

**DEPARTMENT OF THE INTERIOR**

**Fish and Wildlife Service**

**50 CFR Part 17**

**[Docket No. FWS–R3–ES–2015–0112; 4500030113]**

**RIN 1018–BB66**

**Endangered and Threatened Wildlife and Plants; Endangered Species Status for  
Rusty Patched Bumble Bee**

**AGENCY:** Fish and Wildlife Service, Interior.

**ACTION:** Final rule.

**SUMMARY:** We, the U.S. Fish and Wildlife Service (Service), determine endangered species status under the Endangered Species Act of 1973 (Act), as amended, for the rusty

patched bumble bee (*Bombus affinis*), a species that occurs in the eastern and Midwestern United States and Ontario, Canada. The effect of this regulation will be to add this species to the List of Endangered and Threatened Wildlife.

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

**ADDRESSES:** This final rule is available on the internet at <http://www.regulations.gov> and on the Midwest Region website at <http://www.fws.gov/midwest/Endangered/>. Comments and materials we received, as well as supporting documentation we used in preparing this rule, are available for public inspection at <http://www.regulations.gov>. Comments, materials, and documentation that we considered in this rulemaking will be available by appointment, during normal business hours at: U.S. Fish and Wildlife Service, Twin Cities Ecological Services Field Office, 4101 American Blvd. E., Bloomington, MN 55425; telephone 952-252-0092, extension 210.

**FOR FURTHER INFORMATION CONTACT:** Peter Fasbender, Field Supervisor, U.S. Fish and Wildlife Service, Twin Cities Ecological Services Field Office, 4101 American Blvd. E., Bloomington, MN 55425, by telephone 952-252-0092, extension 210. 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 Endangered Species Act, a species may warrant protection through listing if it is endangered or threatened throughout all or a significant portion of its range. Listing a species as an endangered or threatened species can only be completed by issuing a rule. This rule will finalize the listing of the rusty patched bumble bee (*Bombus affinis*) as an endangered species.

*The basis for our action.* Under the Endangered Species Act, we can determine that a species is an endangered or threatened species based on 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. While the exact cause of the species' decline is uncertain, the primary causes attributed to the decline include habitat loss and degradation, pathogens, pesticides, and small population

dynamics.

*Peer review and public comment.* We sought comments on the species status assessment (SSA) from independent specialists to ensure that our analysis was based on scientifically sound data, assumptions, and analyses. We also invited these peer reviewers to comment on our listing proposal. We also considered all comments and information received during the public comment period.

An SSA team prepared an SSA for the rusty patched bumble bee. The SSA team was composed of U.S. Fish and Wildlife Service biologists, in consultation with other species experts. The SSA 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 rusty patched bumble bee. The SSA underwent independent peer review by 15 scientists with expertise in bumble bee biology, habitat management, and stressors (factors negatively affecting the species). We incorporated peer review suggestions into the SSA. The SSA and other materials relating to this final rule can be found on the Midwest Region website at <http://www.fws.gov/midwest/Endangered/> or on <http://www.regulations.gov>.

### **Previous Federal Action**

Please refer to the proposed listing rule for the rusty patched bumble bee (81 FR 65324; September 22, 2016) for a detailed description of previous Federal actions concerning this species.

## **Background**

A thorough review of the taxonomy, life history, and ecology of the rusty patched bumble bee (*Bombus affinis*) is presented in the species status assessment report (Szymanski *et al.* 2016, Chapter 2; available at <http://www.fws.gov/midwest/Endangered/> and at <http://www.regulations.gov> under Docket No. FWS–R3–ES–2015–0112). All bumble bees, including the rusty patched, belong to the genus *Bombus* (within the family Apidae) (Williams *et al.* 2008, p. 53).

The rusty patched bumble bee is a eusocial (highly social) organism forming colonies consisting of a single queen, female workers, and males. Colony sizes of the rusty patched bumble bee are considered large compared to other bumble bees, and healthy colonies may consist of up to 1,000 individual workers in a season (Macfarlane *et al.* 1994, pp. 3–4). Queens and workers differ slightly in size and coloration; queens are larger than workers (Plath 1922, p. 192, Mitchell 1962, p. 518). All rusty patched bumble bees have entirely black heads, but only workers and males have a rusty reddish patch centrally located on the abdomen.

The rusty patched bumble bee's annual cycle begins in early spring with colony initiation by solitary queens and progresses with the production of workers throughout the summer and ending with the production of reproductive individuals (males and potential queens) in mid- to late summer and early fall (Macfarlane *et al.* 1994, p. 4; Colla and Dumesht 2010, p. 45; Plath 1922, p. 192). The males and new queens (gynes,

or reproductive females) disperse to mate, and the original founding queen, males, and workers die. The new queens go into diapause (a form of hibernation) over winter. The following spring, the queen, or foundress, searches for suitable nest sites and collects nectar and pollen from flowers to support the production of her eggs, which are fertilized by sperm she has stored since mating the previous fall. She is solely responsible for establishing the colony. As the workers hatch and the colony grows, they assume the responsibility of food collection, colony defense, and care of the young, while the foundress remains within the nest and continues to lay eggs. During later stages of colony development, in mid-July or August to September, the new queens and males hatch from eggs.

The rusty patched bumble bee has been observed and collected in a variety of habitats, including prairies, woodlands, marshes, agricultural landscapes, and residential parks and gardens (Colla and Packer 2008, p. 1381; Colla and Dumes 2010, p. 46; USFWS rusty patched bumble bee unpublished geodatabase 2016). The species requires areas that support sufficient food (nectar and pollen from diverse and abundant flowers), undisturbed nesting sites in proximity to floral resources, and overwintering sites for hibernating queens (Goulson *et al.* 2015, p. 2; Potts *et al.* 2010, p. 349). Rusty patched bumble bees live in temperate climates, and are not likely to survive prolonged periods of high temperatures (over 35 °Celsius (C) (95 °Fahrenheit (F)) (Goulson 2016, pers. comm.).

Bumble bees are generalist foragers, meaning they gather pollen and nectar from

a wide variety of flowering plants (Xerces 2013, pp. 27–28). The rusty patched bumble bee is one of the first bumble bees to emerge early in the spring and the last to go into hibernation, so to meet its nutritional needs, the species requires a constant and diverse supply of blooming flowers.

Rusty patched bumble bee nests are typically in abandoned rodent nests or other similar cavities (Plath 1922, pp. 190–191; Macfarlane *et al.* 1994, p. 4). Little is known about the overwintering habitats of rusty patched bumble bee foundress queens, but other species of *Bombus* typically form a chamber in soft soil, a few centimeters deep, and sometimes use compost or mole hills to overwinter (Goulson 2010, p. 11).

Prior to the mid- to late 1990s, the rusty patched bumble bee was widely distributed across areas of 31 States/Provinces: Connecticut, Delaware, District of Columbia, Georgia, Illinois, Indiana, Iowa, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Ontario, Pennsylvania, Quebec, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, and Wisconsin. Since 2000, the rusty patched bumble bee has been reported from 14 States/Provinces: Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Minnesota, North Carolina, Ontario, Ohio, Pennsylvania, Tennessee, Virginia, and Wisconsin (figure 1).

## Summary of Biological Status and Threats

The Act directs us to determine whether any species is an endangered species or a threatened species because of any factors affecting its continued existence. We completed a comprehensive assessment of the biological status of the rusty patched bumble bee, and prepared a report of the assessment, which provides a thorough account of the species' overall viability. We define viability as the ability of the species to persist over the long term and, conversely, to avoid extinction. In this section, we summarize the conclusions of that assessment, which can be accessed at Docket No. FWS–R3–ES–2015–0112 on <http://www.regulations.gov> and at <http://www.fws.gov/midwest/Endangered/>. The reader is directed to the Rusty Patched Bumble Bee (*Bombus affinis*) Species Status Assessment (SSA; Szymanski *et al.* 2016) for a detailed discussion of our evaluation of the biological status of the rusty patched bumble bee and the influences that may affect its continued existence.

To assess rusty patched bumble bee viability, we used the three conservation biology principles of resiliency, representation, and redundancy (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); representation supports the ability of the species to adapt over time to long-term changes in the environment (for example, climate changes); and redundancy supports the ability of the species to withstand catastrophic events (for example, droughts, hurricanes). In general, the more redundant, representative, and resilient a species is, 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.

