase in the future to a degree that may affect the viability of the species. Approximately 42 percent of sites where Franklin's bumble bees have ever been reported (18 of 43) occur on federally owned land, primarily U.S. Forest Service and Bureau of Land Management land; very little habitat on these lands has been permanently altered or lost through agricultural intensification (Service 2018a, p. 32).

Urban Development

Ongoing urbanization contributes to the loss and fragmentation of natural habitats. Urban gardens and parks provide habitat for some pollinators, including bumble bees (Frankie *et al.* 2005, p. 235; McFrederick and LeBuhn 2006, p. 372), but they tend not to support the species richness of bumble bees that can be found in nearby undeveloped landscapes (Xerces Society and Thorp 2010, p. 13) or that which was present historically (McFrederick and LeBuhn 2006). However, Franklin's bumble bee and western bumble bee have both been observed in urban areas of Ashland, Oregon, and in residential areas of Medford, Oregon. Furthermore, approximately 42 percent of the sites where Franklin's bumble bee have ever been reported (18 of 43) occur on federally owned land, primarily U.S. Forest Service and Bureau of Land Management land, and very little habitat on these lands has been permanently altered or lost through development.

Generally good habitat conditions currently exist throughout the known historical Franklin's bumble bee locations and all of the recent focused survey areas. Two notable

events occurred in areas with previous observations of Franklin's bumble bee: the creation of Lake Applegate upon the completion of Applegate Dam in the fall of 1980, and a report of soil modification on a portion of the Gold Hill site in 2004; however, we have no information to indicate that Franklin's bumble bees were still in the vicinity or had any colonies in the area when these events occurred. The Applegate Dam project inundated two sites with historical observations of Franklin's bumble bee (from the 1960s), but no subsequent search efforts or observations (Xerces Society and Thorp 2010, p. 13; Thorp, pers. comm. 2017). The June 23, 2010, petition noted that in 2004, soil had been excavated and deposited in a portion of the Gold Hill area (Xerces Society and Thorp 2010, p. 13). The last observation of Franklin's bumble bee at Gold Hill was in the year 2000, and the site was revisited 14 times over the next 3 years with no observations of Franklin's bumble bee. In both of these cases, we have no information to suggest the species was still using the habitat in the area by the time the activities took place, and therefore no information to suggest that either of these events affected the resiliency of any population of Franklin's bumble bee. We have no documentation in our files or any direct evidence that urbanization or development in the range of Franklin's bumble bee, or the incidents described above, contributed to the decline of the species or will increase in the future to a degree that may affect the viability of the species (Portland State University 2015, p. 7).

Livestock Grazing

Livestock grazing occurs on public land in much of the historical range of the Franklin's bumble bee. Overgrazing by sheep between 1890 and 1920 resulted in trampling vegetation and denuding soils, and grazing is currently evident today in the continuing erosion of the granitic soils of the McDonald Basin, Siskiyou Gap, Mt. Ashland, and the Siskiyou Crest (LaLande 1995, p. 31; T. Atzet 2017, pers. comm.). Several studies on the impacts of livestock grazing on bees suggest that an increase in the

intensity of livestock grazing affects the species richness of bees (Service 2018a, p. 35). In contrast, grazing, especially by cattle, can play a key positive role in maintaining the abundance and species richness of preferred bumble bee forage (Carvell 2002, p. 44). Evidence of livestock grazing was observed interspersed within abundant floral resources in Franklin's bumble bee habitat during several recent targeted survey efforts (Brooks 1997, pers. comm.; Service 2016, entire; Service 2017, entire; Trail 2017, pers. comm.). We have no new information that the timing, location, intensity, or duration of grazing has changed, with the exception of the Cascade-Siskiyou National Monument, where most grazing has been retired (Colyer 2018, pers. comm.). The lack of specific information on the impacts of livestock grazing on the Franklin's bumble bee limits our ability to connect the activity to any specific species' response, and we do not anticipate grazing will increase in the future to a degree that may affect the viability of the species (Bureau of Land Management 2016, pp. 96-103).

Effects of Climate Change

Specific impacts of climate change on pollinators are not well understood; most of the existing information on climate change impacts to pollinators comes from studies on butterflies. Studies specifically relating to bumble bees are scant, and we found no climate change information specific to the Franklin's bumble bee. Changes in temperature and precipitation, and the increased frequency of storm events, can affect pollinator population sizes directly, by affecting survival and reproduction (Intergovernmental Panel on Climate Change 2013, entire; Bale *et al.* 2002, p. 11; Roland and Matter 2016, p. 22). These climatic changes can also affect populations indirectly, by altering resource availability and species interactions (Service 2018a, p. 36).

Bumble bee abundance for three species of *Bombus* in the Rocky Mountains increased when floral resources were available for more days, and the number of days when floral resources were available increased with greater summer precipitation and

later snowmelt dates (Ogilvie *et al.* 2017, p. 4). Several of the targeted Franklin's bumble bee and western bumble bee survey reports between 2015 and 2017 include mention of widespread hot, dry climate affecting timing and abundance of floral resources during the surveys (Bureau of Land Management 2015, p. 2; Trail 2017, pers. comm.). Although the Ogilvie *et al.* study and the survey reports suggest potential indirect effects of climate change on *Bombus*, we have no information to indicate that the effects of climate change were connected to the decline of the Franklin's bumble bee; numerous *Bombus* species persist in areas that are considered good quality habitat for the Franklin's bumble bee (Pool 2014, entire; Colyer 2016, entire). As a habitat generalist, Franklin's bumble bee appears to forage on a variety of floral resources, and we have no information to suggest that they would not forage off of whatever floral resource was in bloom at the time they emerge from their nests. We have no information to suggest that any changes in the vegetation community to date led to the decline of the species.

In order to understand the potential future impact of climate change on Franklin's bumble bee, we looked at climate change projection models. Global climate projections are informative and, in some cases, the only or the best scientific information available for us to use. However, projected changes in climate and related impacts can vary substantially across and within different regions of the world (Intergovernmental Panel on Climate Change 2007, pp. 8–12). Therefore, we use “downscaled” projections when they are available and have been developed through appropriate scientific procedures because such projections provide higher-resolution information that is more relevant to spatial scales used for analyses of a given species (see Glick *et al.* 2011, pp. 58–61, for a discussion of downscaling).

Downscaled projections as of 2016 were available for our analysis of the Franklin's bumble bee from the U.S. Geological Survey's National Climate Change Viewer (Alder, J. and S. Hostetler. 2016, entire). The National Climate Change Viewer

is based on the mean of 30 models, which can be used to predict changes in air temperature and precipitation for Jackson County, Oregon (location of the last known occurrence record of Franklin's bumble bee), for two greenhouse gas emission scenarios, RCP4.5 and RCP8.5. . From the year 2020 to the year 2050, the model set shows an increase in the mean maximum air temperature of between 1.9 degrees Fahrenheit (°F) (1 degree Celsius (°C)) (RCP4.5) and 3.1 °F (1.7 °C) (RCP8.5), and an increase in the mean annual minimum air temperature of between 1.0 °F (0.3 °C) (RCP4.5) and 2.7 °F (1.5 °C) (RCP8.5). For both scenarios, mean precipitation is predicted to decrease by approximately 0.4 inches (10 millimeters) for both scenarios.

Projections for an increase in temperature and decrease in precipitation over the next 30 years may lead to alteration in the vegetation community in Franklin's bumble bee habitat, including the varieties of floral resources that Franklin's bumble bee relies on for nectar. However, we have no information to suggest that these changes will result in a decrease in the availability of nectar resources to the species. Some studies suggest that pollinators are responding to climate change with recent latitudinal and elevational range shifts such that there is spatial mismatch among plants and their pollinators; while this has been demonstrated in butterflies, it may be less of a factor for bumble bees (Service 2018a, p. 36). As generalist foragers, bumble bees do not require synchrony with a particular plant species, although some bumble bee populations are active earlier in the season than in the past (Bartomeus *et al.* 2011, p. 20646).

Projections for an increase in temperature and decrease in precipitation over the next 30 years may also affect the frequency or intensity of wildfires and storm events (including flooding). These events could affect the availability of floral resources, the suitability of nest locations, and the survival of overwintering queens. However, we do not have information projecting the timing, scope, or intensity of wildfires or storms; the stochastic nature of these events limits our ability to project the magnitude of impact on

the future condition of Franklin's bumble bee or its habitat, and hinders our ability to assess their impact on the viability of the species.