We evaluated the change in resiliency, representation, and redundancy from the past until the present, and projected the anticipated future states of these conditions. To forecast the biological condition into the future, we devised plausible future scenarios by eliciting expert information on the primary stressors anticipated in the future to the rusty patched bumble bee: pathogens, pesticides, habitat loss and degradation, effects of climate change, and small population dynamics. To assess resiliency, we evaluated the trend in rusty patched bumble bee occurrences (populations) over time. To forecast future abundance, we used a population model to project the number of populations expected to persist based on plausible future risk scenarios. To assess representation (as an indicator of adaptive capacity) of the rusty patched bumble bee, we evaluated the spatial extent of occurrences over time. That is, we tallied the number of counties, States, and ecoregions occupied by the species historically, currently, and projected into the future. Ecoregions are areas delineated to capture the variation (representation) in the species. We relied on unique climate conditions to delineate variations, and thus, used the Bailey Ecoregions (Bailey 1983, Bailey *et al.* 1994) and the equivalent Canadian Ecoregions (Ecological Stratification Working Group, 1996) in our analyses. To assess

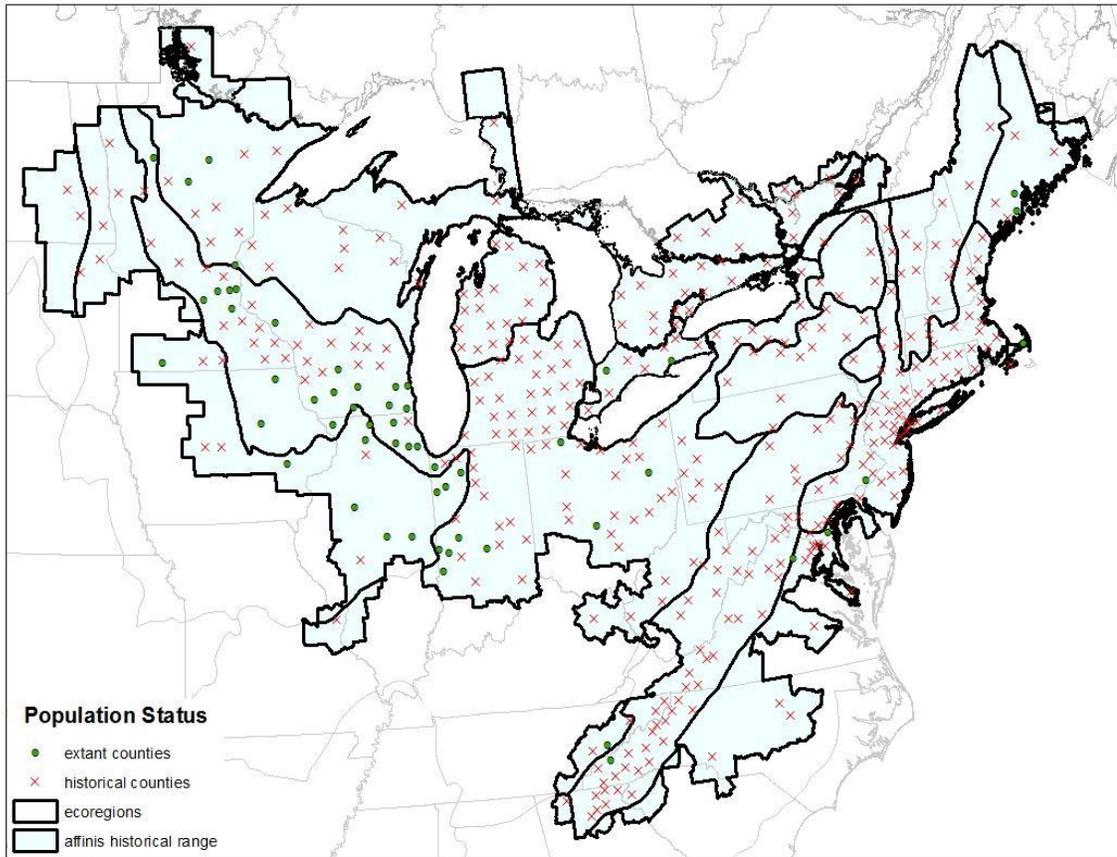
redundancy, we calculated the risk of ecoregion-wide extirpations given the past frequency of catastrophic drought events in each of the ecoregions.

Our analyses indicate that the resiliency, representation, and redundancy of the rusty patched bumble bee have all declined since the late 1990s and are projected to continue to decline over the next several decades. Historically, the species was abundant and widespread, with hundreds of populations across an expansive range, and was the fourth-ranked *Bombus* species in our relative abundance analysis. This information has also been reported by others.

Since the late 1990s, rusty patched bumble bee abundance and distribution has declined significantly. Historically, the rusty patched bumble bee has been documented from 926 populations; since 1999, the species has been observed at 103 populations, which represents an 88 percent decline from the number of populations documented prior to 2000). We assumed any population with at least one record (one individual rusty patched bumble bee seen) since 1999 is current, and thus, the overall health and status of these 103 current populations is uncertain. Indeed, many populations have not been reconfirmed since the early 2000s and may no longer persist. For example, no rusty patched bumble bees were observed at 41 (40 percent) of the current sites since 2010 and at 75 (73 percent) of the 103 sites since 2015. Furthermore, many of the current populations are documented by only a few individuals; 95 percent of the populations are documented by 5 or fewer individuals; the maximum number found at any site was 30. The number of individuals constituting a healthy colony is typically several hundred, and

a healthy population typically contains tens to hundreds of colonies (Macfarlane *et al.* 1994, pp. 3–4).

Along with the loss of populations, a marked decrease in the range and distribution has occurred in recent times. As noted above, the rusty patched bumble bee was broadly distributed historically across the Eastern United States, upper Midwest, and southern Quebec and Ontario, an area comprising 15 ecoregions, 31 States/Provinces, and 394 U.S. counties and 38 county-equivalents in Canada. Since 2000, the species' distribution has declined across its range, with current records from 6 ecoregions, 14 States or Provinces, and 55 counties (figure 1); this represents an 87-percent loss of spatial extent (expressed as a loss of counties with the species) within the historical range. The losses in both the number of populations and spatial extent render the rusty patched bumble bee vulnerable to extinction even without further external stressors (*e.g.*, habitat loss, insecticide exposure) acting upon the species.



**Figure 1.** Rusty patched bumble bee range map showing the current distribution. Dots represent counties with a rusty patched bumble bee occurrence since 2000. The Xs represent counties with historical occurrences only (*i.e.*, no occurrences since 2000). (See Szymanski *et al.* (2016, p. 12) for an explanation of current and historical time periods.)

Many of the existing populations, however, continue to face the effects of past and ongoing stressors, including pathogens, pesticides, habitat loss and degradation, small population dynamics, and effects of climate change. A brief summary of these primary stressors is presented below; for a full description of these stressors, refer to chapter 5 of the SSA report.

*Pathogens*—The precipitous decline of several bumble bee species (including the rusty patched) from the mid-1990s to the present was contemporaneous with the collapse in populations of commercially bred western bumble bees (*B. occidentalis*), raised primarily to pollinate greenhouse tomato and sweet pepper crops, beginning in the late 1980s (for example, Szabo *et al.* 2012, pp. 232–233). This collapse was attributed to the microsporidium (fungus) *Nosema bombi*. Around the same time, several North American wild bumble bee species also began to decline rapidly (Szabo *et al.* 2012, p. 232). The temporal congruence and speed of these declines led to the suggestion that they were caused by transmission or “spillover” of *N. bombi* from the commercial colonies to wild populations through shared foraging resources. Patterns of losses observed, however, cannot be completely explained by exposure to *N. bombi*. Several experts have surmised that *N. bombi* may not be the culpable (or only culpable) pathogen in the precipitous decline of certain wild bumble bees in North America (for example, Goulson 2016, pers. comm.; Strange and Tripodi 2016, pers. comm.), and the evidence for chronic pathogen spillover from commercial bumble bees as a main cause of decline remains debatable (see various arguments in Colla *et al.* 2006, entire; Szabo *et al.* 2012, entire; Manley *et al.* 2015, entire).

In addition to fungi such as *N. bombi*, other viruses, bacteria, and parasites are being investigated for their effects on bumble bees in North America, such as deformed wing virus, acute bee paralysis virus, and parasites such as *Crithidia bombi* and *Apicystis bombi* (for example, Szabo *et al.* 2012, p. 237; Manley *et al.* 2015, p. 2; Tripodi 2016,

pers. comm.; Goulson *et al.* 2015, p. 3). Little is known about these diseases in bumble bees, and no studies specific to the rusty patched bumble bee have been conducted. Refer to Szymanski *et al.* (2016, pp. 40–43) for a brief summary of those that have the greatest potential to affect the rusty patched bumble bee.

*Pesticides*—A variety of pesticides are widely used in agricultural, urban, and even natural environments, and native bumble bees are simultaneously exposed to multiple pesticides, including insecticides, fungicides, and herbicides. The pesticides with greatest effects on bumble bees are insecticides and herbicides: Insecticides are specifically designed to directly kill insects, including bumble bees, and herbicides reduce available floral resources, thus indirectly affecting bumble bees. Although the overall toxicity of pesticides to rusty patched or other bumble bees is unknown, pesticides have been documented to have both lethal and sublethal effects (for example, reduced or no male production, reduced or no egg hatch, and reduced queen production and longevity) on bumble bees (for example, Gill *et al.* 2012, p. 107; Mommaerts *et al.* 2006, pp. 3–4; Fauser-Misslin *et al.* 2014, pp. 453–454).

Neonicotinoids are a class of insecticides used to target pests of agricultural crops, forests (for example, emerald ash borer), turf, gardens, and pets and have been strongly implicated as the cause of the decline of bees in general (European Food Safety Authority 2015, p. 4211; Pisa *et al.* 2015, p. 69; Goulson 2013, pp. 7–8), and specifically for rusty patched bumble bees, due to the contemporaneous introduction of neonicotinoid use and the precipitous decline of the species (Colla and Packer 2008, p. 10). The neonicotinoid

imidacloprid became widely used in the United States starting in the early 1990s, and clothianidin and thiamethoxam entered the commercial market beginning in the early 2000s (Douglas and Tooker 2015, pp. 5091–5092). The use of neonicotinoids rapidly increased as seed-applied products were introduced in field crops, marking a shift toward large-scale, preemptive insecticide use. If current trends continue, Douglas and Tooker (2015, p. 5093) predict that neonicotinoid use will increase further, through application to more soybeans and other crop species.

Most studies examining the effect of neonicotinoids on bees have been conducted using the European honey bee (*Apis mellifera*) (Lundin *et al.* 2015, p. 7). Bumble bees, however, may be more vulnerable to pesticide exposure for several reasons: (1) They are more susceptible to pesticides applied early in the year, because for 1 month the entire bumble bee population depends on the success of the queens to forage and establish new colonies; (2) bumble bees forage earlier in the morning and later in the evening than honey bees, and thus are susceptible to pesticides applied in the early morning or evening to avoid effects to honey bees; (3) most bumble bees have smaller colonies than honey bees; thus, a single bumble bee worker is more important to the survival of the colony (Thompson and Hunt 1999, p. 155); (4) bumble bees nest underground, and thus are also exposed to pesticide residues in the soil (Arena and Sgolastra 2014, p. 333); and (5) bumble bee larvae consume large amounts of unprocessed pollen (as opposed to honey), and therefore are much more exposed to pesticide residues in the pollen (Arena and Sgolastra 2014, p. 333).

*Habitat loss and degradation*—The rusty patched bumble bee historically occupied native grasslands of the Northeast and upper Midwest; however, much of this landscape has now been lost or is fragmented. Estimates of native grassland losses since European settlement of North America are as high as 99.9 percent (Samson and Knopf 1994, p. 418). Habitat loss is commonly cited as a long-term contributor to bee declines through the 20th century, and may continue to contribute to current declines, at least for some species (Goulson *et al.* 2015, p. 2; Goulson *et al.* 2008; Potts *et al.* 2010, p. 348; Brown and Paxton 2009, pp. 411–412). However, the rusty patched bumble bee may not be as severely affected by habitat loss compared to habitat specialists, such as native prairie endemics, because it is not dependent on specific plant species, but can use a variety of floral resources. Still, loss or degradation of habitat has been shown to reduce both bee diversity and abundance (Potts *et al.* 2010, pp. 348–349). Large monocultures do not support the plant diversity needed to provide food resources throughout the rusty patched bumble bees’ long foraging season, and small, isolated patches of habitat may not be sufficient to support healthy bee populations (Hatfield and LeBuhn 2007, pp. 154–156; Öckinger and Smith 2007, pp. 55–56).

Although habitat loss has established negative effects on bumble bees (Goulson *et al.* 2008; Williams and Osborne 2009, pp. 371–373), 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.* 2011b, p. 665). However, the past effects of habitat loss and degradation may continue to have

impacts on bumble bees that are stressed by other factors. If there is less food available or if the bumble bees must expend more energy and time to find food, they are less healthy overall, and thus less resilient to other stressors (for example, nutritional stress may decrease the ability to survive parasite infection (Brown *et al.* 2000, pp. 425–426) or cope with pesticides (Goulson *et al.* 2015, p. 5)). Furthermore, bumble bees may be more vulnerable to extinction than other animals because their colonies have long cycles, where reproductive individuals are primarily produced near the end of those cycles. Thus, even slight changes in resource availability could have significant cumulative effects on colony development and productivity (Colla and Packer 2008, p. 1380).

*Small population dynamics*—The social organization of bees has a large effect on their population biology and genetics (Pamilo and Crozier 1997, entire; Chapman and Bourke 2001, entire; Zayed 2009, entire). The rusty patched bumble bee is a eusocial bee species (cooperative brood care, overlapping generations within a colony of adults, and a division of labor into reproductive and nonreproductive groups), and a population is made up of colonies rather than individuals. Consequently, the effective population size (number of individuals in a population who contribute offspring to the next generation) is much smaller than the census population size (number of individuals in a population). Genetic effects of small population sizes depend on the effective population size (rather than the actual size), and for the rusty patched bumble bee the effective population sizes are inherently small due to the species' eusocial structure, haplodiploidy reproduction, and the associated “diploid male vortex.”

Like many insect species, the rusty patched bumble bee has haplodiploidy sex differentiation, in which haploid (having one set of chromosomes) males are produced from unfertilized eggs and diploid (containing two complete sets of chromosomes) females from fertilized eggs (Zayed 2009, p. 239). When females mate with related males (as is more likely to happen in small populations), however, half of the females' progeny will develop into diploid males instead of females. Having fewer females decreases the health of the colony, as males do not contribute food resources to the colony (Ellis *et al.* 2006, p. 4376). Additionally, diploid males are mostly unviable or, if viable and mate, produce unviable eggs or sterile daughters (Zayed 2009, p. 239 and references within), so those males that are produced are unable to contribute to next year's cohort. (See Szymanski *et al.* 2016, pp. 17–18 for a more detailed explanation of this life-history characteristic). This reproductive strategy (haplodiploidy) makes the rusty patched bumble bee particularly vulnerable to the effects of a small population size, as the species can experience a phenomenon called a “diploid male vortex,” where the proportion of nonviable males increases as abundance declines, thereby further reducing population size. Given this, due to the small sizes of the current populations, some populations may not persist and others are likely already quasi-extirpated (the level at which a population will go extinct, although it is not yet at zero individuals) (Szymanski *et al.* 2016, p. 66).

*Effects of climate change*—Global climate change is broadly accepted as one of the most significant risks to biodiversity worldwide; however, specific impacts of climate

change on pollinators are not well understood. The changes in climate likely to have the greatest effects on bumble bees include: increased drought, increased flooding, increased storm events, increased temperature and precipitations, early snow melt, late frost, and increased variability in temperatures and precipitation. These climate changes may lead to decreased resource availability (due to mismatches in temporal and spatial co-occurrences, such as availability of floral resources early in the flight period), decreased availability of nesting habitat (due to changes in rodent populations or increased flooding or storms), increased stress from overheating (due to higher temperatures), and increased pressures from pathogens and nonnative species, (Goulson *et al.* 2015, p. 4; Goulson 2016, pers. comm.; Kerr *et al.* 2015, pp. 178–179; Potts *et al.* 2010, p. 351; Cameron *et al.* 2011a, pp. 35–37; Williams and Osborne 2009, p. 371).

*Synergistic effects*—It is likely that several of the above summarized risk factors are acting synergistically or additively on the species, and the combination of multiple stressors is likely more harmful than a single stressor acting alone. Although the ultimate source of the decline is debated, the acute and widespread decline of rusty patched bumble bees is undisputable.

*Beneficial factors*—We are aware of only a few specific measures for bumble bee conservation at any of the current rusty patched bumble bee locations in the United States. In Canada, the species was listed as endangered on Schedule 1 of the Species at Risk Act in 2012, and a recovery strategy has been proposed (Environment and Climate Change Canada 2016, entire). However, we are aware of only nine current occurrences

(three populations) in Canada. The rusty patched bumble bee is listed as State endangered in Vermont and Special Concern in Connecticut, Michigan, and Wisconsin. Of these 4 States, Wisconsin is the only State with current records (18 populations). Existing regulatory mechanisms that address threats to the species vary across the species' range; one such mechanism is the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), under which the U.S. Environmental Protection Agency (EPA) determines the ecological risk of all registered pesticides. Also, one way the Service works to ensure pesticides are used with the least amount of hazards to human and environmental health is through its pesticide consultations with the EPA. Since 2013, the Service and EPA, together with the National Marine Fisheries Service (NOAA–Fisheries), have been working collaboratively on the Act's section 7 consultation process. The agencies are currently working together to complete consultations on nine pesticides (carbaryl, chlorpyrifos, diazinon, malathion, methomyl, atrazine, simazine, propazine, and glyphosate), with biological opinions to be completed in December 2017, 2018, and 2022 for those chemicals.