Summary

Although habitat loss has had negative effects on bumble bees, we conclude it is unlikely to be a main driver of the decline of the Franklin's bumble bee. Habitat appears generally intact and in good condition throughout the known, historical locations of the Franklin's bumble bee and throughout all of the recent focused survey areas (with the exceptions of the historical sites affected by the creation of Lake Applegate in the fall of 1980, and soil modification that occurred on a portion of the Gold Hill site in 2004). In our assessment, we found no information to suggest that destruction, degradation, or conversion of habitat occurred at a scope and magnitude that would cause it to be a primary factor in the decline of the Franklin's bumble bee (Service 2018a, pp. 35–37). Furthermore, we have no information to suggest that habitat destruction or modification will increase in scope and magnitude to the point where it will be a primary stressor to the species in its range in the near future.

A number of diseases and parasites are known to occur in bumble bee populations. These include the protozoan parasite *Crithidia bombi* (*C. bombi*), the tracheal mite *Locustacarus buchneri*, the microsporidium (parasitic fungus) *Nosema bombi* (*N. bombi*), as well as deformed wing virus. Pathogens and parasites are widespread generalists in the host genus, but affect species differently according to host susceptibility and tolerance to infection (Kissinger *et al.* 2011, p. 221; Malfi and Roulston 2014, p. 18). The host species' life history plays a role in the virulence of a given pathogen; for instance, parasites may have relatively smaller effects on species with shorter colony life cycles and smaller colony sizes (Rutrecht and Brown 2009, entire).

Pathogen spillover is a process whereby parasites and pathogens spread from commercial bee colonies to native bee populations (Colla *et al.* 2006, p. 461; Otterstatter

and Thompson 2008, p. 1). The decline of certain *Bombus* species from the mid-1990s to present, particularly species in the subgenus *Bombus sensu stricto* (including Franklin's bumble bee), was contemporaneous with the collapse of commercially bred western bumble bee (raised primarily to pollinate greenhouse tomato and sweet pepper crops beginning in the late 1980s) (Szabo *et al.* 2012, pp. 232–233). This collapse was attributed to infections of *Nosema bombi*.

Nosema bombi has been detected in native bumble bees in North America, and has been found to be a part of the natural pathogen load. The fungus has been reported in Canada since the 1940s (Cordes *et al.* 2011, p. 7) and appears to have a broad host range in North American (Kissinger *et al.* 2011, p. 222). Infections of the pathogen primarily occur in the malpighian tubules (small excretory or water regulating glands), but also in fat bodies, nerve cells, and sometimes the trachea (Macfarlane *et al.* 1995). *Bombus* colonies can appear to be healthy but still carry *N. bombi* and transmit it to other colonies, most likely when spores are fed to larvae and then infected adults drift into non-natal colonies (Service 2018a, p. 25).

While we have no evidence of direct effects of a virulent strain of *N. bombi* on the Franklin's bumble bee, *N. bombi* has been detected in closely related species in the range of the Franklin's bumble bee. Furthermore, *N. bombi* infections in rare species like the Franklin's bumble bee are more frequent, are more severe, and seem to affect a higher percentage of individuals of the species (Cameron *et al.* 2011, entire; Cordes *et al.* 2011, p. 2).

The effect of pathogens on bumble bees varies from mild to severe (Macfarlane *et al.* 1995; Rutrecht *et al.* 2007, p. 1719; Otti and Schmid-Hempel 2008, p. 577). Bumble bees infected with *Nosema bombi* may have crippled wings, and queens may have distended abdomens and be unable to mate (Otti and Schmid-Hempel 2007, pp. 122–123). Malfi and Roulston (2014, p. 24) found that *N. bombi* infections are more frequent

and more severe in rare species, and the species with the highest percentages of infected individuals were rare species. Furthermore, the effects of pathogen infection on bumble bees may be amplified by other influence factors. Nutritional stress may compromise the ability of bumble bees to survive parasitic infections, as evidenced by a significant difference in mortality in bumble bees on a restricted diet compared to well-fed bees infected with *C. bombi* (Brown *et al.* 2000, pp. 424–425).

A virulent strain of *Nosema bombi* from the buff-tailed bumble bee (*Bombus terrestris*) may have spread to the eastern bumble bee (*B. impatiens*) and western bumble bee from Europe. In the mid-1990s, companies shipped queen eastern and western bumble bees to Europe for their development into colonies to use in commercial pollination services. When the colonies had reached sufficient size, they were shipped back to the United States and deployed in industrial greenhouse operations in California, primarily to pollinate tomatoes and peppers. The colonies may have picked up *N. bombi* prior to their shipment back into the United States, and once in this country, the commercially reared colonies may have spread the virulent strain to wild populations of Franklin's bumble bee (Xerces Society and Thorp 2010, p. 14). In work partially funded by the Service, the University of Illinois conducted surveys for parasites and pathogens in bumble bee populations of the Pacific Northwest and Midwest between 2005 and 2009. The goal was to assess *Bombus* populations for presence and prevalence of pathogens, particularly microsporidia, in an effort to provide baseline data to assess disease as a potential factor in the decline of the Franklin's bumble bee, western bumble bee, and American bumble bee (*B. pensylvanicus*) (Solter *et al.* 2010, p. 1). The highest prevalence of *N. bombi* was found in western bumble bee, with 26 percent of collected individuals infected. *Crithidia bombi* infections of western bumble bee were 2.8 percent overall (Solter *et al.* 2010, pp. 3–4); no Franklin's bumble bees were collected during the study. However, Mt. Ashland, Oregon, was one of only three sites in the Pacific

Northwest study area where *N. bombi* infections were found in multiple *Bombus* species (the indiscriminate cuckoo bumble bee (*B. insularis*) and black-notched bumble bee (*B. bifarius*)) (Solter *et al.* 2010, pp. 3–4). Although Cordes *et al.* (2011, p. 7) found a new allele in *N. bombi*, the recent study by Cameron *et al.* (2016) found no evidence of an exotic strain of *N. bombi*.

In summary, known pathogens occur within the historical range of the Franklin's bumble bee, and we have evidence of several pathogens infecting closely related species within that range that have also likely affected the Franklin's bumble bee. Although we have no direct evidence of pathogens playing a role in the decline of the Franklin's bumble bee, the disappearance of the Franklin's bumble bee occurred soon after a period of potential exposure to introduced pathogens, particularly *N. bombi*, which is known to have a more severe impact on rare species like the Franklin's bumble bee. Decline of other closely related pollinators has been associated with these pathogens, and it is highly likely pathogens have had some negative influence on the resiliency of Franklin's bumble bee populations.

Pesticide Use

Exposure to pesticides can occur to bumble bees from direct spray or drift, or from gathering or consuming contaminated nectar or pollen (Johansen and Mayer 1990; Morandin *et al.* 2005, p. 619). Lethal and sublethal effects on bumble bee eggs, larvae, and adults have been documented for many different pesticides under various scenarios (Service 2018a, p. 28). Documented sub-lethal effects to individual bumble bees and colonies include reduced or no male production, reduced or no egg hatch, reduced queen production, reduced queen longevity, reduced colony weight gain, reduced brood size, reduced feeding, impaired ovary development, and an increased number of foragers or foraging trips or duration (interpreted as risky behaviors) (Service 2018a, p. 28). Bumble bee habitat can also be impacted by pesticides due to changes in vegetation and the

removal or reduction of flowers needed to provide consistent sources of pollen, nectar, and nesting material (Service 2018a, p. 28). Declines in bumble bees in parts of Europe have been at least partially attributed to the use of pesticides (Williams 1986, p. 54; Kosior *et al.* 2007, p. 81).

Although the use of land for agricultural purposes has traditionally involved the use of pesticides and other products toxic to bees, one particular class of insecticides known as neonicotinoids have been strongly implicated in the decline of honey bees (*Apis* spp.) worldwide, and implicated in the decline of several *Bombus* species, including rusty patched bumble bee, buff-tailed bumble bee, and eastern bumble bee (Pisa *et al.* 2015, p. 69; Goulson 2013, pp. 7–8; Colla and Packer 2008, p. 10; Lundin *et al.* 2015, p. 7). Neonicotinoids are a broad class of insecticides based on nicotine compounds used in a variety of agricultural applications; they act as a neurotoxin, affecting the central nervous system of insects by interfering with the receptors of the insects' nervous system, causing overstimulation, paralysis, and death (Douglas and Tooker 2015, pp. 5090-5092). The neonicotinoid family of insecticides includes acetamiprid, clothianidin, imidacloprid, nitenpyram, nithiazine, thiacloprid, and thiamethoxam. In the range of the Franklin's bumble bee (Jackson, Douglas, and Josephine Counties in Oregon, as well as Trinity and Siskiyou Counties in California), the first reported use of imidacloprid was in 1996, thiamethoxam in 2001, and clothianidin in 2004. The use of neonicotinoid pesticides continued in the range of the species through 2006, when the last observation of the Franklin's bumble bee was recorded. Across all five counties, total estimated applications of these three neonicotinoids increased from 53.31 pounds (lbs) (24.19 kilograms (kg)) in 1996, to 1,144.6 lbs (519.9 kg) in 2014. However, the exponential growth of neonicotinoid applications started in 2011, 5 years after the last observation of the species. The vast majority of neonicotinoids are used as seed treatments on grains and other field crops (Oregon Department of Agriculture 2018, pers. comm.), and total

agricultural land within the historical range of the species is less than 2 percent of the total land base (2011 National Land Cover Data Set and 2016 USDA Crop Data Layers (CDL) in Syngenta 2019, pers. comm).

No studies have investigated the effects of pesticide use on the Franklin's bumble bee, and no discoveries have been documented of any Franklin's bumble bees injured or killed by pesticides. The Franklin's bumble bee is a habitat generalist and is not known to have a close association with agricultural lands; therefore, it may have less exposure to pesticides than some other *Bombus* species. However, pesticide use occurs in the range of the Franklin's bumble bee. The similarity in foraging traits that the Franklin's bumble bee has with both honey bees and the other *Bombus* species (e.g., generalist foragers collecting pollen from similar food sources) allows us to infer that Franklin's bumble bee populations are likely to suffer exposure to and impacts from pesticides in similar measure to other *Bombus* species when the Franklin's bumble bee is in areas where pesticides are applied.

Effects of Small Population Size

The Franklin's bumble bee is rare and has always had very small populations (relative to other similar, native bumble bees in the western United States), and likely has low genetic diversity due to the haplodiploid genetic system it shares with all *Bombus* species (Zayed 2009, p. 238). These factors make the species more vulnerable to habitat change or loss, parasites, diseases, stochastic events, and other natural disasters such as droughts (Xerces Society and Thorp 2010, p. 20). Between 1998 and 2006, the number of Franklin's bumble bee observations went from a high of 98 at 11 locations, to a lone individual in 2006. No observations of the Franklin's bumble bee have occurred since 2006, despite an increase in survey effort. Diploid male production has been detected in naturally occurring populations of bumble bees, and recent modeling work has shown that diploid male production may initiate a rapid extinction vortex (a situation in which

genetic and demographic traits and environmental conditions reinforce each other in a downward spiral, leading to extinction) (Goulson *et al.* 2008, p. 11.8). Because of inbreeding and the production of sterile males, the haplodiploid genetic system makes bumble bees very vulnerable when populations get small (Colla 2018, pers. comm.). Although we have no direct evidence that small population size or a rapid extinction vortex contributed to the decline of the species, the genetic system and historically small population size of the Franklin's bumble bee likely heightened the species' vulnerability to other threats in the environment; we, therefore, consider the effects of small population size a synergistic threat to the species.

Competition with Nonnative Bees

The European honey bee (*Apis mellifera*) was first introduced to eastern North America in the early 1620s, and into California in the early 1850s (Xerces Society and Thorp 2010, p. 21). The resource needs of the European honey bee and native *Bombus* species may overlap, resulting in the potential for increased competition for resources (Thomson 2004, p. 458; Thomson 2006, p. 407). Decreased foraging activity and lowered reproductive success of *Bombus* colonies have been noted near European honey bee hives (Evans 2001, pp. 32–33; Thomson 2004, p. 458; Thomson 2006, p. 407). Additionally, the size of workers of native *Bombus* species were noticeably reduced where European honey bees were present, which may be detrimental to *Bombus* colony success (Goulson and Sparrow 2009, p. 177). It is likely that the effects discussed in these studies are local in space and time, and most pronounced where floral resources are limited and large numbers of commercial European honey bee colonies are introduced (Xerces Society and Thorp 2010, p. 21). We have no information to indicate that any area of Franklin's bumble bee habitat in the range of the species has limited floral resources and large numbers of European honey bees. We have no information related to the specific placement of commercial honey bee colonies in or near Franklin's bumble

bee habitat. Furthermore, European honey bees have been present without noticeable declines in *Bombus* populations over large portions of their ranges (Xerces Society and Thorp 2010, p. 21), and we have no new information that connects competition from European honey bees to the decline of the Franklin's bumble bee.

There is potential for nonnative, commercially raised bumble bees to naturalize and outcompete native bumble bees for limited resources such as nesting sites and forage areas. Five commercially reared eastern bumble bee workers and one queen were captured in the wild near greenhouses where commercial bumble bees are used, suggesting this species may have naturalized outside of its native range. The eastern bumble bee, which has a native range in eastern North America, was detected in western Canada (Ratti and Colla 2010, pp. 29–31). In Japan, nonnative buff-tailed bumble bee colonies founded by bees that had escaped from commercially produced colonies had more than four times the mean reproductive output of native bumble bees (Matsumura *et al.* 2004, p. 93). In England, commercially raised buff-tailed bumble bee colonies had higher nectar-foraging rates and greater reproductive output than a native subspecies of the buff-tailed bumble bee (Ings *et al.* 2006, p. 940). Colonies of eastern bumble bee were imported to pollinate agricultural crops and strawberries in Grants Pass, Oregon, in the range of the Franklin's bumble bee (Xerces Society and Thorp 2010, p. 18).

Although nonnative *Bombus* species in the range of Franklin's bumble bee could outcompete Franklin's bumble bee for floral resources and nesting habitat, we have no information to definitively connect competition with nonnative bumble bees to the decline of the Franklin's bumble bee. Furthermore, invertebrate surveys in Franklin's bumble bee habitat continue to show evidence of healthy populations of other native *Bombus* species unaffected by competition from nonnative bees (Pool 2014, entire; Colyer 2016, entire).

Summary

We find that several natural and other human-caused factors contributed to the decline of the Franklin's bumble bee. While it is unlikely that pesticides alone can account for the decline of the Franklin's bumble bee, documented effects of pesticides on closely related *Bombus* species suggest pesticide use was likely a factor in the decline of the Franklin's bumble bee. The haplodiploid genetic system of the Franklin's bumble bee, combined with its historically small population size, was also likely a factor in the decline of the species. Although nonnative *Bombus* species in the range of the Franklin's bumble bee could outcompete the Franklin's bumble bee for floral resources and nesting habitat, we have no information connecting competition with nonnative bumble bees to the decline of the Franklin's bumble bee. Additionally, surveys in Franklin's bumble bee habitat continue to show evidence of healthy populations of other native *Bombus* species unaffected by competition from nonnative bees.

Synergistic and Cumulative Effects

It is likely that several threats are acting cumulatively and synergistically on many *Bombus* species, including the Franklin's bumble bee (Goulson *et al.* 2015, p. 5), and the combination of multiple threats is likely more harmful than any one acting alone (Gill *et al.* 2012, p. 108; Coors and DeMeester 2008, p. 1821; Sih *et al.* 2004, p. 274). There is recent evidence that the interactive effects of pesticides and pathogens could be particularly harmful for bumble bees (Service 2018a, p. 39). Nutritional stress may compromise the ability of bumble bees to survive parasitic infections (Brown *et al.* 2000, pp. 424–425). Bumble bees with activated immunity may have metabolic costs, such as increased food consumption (Tyler *et al.* 2006, p. 2; Moret and Schmid-Hempel 2000, pp. 1166–1167). Additionally, exposure to pesticides may increase with increased food consumption in infected bees (Goulson *et al.* 2015, p. 5). Activating immunity impairs learning in bumble bees (Riddell and Mallon 2006; Alghamdi *et al.* 2008, p. 480). Impaired learning is thought to reduce the ability of bees to locate floral resources and

extract nectar and pollen, therefore exacerbating nutritional stresses (Goulson *et al.* 2015, p. 5). Further, declining North American species with low genetic diversity have higher prevalence of the pathogen *Nosema bombi* (Cameron *et al.* 2011, p. 665). In summary, we, therefore, find that pathogens in combination with pesticides, as well as pathogens in combination with the effects of small population size, may have hastened and amplified the decline of the Franklin's bumble bee to a greater degree than any one of the three threats would cause on its own.