A few organizations have or may soon start monitoring programs, such as Bumble Bee Watch ([www.bumblebeewatch.org](http://www.bumblebeewatch.org)), a collaborative citizen science effort to track North American bumble bees, and the Xerces Society. Also, the International Union of Concerned Scientists Conservation Breeding Specialist Group has developed general conservation guidelines for bumble bees (Hatfield *et al.* 2014b, pp. 11–16; Cameron *et al.* 2011a, entire). There is an increased awareness on pollinators in general, and thus

efforts to conserve pollinators may have a fortuitous effect on the rusty patched bumble bee. An example of such efforts is the Ohio Pollinator Habitat Initiative, which is working to improve and create pollinator habitat and raise awareness of the importance of pollinators in Ohio (<http://www.ophi.info/> (accessed December 14, 2016)). Actions such as planting appropriate flowers may contribute to pollinator conservation; however, there is a need to develop regionally appropriate, bumble bee-specific recommendations based on evidence of use (Goulson 2015, p. 6).

In summary, the magnitude of population losses and range contraction to date has greatly reduced the rusty patched bumble bee's ability to adapt to changing environmental conditions and to guard against further losses of adaptive diversity and potential extinction due to catastrophic events. In reality, the few populations persisting and the limited distribution of these populations have substantially reduced the ability of the rusty patched 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 its haplodiploidy reproductive strategy, the rusty patched bumble bee may lack the resiliency required to sustain populations into the future, even without further exposure to stressors.

### **Summary of Changes from the Proposed Rule**

In preparing this final rule, we reviewed and fully considered comments from the public and peer reviewers on the proposed rule. This final rule incorporates minor

changes to our proposed listing based on the comments we received, as discussed below in **Summary of Comments and Recommendations**, and newly available occurrence data. These data allowed us to refine occurrence information, thus, the final numerical results are slightly different from those in the proposed rule.

We have reevaluated the viability of the rusty patched bumble bee in the SSA given this new information, and found that the probability of the species' persistence has not changed from the proposed rule. Specifically, in four of the ecoregions, the probability of extirpation exceeds 90 percent within 10 years, and extirpation in the remaining ecoregions is greater than 90 percent by year 30. The new information we received in response to the proposed rule did not change our determination that the rusty patched bumble bee is an endangered species, nor was it significant enough to warrant reopening the public comment period.

### **Summary of Comments and Recommendations**

In the proposed rule published on September 22, 2016 (81 FR 65324), we requested that all interested parties submit written comments on the proposal by November 21, 2016. We also contacted appropriate Federal and State agencies, scientific experts and organizations, and other interested parties and invited them to comment on the proposal. A newspaper notice inviting general public comment was published in USA Today on October 6, 2016. We did not receive any requests for a public hearing.

We reviewed all comments received in response to the proposed rule for substantive issues and new information. Over 70 commenters provided substantive information. Those commenters included members of the general public, local governments, nongovernmental organizations, State agencies, species experts, agricultural organizations, and industry. We did not receive comments from Federal agencies or Tribes.

We also received more than 100 individual comments supporting the proposed rule to list rusty patched bumble bee, and thousands (more than 90,000) of supportive comments submitted in form-letter format by members of Environment America, Environmental Action, Friends of the Earth, League of Conservation Voters, Sierra Club, and the Natural Resources Defense Council. Although comments simply expressing support or opposition to the proposed action do not affect the final determination, we appreciate knowing of the public's opinion regarding our action.

All substantive information provided during the comment period has either been incorporated directly into this final determination or addressed below. The new occurrence data we received was incorporated into our SSA analysis.

#### *Peer Reviewer Comments*

In accordance with our peer review policy published on July 1, 1994 (59 FR 34270), we solicited review of the SSA report from 25 knowledgeable individuals with scientific expertise that included familiarity with the rusty patched bumble bee and its

habitat, biological needs, and threats. We received responses from 15 of the peer reviewers.

We reviewed all comments we received from the peer reviewers for substantive issues and new information regarding the rusty patched bumble bee. The peer reviewers generally concurred with our methods and conclusions and provided additional information, clarifications, and suggestions to improve the assessment. Peer reviewer comments are addressed in an appendix to the SSA, as appropriate; therefore, our proposal and this final rule were developed in consideration of peer reviewer comments.

*Comments from States*

*(1) Comment:* One State transportation agency recommended the Service review literature on bumble bee mortality from vehicle collisions prior to listing, particularly in regard to areas where suitable habitat and highway rights-of-way intersect. The commenting agency was concerned about undue constraints being placed on transportation agencies that may be responsible for implementing wildlife-friendly road crossings.

*Our Response:* To date, we have not found evidence that suggests vehicle collision is a threat to the rusty patched bumble bee. Through the recovery process, we will be conducting population-specific assessments to identify the stressors acting upon the populations. If vehicle collisions are found to be a problem for a specific population, the Service will work with the applicable county, State, or Federal agency to strategize on measures that could be used to reduce the mortality.

(2) *Comment:* A few State transportation and agriculture agencies and other commenters indicated that we should conduct additional population surveys prior to listing, because they believed additional populations would likely be found.

*Our Response:* The listing decision must be made using the best scientific and commercial data available at that time. In this case, we have access to rangewide, rusty patched bumble bee specific survey data from the late 1990s through 2016. Since we published the proposed listing rule, additional survey data have become available to us from large-scale bumble bee surveys in the States of Maine, Michigan, and Minnesota, as well as several smaller scale searches for the species, including citizen science surveys. These surveys were generally focused on prairies and grasslands with good-quality habitat for the species and, therefore, a good potential of hosting the species. However, as in the majority of previous surveys, the rusty patched bumble bee was not detected at most sites.

In 2016, no rusty patched bumble bees were found at the 50 sites surveyed in Michigan, and the species was detected at 15 of the approximately 120 locations surveyed in Minnesota. Maine initiated a statewide 5-year bumble bee atlas program in 2015 to better understand the status of the State's bumble bees through citizen science. The rusty patched bumble bee was not among approximately 4,500 submitted vouchers and photos from Maine in 2015, nor was it detected in the 2016 survey effort. Given the amount of sampling within the range of the rusty patched bumble bee, we find that the likelihood of discovering a significant number of new populations is

low. Further, given the condition of the persisting populations and the stressors that those populations face, adding a small number of new populations does not change our endangered determination, since the additional populations likely face similar stressors.

*(3) Comment:* One State agency expressed an interest in converting more rights-of-way into pollinator habitat to benefit the rusty patched bumble bee and other species, but is concerned that, as these areas become suitable habitat for a listed species, projects in these locations may require section 7 consultations. The agency further stated that consultation concerns could be alleviated via a rule issued under the authority of section 4(d) of the Act, if evidence supports the species being listed as threatened, or by other methods such as assurances from the Service, Safe Harbor Agreements, or programmatic consultations. A few industry groups also requested that the Service develop a species-specific section 4(d) rule, if threatened status is warranted. Such a rule, they state, would help protect the species and allow ongoing conservation efforts. One commenter suggested that a threatened listing, as opposed to endangered, would be a more appropriate classification for this species.

*Our Response:* We appreciate the agency's interest in enhancing pollinator habitat. These plantings can offer foraging and breeding habitats for pollinators and may connect previously separated habitats and aid in species recovery. Although an increased workload for section 7 consultations may be associated with listing, section 4 of the Act requires the Service to determine whether any species is an endangered or threatened species because of any of the section 4(a)(1) factors. The Service will work with the

consulting agency as expeditiously as possible to complete the section 7 consultation processes in a timely manner. Once a species is listed, we offer private or other non-Federal property owners voluntary Safe Harbor Agreements that can contribute to the recovery of species, Habitat Conservation Plans that facilitate private activities (*e.g.*, grazing) while minimizing effects to species, funding through the Partners for Fish and Wildlife Program to help promote conservation actions, and grants to the States under section 6 of the Act.

We have determined that, based on the best scientific and commercial data available at the time of listing, the rusty patched bumble bee warrants listing as an endangered species. A complete discussion is provided in the **Determination** section of the preamble to this rule. Section 4(d) of the Act allows for development of rules for species listed as threatened. As this species is being listed as an endangered species, a section 4(d) rule cannot be promulgated.

*(4) Comment:* Several commenters stated that, because the rusty patched bumble bee has such a large historical range, overly burdensome regulations could be placed on a large geographic area. Specifically, one State transportation agency commented that, based on the available status information, the State would support listing with rules that would encourage conservation plan elements that allow State transportation agencies to plan highway roadside management without a large section 7 consultation burden. The agency further commented that it is willing to maintain roadsides that provide environmental benefits, as long as safety of the traveling public is not compromised and

resources are available. Also, the agency wanted to ensure that the Service is aware of potential conflicts with other federally mandated practices related to roadside vegetation management.

*Our Response:* For federally listed species, 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 the 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 enters into consultation with the Service regarding the degree of impact and measures available to avoid or minimize adverse effects. We look forward to working with the States and other agencies and organizations in developing ways to conserve the rusty patched bumble bee while streamlining consultation requirements. We may also issue permits to carry out otherwise prohibited activities involving endangered wildlife under certain circumstances. Regulations governing permits are codified in title 50 of the Code of Federal Regulations 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.

*(5) Comment:* One State agency was concerned that, although habitat loss and pesticide use may be less likely to be the causes of the decline than pathogens and the effects of climate change, habitat and pesticide use will be the only two factors addressed in the species' recovery plan. If the Service focuses on only those two threats, the

commenter stated that recovery will be less efficient, and the listing will impact landowners and farmers to a greater degree than other members of the regulated community. The commenter believes that the Service should consider approaches to pollinators that address all of the relevant factors to truly protect and preserve the rusty patched bumble bee.

*Our Response:* Landowners deserve great credit for their land stewardship, and we want to continue to encourage those management practices that support bumble bees and other insect pollinators. The Service also strives to find ways to meet people's needs while protecting imperiled species. The Service is committed to working with private landowners, public land managers, conservation agencies, nongovernmental organizations, and the scientific community to conserve the rusty patched bumble bee. Determining why populations persist in some areas and not others will be a key question during recovery planning for this species. All primary stressors will be considered during recovery planning and implementation. More information about stressors acting on each remaining population will help inform effective and efficient recovery planning and recovery actions.

*(6) Comment:* One State transportation agency recommended that the Service more clearly define the phrase "where the rusty patched bumble bee is known to occur" in the discussion of activities that could result in take if performed in areas currently occupied by the species. The agency requested that the Service clarify what is considered as occupied habitat (historical range, current range, or specific known locations). The

agency recommended limiting the definition of occupied habitat to current collection records, and limiting requirements for survey work to areas within and directly adjacent to currently known locations.

*Our Response:* The Service maintains a list of counties that are within the current range of the species on publicly accessible websites. We suggest that project proponents contact their State's U.S. Fish and Wildlife Service Ecological Services Field Office for specific information for their locality. The species is likely to be present only in areas with suitable habitat. Suitable habitats are described in the **Background** section of the preamble to this final listing rule. The phrase "known to occur" was inserted to clarify that the rusty patched bumble bee would have to be exposed to actions for those actions to cause take and that the bees would be exposed only if they occur in the area that would be affected by a particular action. That is, we want to avoid the interpretation that the general use of pesticides, for example, could be prohibited per the listing of the rusty patched bumble bee. However, the species will be protected under the Act in any area where it is found to occur.

*(7) Comment:* The Ohio Department of Transportation (DOT) recommended allowing specialists to start applying for collector's permits before the species is listed so that permitted surveyors are available as needed once the listing process is complete.

*Our Response:* The Service can include proposed species on section 10(a)(1)(a) permits and encourages the submission of permit applications as soon as possible.

*(8) Comment:* The Ohio DOT provided information about past conservation projects in Ohio that may benefit the rusty patched bumble bee, even though they were not specifically designed to conserve the species. Examples of existing conservation efforts that have been completed by the agency include protection of mitigation areas that are under conservation easement, development of procedures to limit moving certain rights-of-way, partnerships with the Ohio Pollinator Habitat Initiative, and pilot testing of pollinator plots within rights-of-way.

*Our Response:* We appreciate Ohio's interest and contribution to conservation and look forward to continuing a cooperative relationship with Ohio and other States as we proceed with recovery planning and implementation for the rusty patched bumble bee. Despite these beneficial measures, however, the status of the species remains dire.

*(9) Comment:* The Pennsylvania Department of Agriculture noted that one of the threats to the rusty patched bumble bee identified in the proposal is the spread of pathogens from commercial honey and bumble bees. The commenter stated that the Pennsylvania Department of Agriculture does not have the authority or the mandate to regulate or inspect bumble bee colonies that are reared for agricultural purposes. The commenter expressed concern over this lack of oversight if the spread of pathogens from captive to wild bees is going to be better understood and addressed.

*Our Response:* We appreciate this information and will consider it during the recovery planning process.

*(10) Comment:* Several State agencies and other commenters provided information regarding ongoing or planned pollinator conservation actions and plans that the Service should consider. One State agency commented that its government is in the process of developing a Pollinator Protection Plan intended to improve and protect the health of pollinators, while also protecting crops, property, and human health. The plan is a nonregulatory guidance document that provides voluntary measures for apiarists and pesticide applicators. Two other State agencies provided information regarding planned future conservation actions, specifically in the States of Ohio and North Dakota. These activities include seeking funding for population surveys, monitoring, and research, and developing pollinator strategy plans. Other commenters cited, for example, that the White House has developed several documents outlining measures to protect honey bees and other pollinators and that a number of other groups and companies are involved in voluntary efforts to support pollinator health. The commenters note that these efforts will contribute to conservation of the rusty patched bumble bee.

*Our Response:* We appreciate the pollinator conservation efforts our State partners and others are currently implementing and planning for the future. We look forward to working cooperatively on pollinator, and specifically rusty patched bumble bee, conservation. Despite these beneficial measures, however, the status of the species remains dire.

*(11) Comment:* Several State agencies and other organizations expressed their support for bumble bee and general pollinator conservation. The commenters conveyed

their commitment and willingness to continue or initiate cooperative participation in habitat management and other conservation efforts. Some commenters mentioned beneficial actions they are able to fulfill, such as the following: (1) creating and maintaining flowering plant habitat and overwintering sites by revegetating project areas with appropriate native seed mixes, (2) timing vegetation-related maintenance activities to minimize impacts to the rusty patched bumble bee and other pollinators, and (3) restricting pesticide and herbicide use at appropriate times of the year.

*Our Response:* The Service appreciates the commenters' support and interest in rusty patched bumble bee and other pollinator conservation efforts. We agree that the actions as described will contribute to the conservation of the rusty patched bumble bee and other pollinator species. We welcome the involvement of these agencies and organizations as stakeholders in recovery planning for the species. We will work with stakeholders through recovery planning to identify areas that would aid in recovery of this species and to determine the appropriate actions to take. The Service understands the importance of stakeholder participation and support in the recovery of the rusty patched bumble bee and will continue to work with all stakeholders to this end.

*(12) Comment:* One State agriculture agency questioned the relative role of habitat loss versus other stressors as the true cause of population declines. Specifically, the commenter indicated the Service contradicts the statement that the rusty patched bumble bee may find suitable habitat in agricultural cropping systems by then noting that the flowering period for most crops is too short to sustain their population.

*Our Response:* Our assessment determined that there is uncertainty about the relative role of the cause(s) of the population declines and range contraction since 1990. Based on the available information, we cannot narrow the primary driver down to a single cause, nor do we have reason to assume that bumble bee losses were due to uniform impacts across the range. Although listing the rusty patched bumble bee is based on population trends showing a severe decline over the past 2.5 decades with no evident prospect of a natural reversal, the individual and combined effects of the multiple possible causes of this decline cannot be ascertained based on available information. Further research into past and ongoing stressors on the species will be an essential component of any future conservation strategy for this species. Rusty patched bumble bees have been observed in agricultural landscapes, although such observances are declining with the decrease in diversity of floral resources in such areas.

*(13) Comment:* Two North Dakota State agencies commented that the range where the rusty patched bumble bee would be listed should not include North Dakota, nor should critical habitat be designated in the State, because the species has not been found there since 2000.

*Our Response:* The species receives the protections of the Act wherever found; thus, if the species does occur in North Dakota, it would be protected there. We will consider a range of recovery actions following listing, and will work with local and State partners to determine and implement actions in locations that will benefit the species.