Existing Regulatory Mechanisms and Conservation Efforts

Surveys conducted by Dr. Robbin Thorp, other private individuals, university classes and researchers, the U.S. Forest Service, and Bureau of Land Management have significantly contributed to the existing information on Franklin's bumble bee. However, other than those search efforts, we are aware of no conservation efforts or beneficial actions specifically taken to address threats to the Franklin's bumble bee. Oregon does not include invertebrates on their State endangered species list (Oregon Department of Fish and Wildlife 2018, entire) and California has no bee species included on its list of threatened and endangered invertebrates (California Department of Fish and Wildlife 2018, entire). California has the Franklin's bumble bee listed on its list of terrestrial and vernal pool invertebrates of conservation priority but has no required actions or special protections associated with the listing (California Department of Fish and Wildlife 2017, p. 10). The Franklin's bumble bee is on the species index for the U.S. Forest Service and Bureau of Land Management Interagency Special Status/Sensitive Species Program (ISSSSP). Although the Federal agencies include the species in survey efforts and conduct general meadow enhancement activities, there are no actions resulting from the ISSSSP classification that address known threats to the Franklin's bumble bee (ISSSSP 2018, entire).

General awareness of colony collapse disorder and increase of conservation efforts for pollinators in general has likely had limited, indirect effects on policies and regulations. The U.S. Forest Service is working to include a section in all biological evaluations to address the effects from agency actions on pollinators. In addition, the Rogue River-Siskiyou National Forest is implementing ongoing projects and mitigations to create and enhance pollinator habitat (Colyer 2018, pers. comm.). The Oregon Department of Agriculture restricts some potential sources of *Nosema bombi* from entering the State for agricultural uses, including commercially produced colonies of eastern bumble bee; only *Bombus* species native to Oregon are allowed for commercial pollination purposes (Oregon Department of Agriculture 2017, p. 5). However, California allows, with appropriate permits, the importation of eastern bumble bee, and other species such as the blue orchard bee (*Osmia lignaria*), for greenhouse pollination (California Department of Food and Agriculture 2017), making the potential for pathogen spillover from nonnative bees higher in California.

Some local municipalities in Oregon enacted legislation against aerial pesticide applications but none in the range of the Franklin's bumble bee (Powell 2017, p. 1; City of Portland 2015, p. 2). However, in the 2017 legislative session, Oregon passed an Avoidance of Adverse Effects on Pollinating Insects law (Oregon Revised Statutes (ORS) 634.045) that is providing enhanced training of licensed and unlicensed pesticide applicators in the State (Melathopoulos 2018, pers. comm.), and could thereby reduce effects of pesticides on pollinators, including Franklin's bumble bee.

In January 2017, the U.S. Environmental Protection Agency's Office of Pesticide Programs published their "Policy to Mitigate the Acute Risk to Bees from Pesticide Products," which recommended new labeling statements for pesticide products, including warnings for pesticides with a known acute toxicity to bees (Tier 1 pesticides), including neonicotinoids (specifically including imidacloprid, clothianidin, and thiamethoxam)

(U.S. Environmental Protection Agency 2017, p. 31). In addition, the Environmental Protection Agency is working with State and Tribal agencies to develop and implement local pollinator protection plans, known as Managed Pollinator Protection Plans (MP3s). The Environmental Protection Agency is promoting MP3s to address potential pesticide exposure to bees and other pollinators at and beyond the site of the application. However, States and Tribes have the flexibility to determine the scope of pollinator protection plans that best responds to pollinator issues in their regions. For example, State and Tribal MP3s may address pesticide-related risks to all pollinators, including managed bees and wild insect and non-insect pollinators (U.S. Environmental Protection Agency 2018). The Service implemented a ban on the use of neonicotinoids on all lands in the National Wildlife Refuge System in 2014 (Service 2014); however, no refuge lands occur within the range of the Franklin's bumble bee, and the Service rescinded the ban in 2018 (Service 2018b, entire). None of these aforementioned regulatory or conservation measures has appreciably reduced or fully ameliorated threats to the Franklin's bumble bee, as evidenced by the species' acute and rangewide decline.

We note that, by using the SSA framework to guide our analysis of the scientific information documented in the SSA report, we have not only analyzed individual effects on the species, but we have also analyzed their potential cumulative effects. We incorporate the cumulative effects into our SSA analysis when we characterize the current and future condition of the species. Our assessment of the current status of the Franklin's bumble bee incorporates the threats individually and cumulatively. Our assessment is iterative because it accumulates and evaluates the effects of all the factors that may be influencing the species, including threats and conservation efforts. Because the SSA framework considers not just the presence of the factors, but to what degree they collectively influence risk to the entire species, our assessment integrates the cumulative effects of the factors and replaces a standalone cumulative effects analysis.

Summary of Status

The significant decrease in abundance and distribution of the Franklin's bumble bee to date has greatly reduced the species' ability to adapt to changing environmental conditions and to guard against further losses of adaptive diversity and potential extinction due to catastrophic events. It also substantially reduced the ability of the Franklin's bumble bee to withstand environmental variation, catastrophic events, and changes in physical and biological conditions. Coupled with the increased risk of extirpation due to the interaction of reduced population size and the species' haplodiploid genetic system, the Franklin's bumble bee may lack the resiliency required to sustain populations into the future, even without further exposure to pathogens and pesticides.

Summary of Comments and Recommendations

In our proposed rule published on August 13, 2019 (84 FR 40006), we requested that all interested parties submit written comments on the proposal by October 15, 2019. All comments we received are posted at <http://www.regulations.gov> under Docket No. FWS-R1-ES-2018-0044. We contacted appropriate Federal and State agencies (in both Oregon and California), scientific experts and organizations, and other interested parties and invited them to comment on the proposal, even if they previously provided peer or partner review comments on the SSA report. We did not receive any additional comments from individuals or agencies who had previously provided peer review or partner review on the SSA report. We did not receive any requests for a public hearing. We reviewed all comments for substantive issues and new information regarding the Franklin's bumble bee. During the comment period, we received 53 letters or statements directly addressing the proposed action, including one comment with 15,749 signatures (supporting the listing of the Franklin's bumble bee). All but one of the commenters supported the listing of the Franklin's bumble bee as endangered. All but one of the commenters disagreed with our determination that designating critical habitat is not

prudent. Substantive comments we received during the comment period are addressed below and, where appropriate, are incorporated directly into this final rule.

Public Comments

(1) *Comment:* Several commenters disagreed with our conclusion that Franklin's bumble bees are habitat generalists. Commenters stated that the limited range of the species demonstrates that it is only found in specific habitats and that if the species was truly a habitat generalist, it would be expected to have a much larger range. They noted that the range of the species is limited to the Siskiyou Mountains, a subset of the Klamath Mountain region of southern Oregon and southwestern California, and that there are specific characteristics of Franklin's bumble bee habitat in that area that can be identified, such as montane meadows rich in lupine, California poppy, mountain monardella, and clover. Commenters note that the Siskiyou Range is known for its high number of endemic species and these other endemic species are not considered habitat generalists.

Our Response: As stated in the SSA report, our analyses are predicated on multiple assumptions due to the significant lack of species-specific information for Franklin's bumble bee (2018a, p. 6). We further note that for the purposes of the analyses in the SSA report, we rely heavily on information from closely-related species from the same sub-genus, *Bombus sensu stricto*, particularly the rusty patched bumble bee and the western bumble bee. The range of the western bumble bee completely overlaps the historical range of Franklin's bumble bee, and the western bumble bee is still found at several known Franklin's bumble bee locations, most recently in 2019 at Mt. Ashland, the last known location of Franklin's bumble bee. As mentioned in the August 13, 2019, proposed rule (84 FR 40006) and the SSA report, a specific habitat study for the species has not been completed, nor have the specific life-history characteristics and behavior of this rare species been studied. Despite uncertainties regarding the Franklin's bumble bee's habitat needs, we know they need (1) floral resources for nectaring

throughout the colony cycle, and (2) relatively protected areas for breeding and shelter. The habitat elements appearing to fulfill those needs that have documented use by the Franklin's bumble bee are relatively plentiful and widely distributed.