*(14) Comment:* A few State natural resource agencies, several species experts, and numerous other public commenters concluded that endangered species protections would benefit the recovery of the rusty patched bumble bee and provided additional suggestions for future conservation actions. Some examples of suggested actions include: creating new pollinator habitat; enhancing existing habitat, limiting, reducing, or eliminating pesticide use and exposure (in part through work with the EPA, U.S. Department of Agriculture, and other agencies); limiting novel disease exposure by regulating commercial bumble bee colony movement; incentivizing habitat improvement activities; increasing or enacting penalties for failure to comply with restrictions and regulations; requiring municipalities to set aside a proportion of undisturbed areas for pollinator use; protecting habitat; initiating captive-rearing programs; conducting additional population surveys; limiting mowing and herbicide spraying; addressing legal barriers (*e.g.*, local weed ordinances) to planting and maintaining habitat with flowering plants; and conducting public outreach and education.

*Our Response:* There are potentially many pathways to achieving rusty patched bumble bee conservation, including many of the actions suggested by commenters. The most prudent course for recovering the rusty patched bumble bee will be developed in the ensuing years, with input from species experts, appropriate agency personnel, and the public.

#### *Public Comments*

*(15) Comment:* Several commenters questioned the validity of the data sets we

used or the analytical methods of those data. Those commenters stated that the Service's assessment relied on incomplete or nontarget survey data and that the analysis had significant data gaps and uncertainties. Thus, those commenters questioned the species' decline as depicted in the SSA. Other commenters validated the Service's use of the best available science and a robust dataset. For example, one of the commenters (a scientist with bumble bee expertise) stated that the analyses and data are reliable and the SSA employs similar techniques as other status assessment tools (*e.g.*, NatureServe rank calculator or IUCN ranking process). They also stated that the SSA analyses are consistent with internationally accepted quantitative methods for assessing extinction risk (Mace *et al.* 2008; IUCN 2012). Several species experts and State natural resource agencies commented that there is strong evidence suggesting that the species has experienced a severe decline and warrants protection.

*Our Response:* Our analysis of the species' status and the determination to list it as an endangered species is based on the best available information. We thoroughly searched the published literature and sought out unpublished information from bumble bee and other subject matter experts in the United States, Canada, England, and Germany, as well as information from all States within the historical range of the rusty patched bumble bee. The datasets on which we relied span more than 100 years and contain more than 94,000 bumble bee records from within the rusty patched bumble bee's range. Each record has been verified. Furthermore, although surveys were not targeted for any specific bumble bee, the rusty patched bumble bee was consistently and routinely

observed prior to the late 1990s; since then, however, the observations have dropped off precipitously. In response to the decline, a concerted effort was put forth by several experts in the early 2000s to search for rusty patched bumble bees. Despite this increase in effort specifically targeting the rusty patched bumble bee, observations of the rusty patched bumble bee continued to drop. Further, to account for the lack of standardization in the annual survey interval, we grouped records into 10-year blocks to assess populations over time. Finally, although we agree that there are gaps in our knowledge of rusty patched bumble bee ecology, this information is not germane to determining whether the species warrants protection under the Act. These unknowns are important to devising a conservation strategy, and we will be working with partners to resolve many of these information gaps as we proceed with recovery.

*(16) Comment:* Several industry groups commented that there is no evidence in the SSA report, proposed rule, or elsewhere in the administrative record that the Service requested all available data from each of the States within the historical range of the rusty patched bumble bee or from the cooperative extensions of the USDA Natural Resources Conservation Service.

*Our Response:* In December of 2015, we requested data and reports from all of the 31 States within the known historical range of the species. We also invited them to attend a followup webinar regarding the SSA process and reminded them of the information request. Furthermore, we requested a review of the draft SSA report from numerous species experts and State natural resources agency staff (*e.g.*, Department of

Natural Resources or equivalent) within the range of the rusty patched bumble bee. During that review, we received responses from 15 species experts (as peer reviewers), and 6 State agencies provided us with additional data and information. We also used verified location data available from Bumble Bee Watch ([www.bumblebeewatch.org](http://www.bumblebeewatch.org)), a collaborative project to gather baseline data about the distribution and abundance of North America's bumble bees. Thus, we requested available data from all State agencies, multiple species experts, and other organizations throughout the historical range of the species. Additionally, we requested comments and information from the public, other concerned governmental agencies, Native American tribes, the scientific community, industry, and any other interested party during the public comment period on the proposed rule. We considered all information that we received throughout the process in this final listing determination.

*(17) Comment:* A few commenters stated that the Service did not utilize the best available science and should revise the SSA and the proposed rule to ensure that it is based on the best available science. Further, two commenters requested that the proposed listing be withdrawn until a more complete and thorough evaluation is completed.

*Our Response:* In accordance with section 4 of the Act, we are required to make listing determinations on the basis of the best scientific and commercial data available. Further, our Policy on Information Standards under the 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 ([www.fws.gov/informationquality/](http://www.fws.gov/informationquality/)), provide criteria and guidance and establish procedures to ensure that our decisions are based on the best scientific data available. They require us, 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 make listing determinations.

Primary or original information sources are those that are closest to the subject being studied, as opposed to those that cite, comment on, or build upon primary sources. The Act and our regulations do not require us to use only peer-reviewed literature, but instead they require us to use the “best scientific and commercial data available” in listing determinations. We have relied on published articles, unpublished research, habitat modeling reports, digital data publicly available on the Internet, and the expertise of subject biologists to make our determination for the rusty patched bumble bee. Although many information sources were used, we acknowledge that data gaps for the species still exist; however, our analyses made the data gaps explicit and we utilized expert opinion to help bridge the data gaps.

Furthermore, in accordance with our peer review policy published on July 1, 1994 (59 FR 34270), we solicited peer review from knowledgeable individuals with scientific expertise that included familiarity with the species, the geographic region in which the species occurs, and conservation biology principles. Additionally, we requested comments or information from other concerned governmental agencies, Native American

Tribes, the scientific community, industry, and any other interested parties concerning the proposed rule. Comments and information we received helped inform this final rule.

*(18) Comment:* A few industry organizations commented that the existing administrative record does not support the proposed listing decision. One commenter further stated that, for the Service to find that a species is “endangered” or “in danger of extinction throughout all or a significant portion of its range,” it needs to show that the species is “currently on the brink of extinction in the wild.” They stated that, while the proposed rule suggests that the Service likely believes that the rusty patched bumble bee fits into the third and/or fourth category in the December 22, 2010, memo to the polar bear listing determination file, “Supplemental Explanation for the Legal Basis of the Department’s May 15, 2008, Determination of Threatened Status for the Polar Bear,” signed by then Acting Director Dan Ashe (hereafter referred to as Polar Bear Memo), the administrative record shows that it fits into neither.

*Our Response:* The Service used the SSA framework to assess the biological status of the rusty patched bumble bee and describe the species’ overall viability. See the **Summary of Biological Status and Threats** section of this rule for our analysis. As required by section 4(a)(1) of the Act, the Service determined whether the rusty patched bumble bee is an endangered or threatened species based on the five listing factors. The Service did not substitute the assessment of the species’ overall viability for the standards and definitions in the Act, but used the SSA report to relate the species’ biological status and threats to the five listing factors and definitions of “endangered” and “threatened” in

the Act. A complete discussion of how the Service has applied these terms to the rusty patched bumble bee is provided in the **Determination** section of this final rule.

In assessing the status of the rusty patched bumble bee, we applied the general understanding of “in danger of extinction” discussed in the Polar Bear Memo. The Polar Bear Memo provides further guidance on the statutory difference between a threatened species and an endangered species and clarifies that if a species is in danger of extinction now, it is an endangered species. In contrast, if it is likely to become in danger of extinction in the foreseeable future, it is a threatened species. As detailed in the **Determination** section of this final rule, we conclude, based on our analysis of the best scientific and commercial information, that the rusty patched bumble bee is currently in danger of extinction throughout all or a significant portion of its range, and thus meets the Act’s definition of an endangered species.

*(19) Comment:* One species expert commented that he has collected thousands of bumble bee specimens in the range of this species since 1999, but has not observed new rusty patched bumble bee populations in those targeted searches. One entomological organization noted that several of their members who have taken up the study of native pollinators within the last 5 years have never seen a rusty patched bumble bee in the wild. Additionally, two species experts (who also were peer reviewers of the SSA) and two private citizens, who have discussed the decline of this species with numerous other species experts, commented that there is strong evidence the species has disappeared from most of its former range; without legal protection, the scientific consensus is that

this species is heading for imminent extinction. Another species expert stated that the rusty patched bumble bee was common throughout the upper Midwest in the early 1990s. The expert started systematic surveys at sites with relatively recent records (1990s) in 2007 but did not find any rusty patched bumble bees until 2010.

*Our Response:* We appreciate the commenters' confirmation of the data we have, which show a significant decline in rusty patched bumble bee occurrences.