In our expert elicitation, we asked the following question: In looking at the distribution map of all known occurrences of Franklin's bumble bee, are there areas in Douglas, Jackson, Josephine, Siskiyou, and Trinity Counties in addition to these occurrence sites that might contain the species' known foraging plants: lupine (*Lupinus* spp.), California poppy (*Eschscholzia californica*), horsemint or nettle-leaf giant hyssop (*Agastache urticifolia*), and mountain monardella (*Monardella odoratissima*)? Dr. Thorp (the preeminent authority on Franklin's bumble bee) responded that he was "trying to figure out what defined or limited habitat at the time that [the species] disappeared." Dr. Thorp noted that the species had historically ranged from 500 ft in elevation at Sutherland to over 6,700 ft at Mt. Shasta and Mt. Ashland, meaning they could go through multiple mountain passes to extend east or south, but they did not; they were not limited by geography. Further, they were also not limited by flowering plants; they are generalist foragers (Thorp 2018, pers. comm). In addition, bumble bees "are classic generalist foragers, capable of working a wide variety of plants for their resources" (Williams *et al.* 2014, p. 15). The historical record also suggests the Franklin's bumble bee may use a variety of nesting substrates given that a colony was found in a residential garage in Medford, Oregon (Thorp 2017, pers. comm.).

We agree that the Klamath-Siskiyou ecoregion, which hosts much of the historical range of the Franklin's bumble bee, is very diverse and relatively rich in endemic species. The Klamath-Siskiyou ecoregion is considered a global center of biodiversity, is an International Union for Conservation of Nature (IUCN) Area of Global Botanical Significance (1 of 7 in North America), and is proposed as a World Heritage Site and United Nations Educational, Scientific and Cultural Organization (UNESCO) Biosphere

Reserve (World Wildlife Fund 2020, entire). Extensive literature is available describing some of the biologic investigations in this ecoregion (University of Oregon 2020, entire). However, we are not aware of any information linking Franklin's bumble bee exclusively to endemic habitat features, including floral resources specific to this ecosystem.

(2) *Comment:* One commenter noted that forage is only one component of Franklin's bumble bee's niche and does not alone define a habitat generalist, citing Devictor *et al.* 2010. They stated that even if the species is a general forager it could still have a relatively narrow habitat niche, adding that narrow pollen diets are associated with other rare bumble bees like Franklin's bumble bee. They referenced a recent study, Wood *et al.* 2019, that looked at the diets of two species closely related to Franklin's bumble bee, the American bumble bee and rusty patch bumble bee, and found these declining species had a narrow pollen diet, collecting around one-third fewer pollen types than other more stable species. The study further noted that these two species are short-tongued and the anatomical feature was mentioned as a potential factor in their narrower diet.

Our Response: There are many factors related to Franklin's bumble bees and their habitat that we do not yet, and may never, understand; however, the information gathered for our assessment, including the opinion of the preeminent authority on the species (Dr. Robbin Thorp), indicates that Franklin's bumble bee is likely a habitat generalist. The commenter cites Devictor *et al.* 2010, when noting forage is only one component of Franklin's bumble bee's niche and may not alone define a habitat generalist. However, the same paper also states that a measure of ecological specialization is the assumption that specialists should co-occur with relatively few species; this is in contrast to generalist species who should co-occur with many different species across sites (Devictor *et al.* 2010, p. 23), as has been observed with Franklin's bumble bees.

We agree that narrow pollen diets likely play a role in the decline of some *Bombus* species as the distribution and abundance of their floral resources change, but we do not have sufficient information to determine if this was a significant causal factor in the decline of the Franklin's bumble bee. We do have some records of the species of plants visited by Franklin's bumble bee, but we do not have an exhaustive or comprehensive list. Of the plants Franklin's bumble bee is known to use, many are widely distributed. For example, California poppy is found in Oregon, Washington, Nevada, Arizona, Minnesota, and northwestern Baja California, Mexico. Nettle-leaf giant hyssop (horse mint) is native throughout western North America from British Columbia in Canada, to California to Colorado, where it grows in a wide variety of habitat types. Mountain monardella is found in montane forests between 600 m and 3,100 m (1,969 ft and 10,170 ft) in elevation in Oregon, Washington, Nevada, and Utah. Regarding tongue length, although the Franklin's bumble bee is a short-tongued species, Wood *et al.* found no evidence of tongue length as a predictor of dietary breadth (2019, p. 9).

(3) *Comment:* Several commenters disagreed that the present or threatened destruction, modification, or curtailment of habitat is not a threat to the Franklin's bumble bee. One commenter stated that the Service analyzed fire suppression, agricultural intensification, urban development, livestock grazing, and effects of climate change, but only as to whether they contributed to the historical decline of Franklin's bumble bee, not as current threats. One commenter stated that the climate change effects of increased drought severity, wildfire risk, and winter or early season flood risk are clear threats to Franklin's bumble bee habitat in the current and near future; they noted that flood risk is especially concerning for overwintering hibernating queens who may suffer mortality or respond by emerging too early for floral resources. The commenter also noted that due to the myriad of threats outlined in the August 13, 2019, proposed rule (84

FR 40006), it is incorrect to conclude that Franklin's bumble bee's habitat is unlimited in its capacity to provide uncontaminated resources to the species. One commenter stated that all-terrain vehicle (ATV) use and herbicide use are current threats to Franklin's bumble bee's habitat, but provided no additional information upon which to base those claims.

Our Response: In our analysis of the threats facing Franklin's bumble bee in the SSA report, we completed a review of the best available scientific and commercial information on threats that have been present in the range of the bee (Service 2018a, pp. 23-40). During the public comment period on the proposed rule we did not receive any new information regarding potential threats that prompted us to change the conclusions in our analysis. The viability analysis takes into account the threats to the species that have influenced historical populations, threats that are influencing the current condition of populations, and threats which are likely to play a role in the species' overall viability into the future. In our SSA report for Franklin's bumble bee, we noted those threats that are likely to play a role in the future (pathogens, pesticides, and the synergistic effects of small population size), but did not complete a full future condition analysis; the dearth of information on this species, particularly the lack of species occurrence information after 2006, limited our ability to compare current and future condition.

Although empirical data are currently unavailable regarding the level of habitat loss and degradation specifically affecting the Franklin's bumble bee, we do know that habitat impacts have caused the decline of other *Bombus* species (e.g., Goulson *et al.* 2015, p. 2; Goulson and Darvill 2008, pp. 193–194; Brown and Paxton 2009, pp. 411–412). Although habitat loss has had negative effects on *Bombus* species in general, available information did not indicate it was a driver of the decline of Franklin's bumble bee. Habitat appears generally intact and in good condition throughout the known historical locations of the Franklin's bumble bee and in all recent focused survey areas,

and many of these habitats currently host a wide variety of other bumble bees, including closely-related species like the western bumble bee. As noted above in **Summary of Biological Status and Threats**, we have no information to suggest that any known Franklin's bumble bee locations were in the path of wildfire at the time those locations were occupied. Further, as made evident in our geographic information system (GIS) analysis, most of the recent locations with confirmed Franklin's bumble bee observations are on publicly owned land that is managed to preserve habitat conditions through a variety of mechanisms, including fire suppression. Furthermore, we have no information to suggest that habitat destruction or modification from fire suppression, agricultural intensification, urban development, and livestock grazing will increase in intensity to the point where they will be threats to the viability of the species in the future (Bureau of Land Management 2016, p. 103; Portland State University 2015, p. 7; U.S. Forest Service 1989, IV-87 to IV-90, IV-113 to IV-119; U.S. Forest Service 1990, pp. 4-149 to 4-179; Service 2018a, p. 32).

Future changes in temperature and precipitation may lead to changes in the vegetation community in Franklin's bumble bee habitat. However, as a habitat generalist, Franklin's bumble bee appears to forage on a variety of floral resources, and we have no information to suggest that they would not seek the nectar of whatever floral resource was in bloom at the time they emerge from their nests. Additionally, the risk of catastrophic wildfire and seasonal flooding, as well as other effects from storm events, are naturally present in the ecosystems within the range of the Franklin's bumble bee. The effects of climate change may affect the frequency and intensity of these events, thereby affecting the availability of floral resources, the suitability of nest locations, and the survival of overwintering queens. However, we cannot project the likelihood of when or where these events will occur, or how intense they will be if they do occur.