*(20) Comment:* Several commenters asserted that the proposal fails to account for assumptions in the SSA report or the uncertainties underlying the projections, or that the proposal is premised on uncertainty rather than data. Some of those commenters stated that, although the SSA provides a list of 12 key assumptions made in the analysis, the Service did not acknowledge those assumptions in the proposed listing rule and does not evaluate how those assumptions could affect the conclusions. The commenters further added that limitations and uncertainties are prevalent throughout the SSA report and proposed listing rule, but are not acknowledged or accounted for in either.

*Our Response:* As stated in the SSA report, our analyses are predicated on multiple assumptions, which could lead to over- and underestimates of viability. In total, however, we find that our predictions overestimated viability of the species. Specifically, we conclude that 9 of the 12 key assumptions overestimated viability. It was unclear to us whether the remaining three assumptions were underestimated or overestimated. Therefore, even without these assumptions, we would have likely underestimated the future extinction risk of the rusty patched bumble bee. Peer reviewers

also indicated that our analyses underestimated extinction risk. Although not explicitly stated in the rule, this potential underestimation of the extinction risk to the species would only strengthen our endangered determination.

*(21) Comment:* Industry groups commented on the Service's approach to modeling and analyses. One group commented the Service should revise the modeling and analysis to account for ongoing public and private efforts to conserve pollinators. The group further encouraged the Service to include additional model scenarios in the SSA addressing changes in habitat while including different disease risk scenarios.

*Our Response:* We evaluated both positive and negative influences acting upon the species currently and potentially into the future. We developed three scenarios that represent the most likely future scenario, a reasonable worst-case future scenario, and a better-case future scenario. These future scenarios were based on how the primary stressors might act on the populations into the future; all scenarios assumed the current conservation efforts would continue into the future. We could have devised additional future scenarios accounting for different disease and conservation efforts, but the scenarios developed represent a reasonable range of possible outcomes. As all three scenarios yielded similar population trajectories, we did not see a need to model additional scenarios.

*(22) Comment:* Several other industry groups commented on the inherent limitations and uncertainties associated with conservation biology and projections of

species viability. The commenters referenced multiple sources in the publication, *Endangered Species Act: Law, Policy, and Perspectives* (Baur and Irvin, 2010) and explained that limitations and uncertainties are prevalent throughout the SSA Report and proposed listing, but are not acknowledged or accounted for in either.

*Our Response:* The Service recognizes inherent limitations and uncertainties in the field of conservation science. We considered the best scientific and commercial data available regarding the rusty patched bumble bee to evaluate its potential status under the Act (see our response to comment 15). In addition, the Service uses the SSA analytical framework to address uncertainties, and the report states multiple assumptions (see our response to comment 20). Modelers, species experts, and endangered species biologists work cooperatively to best match modelling goals and information needs. Further, our Policy on Information Standards under the 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 ([www.fws.gov/informationquality/](http://www.fws.gov/informationquality/)) provide criteria and guidance, and establish procedures to ensure that our decisions are based on the best scientific data available.

*(23) Comment:* Multiple commenters provided additional expert-verified rusty patched bumble bee observations that were not included in our original SSA analyses. In particular, commenters provided rusty patched bumble bee locations that were either verified by experts or submitted to the Bumble Bee Watch database after we conducted

our analyses.

*Our Response:* We have incorporated the information into the **Background** section of the preamble to this final listing rule. After our original analysis was complete, a small number of additional expert-verified rusty patched bumble bee records were discovered on citizen science websites and/or were provided to us by species experts. Of the records provided to us during the comment period, we were not aware of eight additional rusty patched bumble bee records that were located in Wisconsin. All additional rusty patched bumble bee records were incorporated into our database and we re-ran the extinction risk analyses in the SSA; this information is considered in this final rule. The additional records received since our original analyses do not change our overall determination.

*(24) Comment:* Two commenters provided survey or museum data. In particular, these commenters provided some clarifications about the species in Maine and Virginia and stated that most museum records for this species are available from the Global Biodiversity Information Facility (GBIF) website.

*Our Response:* We have incorporated the commenters' clarifications into the **Background** section of the preamble to this final listing rule. We were already aware of the Maine, Virginia, and GBIF records and utilized those data in our SSA analyses.

*(25) Comment:* A few commenters claimed that there have been recent rusty patched bumble bee observations in Monroe County in West Virginia. They further stated that there may be suitable habitat for the species in Monroe, Summers, and

Greenbrier counties in West Virginia.

*Our Response:* We followed up on this claim and determined that these observations have not been verified by experts. We have asked for further proof of the observations, such as a specimen or clear photographs, such that the species could be positively identified by experts, but have not received the requested information. We have taken note that there may be suitable habitat in additional locations.

*(26) Comment:* One group commented that the SSA does not support the claim that the rusty patched bumble bee is suffering from significant habitat loss and degradation. Specifically, the group asserted that the Service cannot reconcile the long-term habitat loss with the assertion that the declines in the rusty patched bumble bee populations began in the late 1990s or that the species is a habitat generalist, which would minimize habitat impacts.

*Our Response:* Although empirical data are currently unavailable regarding the level of habitat loss and degradation affecting the rusty patched bumble bee, we do know that habitat impacts have caused 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). This, in conjunction with the declines in distribution and relative abundance since the 1990s lead us to infer that habitat changes are, at the least, a contributing factor to the current precarious status of this species. Recognizing the uncertainty regarding the effects of habitat loss, we consulted with bumble bee experts with regard to the likely contribution of habitat impacts to the decline of this species. Although their conclusions

varied, none of these experts stated that habitat loss and/or degradation played no role in the decline.

We agree that habitat impacts are not likely the sole cause of the rusty patched bumble bee declines; rather, as explained, we find there are a multitude of stressors acting on the species. We acknowledge, however, that habitat losses may have become more of a factor as the colonies have been compromised by other, seemingly new, exposures to specific insecticides and pathogens.

*(27) Comment:* One commenter stated that habitat loss and degradation as a factor of the rusty patched bumble bee decline is based on the assumption that the abundance of wildflowers has declined due to agricultural intensification, urban development, and increased fragmentation of natural landscapes, but it is not clear that persisting populations of the rusty patched bumble bee are associated with a particular habitat type, such as native prairie, that has undergone a precipitous decline. The commenter asserted that floral abundance has probably not declined greatly in the nonagricultural and relatively undeveloped Appalachian region where the rusty patched bumble bee has likely disappeared.

*Our Response:* We agree that habitat loss alone cannot explain the disappearance of the rusty patched bumble bee in regions where apparently suitable habitat conditions, including abundant wildflower resources, remain. It follows that multiple stressors, with habitat impacts being only one, have had different relative effects in different parts of the range. We hasten to add, however, that these are inferences based on the conjunction of

increased use of pesticides, possible impacts from the pathogen *N. bombi*, and ongoing habitat changes with the drastic decline of the rusty patched bumble bee from the 1990s to present. More investigation needs to be done into the habitat requirements of this species to design effective and focused habitat conservation strategies.

*(28) Comment:* One group emphasized the importance of woodland habitats that provide early spring ephemeral flowers, which are important food sources for foundress rusty patched bumble bee queens during the time they are establishing colonies. As stated by the commenter, these woodland habitats are subject to a variety of threats including invasive plant and insect species, development, and overgrazing from the overpopulation of white-tailed deer.

*Our Response:* We agree that early spring floral resources are vital for colony establishment. Conservation strategies for meeting the essential habitat requirements for the rusty patched bumble bee will necessarily include local and microhabitat conditions that address its needs throughout its life cycle and at the population level.

*(29) Comment:* Several commenters expressed that the information the Service provided on pathogens and their role in the decline of the rusty patched bumble bee is well-supported by available literature and current research findings, whereas another commenter stated that the proposed rule does not cite any evidence that pathogens are affecting the species. That commenter indicated that the proposal states that experts have surmised that *N. bombi* may not be the culpable pathogen causing declines in the

species.

*Our Response:* We acknowledged the uncertainty regarding the role of pathogens in the decline of the rusty patched bumble bee in the SSA report and the proposed rule. Our current understanding of this stressor on the species is largely extrapolated from studies and observations of pathogenic effects on other bumble bee species, as the rusty patched bumble bee is too depleted to provide needed sample sizes. Nonetheless, as several commenters noted and as pathogen experts have determined, there is considerable evidence of pathogens adversely affecting bumble bees. Although, for the most part, bumble bee species carry a large pathogen load with which they have co-evolved, the congruence between the decline of the rusty patched bumble bee and the collapse of the commercially bred western bumble bee (*B. occidentalis*), attributed by some researchers to the microsporidium *Nosema bombi*, led researchers to suspect that this pathogen was at least one agent of the decline. The experts we consulted during the course of the assessment agreed that transmission of one or more pathogens, whether *N. bombi* or not, is very likely to be at least a contributory, if not the primary, cause of the decline of the rusty patched bumble bee. Indeed, one eminent expert pointed out that the rapid and widespread decline of the species may be plausibly explained only by an epizootic event, even if the particular pathogen remains, to date, unknown.