We agree that Franklin's bumble bee habitat is not unlimited. As we point out in the beginning of the SSA report, Franklin's bumble bee is the most narrowly endemic bumble bee in North America, and possibly the world. In accordance with listing Franklin's bumble bee as endangered under the Act, we will develop a recovery outline for this species. Current and possible future threats will be considered during recovery planning for this species.

(4) *Comment:* One commenter disagreed that critical habitat could not be defined. They point to our proposed rule, which states that surveys have been done in areas that appear to have good habitat for *Bombus* and Franklin's bumble bee, as evidence that there are known and defined characteristics of potential critical habitat in previously occupied areas.

Our Response: While we acknowledge that some general habitat associations of *Bombus* are known, the Franklin's bumble bee has been found in a wide array of habitat types, from foraging in montane meadows in a remote wilderness area of California to nesting in a residential garage in the city limits of Medford, Oregon. Furthermore, elevation does not appear to limit the species' dispersal capabilities. No habitat study for the Franklin's bumble bee has been completed; such a study was initiated in 2006, when the Franklin's bumble bee was last seen, but could not continue due to the subsequent absence of the species. As such, we cannot with specificity articulate the physical or biological features essential to the conservation of the Franklin's bumble bee, or determine whether or not any area would meet the definition of critical habitat for the Franklin's bumble bee (see discussion under *Prudency Determination*, below).

Even if physical and biological features can be articulated for the species, the regulations in effect at the time the species was proposed for listing indicated that we may find that designating critical habitat is not prudent if it is not beneficial to the species. With the exception of the inundation of two sites with older historical

occurrences of Franklin's bumble bee locations by the construction of Applegate Dam, and a report of soil modification on a portion of the Gold Hill site 4 years after the last occurrence of Franklin's bumble bee in the area, no noticeable destruction, modification, or curtailment of habitat or range can be identified in areas where the species had been previously located. No significant destruction or modification of Franklin's bumble bee habitat can be attributed to natural fire, prescribed fire, agricultural intensification, urban development, livestock grazing, or the effects of climate change. Additionally, as discussed above, the Franklin's bumble bee has been documented using a wide variety of habitats throughout its range. Because habitat for the Franklin's bumble bee is not limiting, and because the bee is considered to be flexible with regards to its habitat, the availability of habitat does not limit the conservation of the Franklin's bumble bee now, nor will it in the future (see response to *Comment (3)*). Therefore, we have determined that designation of critical habitat for the Franklin's bumble bee is not beneficial to the species and, therefore, not prudent.

(5) *Comment*: Two commenters disagreed that the designation of critical habitat would not be beneficial to the conservation of the species. They argue it would be beneficial due to the following: (1) Critical habitat would promote connectivity between habitat patches, which will help reduce the risk of inbreeding depression and promote recovery of the species; (2) many studies have shown the link between quality habitat and nutrition and health of bumble bee colonies, and critical habitat would be beneficial because it would give Franklin's bumble bee access to more high-quality habitat to combat the threats of pathogens and pesticides and to recover from them; (3) competition and disease from nonnative honey bees, as well as pesticides from both agriculture and silviculture, are threats that will be unregulated without the designation of critical habitat; (4) critical habitat would provide concrete objective locations in which to protect the species through section 7 of the Act; and (5) critical habitat would inform the species

recovery plan and where exactly the Service would implement recovery actions to ameliorate threats to the species.

Our Response: The implementing regulations of the Act upon which the August 13, 2019, proposed rule (84 FR 40006) and this final rule are based set forth that the factors the Service may consider in determining that a critical habitat designation would not be prudent include, but are not limited to, whether the species is threatened by taking or other human activity, and identification of critical habitat can be expected to increase the degree of threat to the species; or whether such designation of critical habitat would not be beneficial to the species (50 CFR 424.12(a)(1)). We determine that the designation of critical habitat would not be beneficial to the species because the present or threatened destruction, modification, or curtailment of the species' habitat or range (Factor A) is not a threat to the Franklin's bumble bee and because we cannot with specificity articulate the physical or biological features essential to the conservation of the Franklin's bumble bee, or determine whether or not any area would meet the definition of critical habitat for the Franklin's bumble bee (see discussion under *Prudency Determination*, below).

As mentioned in our response to *Comments* (3) and (4), no noticeable destruction, modification, or curtailment of Franklin's bumble bee habitat or range can be identified in areas where the species had been previously located, and could not be shown to have affected the resiliency of any population of Franklin's bumble bee. None of the potential threats to Franklin's bumble bee habitat we assessed appears to threaten the viability of the species (USFWS 2018a, pp. 23–41). Therefore, we find that because the present or threatened destruction, modification, or curtailment of a species' habitat or range is not a threat to Franklin's bumble bee, designating critical habitat is not beneficial and, therefore, not prudent.

Furthermore, regarding section 7 consultation, because of the listing of the species (absent critical habitat), Federal agencies will still be required to consult under section 7 of the Act on activities that may affect this species in areas where the Franklin's bumble bee is reasonably certain to occur. The Federal action agency will be required to identify any listed species that could be within the project area of any proposed activity, and consult with the Service if that activity is likely to adversely affect the species.

Determination of the Status of Franklin's Bumble Bee

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of an endangered species or a threatened species. The Act defines an "endangered species" as a species that is "in danger of extinction throughout all or a significant portion of its range," and a "threatened species" as a species that is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." The Act requires that we determine whether a species meets the definition of "endangered species" or "threatened species" because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence.

Status Throughout All of Its Range

We evaluated the past, present, and future threats to the Franklin's bumble bee and assessed the cumulative effect of the threats under the Act's section 4(a)(1) factors. Our assessment did not find habitat loss or modification (Factor A) to be the cause of the decline of the Franklin's bumble bee, and we have no information to suggest that habitat destruction or modification will increase in intensity in the near future. There is no indication that the Franklin's bumble bee was at risk of overutilization for commercial,

recreational, scientific, or educational purposes (Factor B). Known pathogens occur within the historical range of the Franklin's bumble bee, and we have evidence of several pathogens (Factor C) infecting closely related species within that range. Although we do not have direct evidence of pathogens playing a role in the decline of the Franklin's bumble bee, the disappearance of the Franklin's bumble bee occurred soon after a period of introduction of new pathogens. Furthermore, documented effects to other closely related species lead many species experts to suspect that the effects of pathogens had some connection to the decline of the Franklin's bumble bee. We evaluated existing regulatory mechanisms (Factor D) and conservation measures and their effects on the threats and the status of the Franklin's bumble bee; we found that the existing regulatory mechanisms or conservation measures in place do not appreciably reduce or ameliorate the existing threats to the species, as evidenced by the species' acute and rangewide decline. Although we have no direct evidence that pesticide use contributed to the decline of the Franklin's bumble bee, confirmed effects to other closely related *Bombus* species suggest that pesticide use (Factor E) was likely a factor in the decline of the Franklin's bumble bee. Additionally, given the historically small population size (Factor E) of the Franklin's bumble bee and its haplodiploid genetic system, it is more vulnerable to extirpation than other species, and it is likely the genetic system and the rarity of this species contributed to the decline of the Franklin's bumble bee (Factor E).

The combination of multiple threats is typically more harmful than any one acting alone, and it is likely that several of the threats mentioned above acted cumulatively and synergistically on the Franklin's bumble bee. Pathogens in combination with pesticides, as well as pathogens in combination with the effects of small population size, may have hastened and amplified the decline of the Franklin's bumble bee to a greater degree than any one of the three factors caused on its own. Although the ultimate source of the

decline is unknown, the acute and rangewide decline of the Franklin's bumble bee is undisputable.

The Act defines an "endangered species" as any species that is in danger of extinction throughout all or a significant portion of its range, and a "threatened species" as any species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. We find that, based on the severity and immediacy of threats currently affecting the species, the Franklin's bumble bee meets the definition of an endangered species. The threats of pathogens, pesticides, and small population size are ongoing and rangewide; they will continue to act individually and in combination to decrease the resiliency, redundancy, and representation of the Franklin's bumble bee. The risk of extinction is high because the species has not been found since 2006, and the suspected threats to the species persist. We find that a threatened species status is not appropriate for the Franklin's bumble bee because of the extreme loss of abundance of the species, because the threats are occurring rangewide and are not localized, and because the threats are ongoing and expected to continue into the future. Thus, after assessing the best available information, we determine that the Franklin's bumble bee is in danger of extinction throughout all of its range.

Status Throughout a Significant Portion of Its Range

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. We have determined that the Franklin's bumble bee is in danger of extinction throughout all of its range and accordingly did not undertake an analysis of whether there are any significant portions of its range. Because Franklin's bumble bee warrants listing as endangered throughout all of its range, our determination is consistent with the decision in *Center for Biological Diversity v. Everson*, 2020 WL 437289 (D.D.C. Jan. 28, 2020), in which the court vacated only the

aspect of our July 1, 2014, Final Policy on Interpretation of the Phrase “Significant Portion of Its Range” in the Endangered Species Act’s Definitions of “Endangered Species” and “Threatened Species” (79 FR 37578) that provided the Services do not undertake an analysis of significant portions of a species’ range if the species warrants listing as threatened throughout all of its range.

Determination of Status

Our review of the best available scientific and commercial information indicates that the Franklin’s bumble bee meets the definition of an endangered species. Therefore, we are listing the Franklin’s bumble bee as an endangered species in accordance with sections 3(6) and 4(a)(1) of the Act. Although this species has not been observed since 2006, we conclude it is premature at this time to determine that the species is extinct absent a more thorough survey effort. We recommend expanded survey efforts to help verify the status of this species.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened species under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness, and conservation by Federal, State, Tribal, and local agencies; private organizations; and individuals. The Act encourages cooperation with States and other countries and calls for recovery actions to be carried out for listed species. The protection required by Federal agencies and the prohibitions against certain activities are discussed, in part, below.

Recovery Actions

The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, so that they no longer need the

protective measures of the Act. Subsection 4(f) of the Act calls for the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The recovery planning process involves the identification of actions that are necessary to halt or reverse a species' decline by addressing the threats to its survival and recovery. The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems.

Recovery planning includes the development of a recovery outline shortly after a species is listed, and preparation of a draft and final recovery plan. The recovery outline guides the immediate implementation of urgent recovery actions and describes the process we will use to develop a recovery plan. Revisions of the plan may be done to address continuing or new threats to the species, as new substantive information becomes available. The recovery plan also identifies recovery criteria for review of when a species may be ready for reclassification from endangered to threatened (“downlisting”) or removal from protected status (“delisting”), and methods for monitoring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. Recovery teams (composed of species experts, Federal and State agencies, nongovernmental organizations, and stakeholders) are often established to develop recovery plans. When completed, the recovery outline, draft recovery plan, and the final recovery plan will be available on our website (<http://www.fws.gov/endangered>), or from our Oregon Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

Implementation of recovery actions generally requires the participation of a broad range of partners, including other Federal agencies, States, Tribes, nongovernmental organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (e.g., restoration of native vegetation), research, captive propagation

and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. To achieve recovery of these species requires cooperative conservation efforts on private, State, and tribal lands.

Following publication of this final listing rule, funding for recovery actions will be available from a variety of sources, including Federal budgets, State programs, and cost share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, pursuant to section 6 of the Act, the States of Oregon and California will be eligible for Federal funds to implement management actions that promote the protection or recovery of the Franklin's bumble bee. Information on our grant programs that are available to aid species recovery can be found at: <http://www.fws.gov/grants>.

Please let us know if you are interested in participating in recovery efforts for the Franklin's bumble bee. Additionally, we invite you to submit any new information on this species whenever it becomes available and any information you may have for recovery planning purposes (see **FOR FURTHER INFORMATION CONTACT**).

Regulatory Provisions

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as an endangered or threatened species and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of any endangered or threatened species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with the Service.

Federal agency actions within the species' habitat that may require conference or consultation or both include management and any other landscape-altering activities on Federal lands administered by the U.S. Forest Service and Bureau of Land Management, the National Park Service, and the Bureau of Reclamation; technical assistance and projects funded through the U.S. Department of Agriculture Natural Resources Conservation Service; issuance of section 404 Clean Water Act (33 U.S.C. 1251 et seq.) permits by the U.S. Army Corps of Engineers, and construction and maintenance of roads or highways by the Federal Highway Administration.

The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to endangered wildlife. The prohibitions of section 9(a)(1) of the Act, codified at 50 CFR 17.21, make it illegal for any person subject to the jurisdiction of the United States to take (which includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect; or to attempt any of these) endangered wildlife within the United States or on the high seas. In addition, it is unlawful to import; export; deliver, receive, carry, transport, or ship in interstate or foreign commerce in the course of commercial activity; or sell or offer for sale in interstate or foreign commerce any species listed as an endangered species. It is also illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to employees of the Service, the National Marine Fisheries Service, other Federal land management agencies, and State conservation agencies.

We may issue permits to carry out otherwise prohibited activities involving endangered wildlife under certain circumstances. Regulations governing permits are codified at 50 CFR 17.22. With regard to endangered wildlife, a permit may be issued for the following purposes: for scientific purposes, to enhance the propagation or survival of the species, and for incidental take in connection with otherwise lawful activities.

There are also certain statutory exemptions from the prohibitions, which are found in sections 9 and 10 of the Act.

It is our policy, as published in the *Federal Register* on July 1, 1994 (59 FR 34272), to identify to the maximum extent practicable at the time a species is listed, those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of a listing on proposed and ongoing activities within the range of the listed species. Based on the best available information, the following actions are unlikely to result in a violation of section 9 of the Act if these activities are carried out in accordance with existing regulations and permit requirements; this list is not comprehensive:

- (1) Recreation, specifically skiing at Mt. Ashland, and use of the Pacific Crest Trail;
- (2) Timber sales; and
- (3) Livestock grazing.

Based on the best available information, the following actions may potentially result in a violation of section 9 of the Act if they are not authorized in accordance with applicable law; this list is not comprehensive:

- (1) Unauthorized handling or collecting of the Franklin's bumble bee;
- (2) Unauthorized release of biological control agents that attack any life stage of the Franklin's bumble bee, including the unauthorized use of herbicides, pesticides, or other chemicals in areas in which the Franklin's bumble bee is known to occur (i.e., in the Franklin's bumble bee's historical range); and
- (3) Unauthorized release of nonnative species or native species that carry pathogens, diseases, or fungi that are known or suspected to adversely affect the Franklin's bumble bee where the species is known to occur (i.e., in the Franklin's bumble bee's historical range).

Questions regarding whether specific activities would constitute a violation of section 9 of the Act should be directed to the Oregon Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

II. Critical Habitat

Background

Critical habitat is defined in section 3 of the Act as:

(1) The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical or biological features

(a) Essential to the conservation of the species, and

(b) Which may require special management considerations or protection; and

(2) Specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

Our regulations at 50 CFR 424.02 define “geographical area occupied by the species” as an area that may generally be delineated around species’ occurrences, as determined by the Secretary (i.e., range). Such areas may include those areas used throughout all or part of the species’ life cycle, even if not used on a regular basis (e.g., migratory corridors, seasonal habitats, and habitats used periodically, but not solely by vagrant individuals).

Conservation, as defined under section 3 of the Act, means to use and the use of all methods and procedures that are necessary to bring an endangered or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and

transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking.

Critical habitat receives protection under section 7 of the Act through the requirement that Federal agencies ensure, in consultation with the Service, that any action they authorize, fund, or carry out is not likely to result in the destruction or adverse modification of critical habitat. The designation of critical habitat does not affect land ownership or establish a refuge, wilderness, reserve, preserve, or other conservation area. Such designation does not allow the government or public to access private lands. Such designation does not require implementation of restoration, recovery, or enhancement measures by non-Federal landowners. Where a landowner requests Federal agency funding or authorization for an action that may affect a listed species or critical habitat, the Federal agency would be required to consult with the Service under section 7(a)(2) of the Act. However, even if the Service were to conclude that the proposed activity would result in destruction or adverse modification of the critical habitat, the Federal action agency and the landowner are not required to abandon the proposed activity, or to restore or recover the species; instead, they must implement “reasonable and prudent alternatives” to avoid destruction or adverse modification of critical habitat.

Under the first prong of the Act’s definition of critical habitat, areas within the geographical area occupied by the species at the time it was listed are included in a critical habitat designation if they contain physical or biological features (1) which are essential to the conservation of the species and (2) which may require special management considerations or protection. For these areas, critical habitat designations identify, to the extent known using the best scientific and commercial data available, those physical or biological features that are essential to the conservation of the species (such as space, food, cover, and protected habitat). In identifying those physical or biological features within an area, we focus on the specific features that support the life-

history needs of the species, including, but not limited to, water characteristics, soil type, geological features, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic, or a more complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity.

Under the second prong of the Act's definition of critical habitat, we can designate critical habitat in areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. We determine whether unoccupied areas are essential for the conservation of the species by considering the life-history, status, and conservation needs of the species. This is further informed by any generalized conservation strategy, criteria, or outline that may have been developed for the species to provide a substantive foundation for identifying which features and specific areas are essential to the conservation of the species and, as a result, to the development of the critical habitat designation. For example, an area currently occupied by the species but that was not occupied at the time of listing may be essential to the conservation of the species and may be included in the critical habitat designation.

Section 4 of the Act requires that we designate critical habitat on the basis of the best scientific data available. Further, our Policy on Information Standards Under the Endangered Species Act (published in the *Federal Register* on July 1, 1994 (59 FR 34271)), the Information Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Pub. L. 106-554; H.R. 5658)), and our associated Information Quality Guidelines, provide criteria, establish procedures, and provide guidance to ensure that our decisions are based on the best scientific data

available. They require our biologists, to the extent consistent with the Act and with the use of the best scientific data available, to use primary and original sources of information as the basis for recommendations to designate critical habitat.

Prudency Determination

Section 4(a)(3) of the Act, as amended, and implementing regulations (50 CFR 424.12), require that, to the maximum extent prudent and determinable, the Secretary shall designate critical habitat at the time the species is determined to be an endangered or threatened species.

On August 27, 2019, the Service published a final rule (84 FR 45020) revising the regulations at 50 CFR part 424 for listing species and designating critical habitat.

However, the revisions apply only to relevant rulemakings for which the proposed rule is published after September 26, 2019, the effective date of the final rule. Thus, the prior version of the regulations at 50 CFR part 424 continues to apply to any rulemakings for which a proposed rule was published before September 26, 2019, including this final rule for Franklin's bumble bee.

The prior version of the regulations at 50 CFR part 424 (50 CFR 424.12(a)(1)) state that the designation of critical habitat is not prudent when one or both of the following situations exist:

(1) The species is threatened by taking or other human activity, and identification of critical habitat can be expected to increase the degree of threat to the species, or

(2) Such designation of critical habitat would not be beneficial to the species. In determining whether a designation would not be beneficial, the factors the Services may consider includes whether the present or threatened destruction, modification, or curtailment of a species' habitat or range is not a threat to the species.

As discussed above in the threats analysis, there is currently no imminent threat of take attributed to collection or vandalism identified under Factor B for this species, and

identification and mapping of critical habitat is not expected to initiate any such threat. In the absence of finding that the designation of critical habitat would increase threats to a species, we next determine whether such designation of critical habitat would be beneficial to the Franklin's bumble bee. For the reasons discussed below, we have determined that designating critical habitat would not be beneficial.

Designating Habitat Would Not Be Beneficial to the Species

The Franklin's bumble bee was widely distributed throughout its range and considered flexible with regard to habitat requirements. We know that the Franklin's bumble bee needs (1) floral resources for nectaring throughout the colony cycle, and (2) relatively protected areas for breeding and shelter. In addition, because the best available scientific information indicates that the Franklin's bumble bee is a generalist forager, its habitat preferences and needs are relatively plentiful and widely distributed. While *Bombus* species in general might prefer protected meadows with an abundance of wildflowers, the Franklin's bumble bee has been found in a wide array of habitat types, from foraging in montane meadows in a remote wilderness area of California to nesting in a residential garage in the city limits of Medford, Oregon. The species has a broad elevational range from 162 m (540 ft) to 2,340 m (7,800 ft); elevation does not appear to limit the species' dispersal capabilities.

Some general habitat associations of *Bombus* are known; however, as one of the rarest *Bombus* species, the Franklin's bumble bee is somewhat enigmatic and a specific habitat study for the Franklin's bumble bee has not been completed. Such a study was initiated in 2006, when the Franklin's bumble bee was last seen, but could not continue due to the subsequent absence of the species. Therefore, we cannot with specificity articulate the physical or biological features essential to the conservation of the Franklin's bumble bee, or determine whether or not any area would meet the definition of critical habitat for the Franklin's bumble bee.

Since it was first identified in 1921, the Franklin's bumble bee appears to have always been a rare species with a limited range. In fact, the species has perhaps the most limited range of any *Bombus* species in the world. Nonetheless, Franklin's bumble bee habitat is not known to be limiting, and habitat loss is not a threat to the species. With the exception of the inundation of two sites with older historical occurrences of Franklin's bumble bee (through the construction of Applegate Dam, and a report of soil modification on a portion of the Gold Hill site 4 years after the last occurrence of Franklin's bumble bee in the area), no noticeable destruction, modification, or curtailment of habitat or range can be identified in areas where the species had been previously located. No significant destruction or modification of Franklin's bumble bee habitat can be attributed to natural fire, prescribed fire, agricultural intensification, urban development, livestock grazing, or the effects of climate change. Additionally, as discussed above, the Franklin's bumble bee has been documented using a wide variety of habitats throughout its range. Because habitat for the Franklin's bumble bee is not limiting, and because the bee is considered to be flexible with regards to its habitat, the availability of habitat does not limit the conservation of the Franklin's bumble bee now, nor will it in the foreseeable future.

In the Service and National Marine Fisheries Service's response to comments on the February 11, 2016, final rule (81 FR 7414) revising the critical habitat regulations (the regulations in effect at the time the Franklin's bumble bee was proposed for listing), the Services expressly contemplated a fact pattern where designating critical habitat may not be beneficial to the species: "[I]n some circumstances, a species may be listed because of factors other than threats to its habitat or range, such as disease, and the species may be a habitat generalist. In such a case, on the basis of the existing and revised regulations, it is permissible to determine that critical habitat is not beneficial and, therefore, not prudent" (81 FR 7425). This is the fact pattern we are presented with

in the case of the Franklin's bumble bee. In view of the foregoing, we conclude that present or threatened destruction, modification, or curtailment of habitat is not a threat to the Franklin's bumble bee; rather, disease and other manmade factors are likely the primary threat to the species within its habitat. Therefore, in accordance with 50 CFR 424.12(a)(1), we determine that critical habitat is not beneficial and, therefore, not prudent for the Franklin's bumble bee.

Required Determinations

National Environmental Policy Act (42 U.S.C. 4321 et seq.)

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 *et seq.*), need not be prepared in connection with listing a species as an endangered or threatened species under the Endangered Species Act. We published a notice outlining our reasons for this determination in the *Federal Register* on October 25, 1983 (48 FR 49244).

Government-to-Government Relationship with Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination With Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we acknowledge our responsibilities to work directly with tribes in developing programs for healthy ecosystems, to acknowledge that tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to tribes. On July 17, 2017, as part of

our status review process, we sent out notification letters to 11 Tribes that are in proximity to the known historical range of the Franklin's bumble bee (6 Tribes in Oregon and 5 Tribes in California). The letter provided the Tribes early notification that were conducting a status review for Franklin's bumble bee and solicited their input to ensure that we had the best scientific data available to inform our subsequent finding on the status. We did not receive a response from any of the Tribes.

References Cited

A complete list of references cited in this rule is available on the Internet at <http://www.regulations.gov> under Docket No. FWS-R1-ES-2018-0044 and upon request from the Oregon Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

Authors

The primary authors of this rule are the staff members of the Fish and Wildlife Service's Species Assessment Team and the Oregon Fish and Wildlife Office.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Regulation Promulgation

Accordingly, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

1. The authority citation for part 17 continues to read as follows:

AUTHORITY: 16 U.S.C. 1361-1407; 1531-1544; and 4201-4245, unless otherwise noted.

2. Amend § 17.11 in paragraph (h) by adding an entry for “Bee, bumble, Franklin’s” to the List of Endangered and Threatened Wildlife in alphabetical order under INSECTS to read as follows:

§ 17.11 Endangered and threatened wildlife.

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(h) * * *

Common name	Scientific name	Where listed	Status	Listing citations and applicable rules
* * * * *				
INSECTS				
Bee, bumble, Franklin’s	<i>Bombus franklini</i>	Wherever found	E	85 FR [Insert <i>Federal Register</i> page where the document begins], [Insert date of publication in the <i>Federal Register</i>].
* * * * *				

Martha Williams
Principal Deputy Director
Exercising the Delegated Authority of the Director
U.S. Fish and Wildlife Service