(30) *Comment:* A commenter stated that the proposal asserts that a variety of pesticides are impacting the rusty patched bumble bee but provides no direct evidence. They further commented that specific data showing that neonicotinoids have

affected the rusty patched bumble bee specifically are not cited, because, they assert, no studies have been performed to examine the asserted impacts of neonicotinoid use on the rusty patched bumble bees. The commenter stated that, absent such data, alleged impacts from pesticides do not support the proposed listing decision.

*Our Response:* We acknowledge that although other bumble bee species have been studied, we are not aware of any direct studies of the effects of pesticides on the rusty patched bumble bee. As with most species that have exhibited severe declines, potentially lethal studies (*e.g.*, toxicity studies) on the species are no longer feasible, because not enough specimens are available for a scientifically meaningful study. We infer, however, that studies of the effects of pesticides on other bumble bee species will likely reflect their effects on the rusty patched bumble bee, because these species have similar life-history traits (*e.g.*, generalist foragers collecting pollen from the same food sources). We used studies that documented impacts to other bumble bees as surrogates to estimate the impacts of various stressors on the rusty patched bumble bee. The pesticide discussions in the SSA focused on research that studied the effects of various chemicals on bumble bees (*Bombus spp.*), noting that much research has also been conducted on the European honey bees (*Apis mellifera*). Bumble bees may, in fact, be more vulnerable to pesticide exposure than European honey bees.

*(31) Comment:* Several commenters suggested that the Service use the U.S. Geological Survey (USGS) National Pesticide Synthesis data to illustrate trends such as the increasing application of neonicotinoids over time within the rusty patched bumble

bee's range.

*Our Response:* We used USGS National Pesticide Synthesis data to help understand the annual regional trends of three neonicotinoids (imidacloprid, clothianidin, and thiamethoxam) within the historical range of the rusty patched bumble bee. We understand the limitations of the data: specifically, only county-level estimates were provided in the USGS dataset and extrapolation methods were used to estimate pesticide use for some counties. Therefore, we used these graphs simply to discern possible temporal correlations between bumble bee (and some species of butterfly) declines and neonicotinoid use. We acknowledged that the exact causes of the decline remain uncertain. In the SSA, we noted that we could have also evaluated the trends in use of numerous other chemicals, but focused only on the three commonly used neonicotinoids, as they represent a class of chemicals that have been implicated in the decline of bees. We will continue to review and evaluate the use of various chemicals and impacts on the rusty patched bumble bee during recovery planning.

*(32) Comment:* Two commenters provided recent research papers on risks to bees posed by pesticides that were not included in our analyses, including new studies on the effects of pesticides to bumble bees and other bees, research on the effects fungicides have on bees, studies about pesticide contamination of pollinator habitat, as well as correlational studies attempting to understand the effects of pesticides on pollinators at a timescale relevant to population-level processes.

*Our Response:* We appreciate the new information. Studies demonstrating lethal

and sublethal effects of pesticides to bees and studies correlating pesticide use trends to pollinator population declines provide further evidence that pesticides likely contributed to the decline of the rusty patched bumble bee. We will continue to review the effects of pesticides during recovery planning and may use an adaptive management approach to recovery to refine actions related to pesticides.

*(33) Comment:* A commenter, citing Watts and Williamson (2015), stated that the persistent organochlorines, like Endosulfan and the highly toxic organophosphates, have been replaced by the neonicotinoids in several countries, trading one set of problems for another. The commenter noted that replacement of one suite of harmful chemicals with another perpetuates an endless cycle of replacing one chemical with another.

*Our Response:* We mention the potential risk of organophosphates to honey bees in our SSA and will consider reviewing the effects of organochlorines to bumble bees in greater detail during recovery planning for this species.

*(34) Comment:* One commenter requested that the Service review the pesticides used in mosquito control to see if they have resulted in bee declines, and, if so, ban their use.

*Our Response:* The issue of banning use of specific chemicals is outside the scope of this rulemaking. During the recovery planning process, we will work closely with contaminant specialists within and outside the government to investigate chemicals that may be causing population-level harm to the rusty patched bumble bee.

*(35) Comment:* Several commenters asserted that the analysis of the relationship

between neonicotinoids and rusty patched bumble bee population declines relies on the assumption that the introduction of neonicotinoids coincided with a steep decline in rusty patched bumble bee populations. They suggest that the decline in rusty patched bumble bee populations preceded the widespread use of neonicotinoids in its range, and that the bees are persisting in places with widespread neonicotinoid use on corn and soybeans. The decline of the rusty patched bumble bee, the commenters conclude, began before the advent of the neonicotinoids, with the sharpest decline of the bee beginning in the 1990s and coinciding with the use of imidacloprid beginning in 1995, which had minimal use compared to imidacloprid usage beginning in 2000. Given the uncertainty about the relevance of the timing of neonicotinoids' introduction to rusty patched bumble bee population decline, the commenters question its emphasis in the SSA.

*Our Response:* The EPA approved the registration of imidacloprid in 1994, and it became widely used in the United States starting in the mid-1990s; clothianidin and thiamethoxam entered the market beginning in the early 2000s. According to the USGS National Synthesis database, beginning in 1995, imidacloprid was used in nearly every State with historical records of the rusty patched bumble bee, and use increased and spread in the following years. Although it is difficult to pinpoint exactly when the species' decline began, the data show that the precipitous declines of the rusty patched bumble bee manifested around 1995 and continued into the early 2000s. This time period coincides with increased neonicotinoid use.

It is difficult to determine how much of the species' decline is due to a single

factor, including neonicotinoids, as there are a myriad of other stressors (*e.g.*, pathogens, parasitoids, and diseases) acting upon the species, and all likely interacting synergistically. However, lethal and sublethal effects to bees have been documented for this class of chemicals, so it is reasonable to think that they likely are contributing to the decline. Furthermore, the additive and synergistic effects of exposure to multiple pesticides at multiple times may exacerbate the toxicity of exposure to any single pesticide, and thus, additional pesticides in combination with others may pose risks to bees as well.

*(36) Comment:* Several commenters stated that, by focusing on pesticides as a risk factor in the SSA, the Service appears to have ignored the advice of the experts they surveyed, who concluded that 31 percent of the rusty patched bumble bee decline was likely due to pathogens and 23 percent of the decline was likely due to habitat loss. Other stressors included pesticides (15 percent), climate change (15 percent), and small population dynamics (15 percent). Yet, in the SSA synopsis, pesticides are listed second among the top three stressors causing the decline of the species.

*Our Response:* The list of potential causative factors in the SSA synthesis was not ordered by relative importance; rather, it was listed alphabetically. According to expert input and literature review, we find that habitat loss and degradation, pathogens, pesticides, and small population dynamics are the primary contributing factors to the declines of the rusty patched bumble bee. Although the relative contribution of pesticides, pathogens, loss of habitat, small population size, and climate changes is not

known, the prevailing data indicate that multiple threats are acting, most likely synergistically and additively, on the species. This combination of multiple threats is likely more harmful than a single threat acting alone.

*(37) Comment:* One commenter noted that the SSA does not cite field studies that found no adverse effects when bees are placed near treated crops and allowed to forage naturally. The commenter provided citations for four field studies with bumble bee colonies placed in or near bee-attractive crops grown from seeds treated with neonicotinoids, and which reported no adverse effects. They further stated that several published studies have reported adverse effects on developing bumble bee colonies that were exposed in confined settings to artificial diets spiked with various levels of neonicotinoids. The commenter also stated that the SSA does not mention that test levels or exposure scenarios in most of these studies have been criticized as unrealistically high.

*Our Response:* We reviewed over 100 published reports and papers regarding the effects of pesticides to bees, focusing primarily on bumble bee studies. Most of the laboratory studies that we reviewed reported at least one sublethal and/or lethal effect to bees, as did some of the field studies. We acknowledge that many studies that we reviewed were not conducted in the field, and we acknowledge that there are studies that did not find adverse effects. The totality of data, however, suggests some insecticides kill bumble bees and others cause sublethal effects. Further, researchers often also note the limitations of laboratory studies. For example, many lab studies that we reviewed were conducted over relatively short-term exposure durations (*e.g.*, 4 to 28 days), which may

not reflect realistic longer term exposures in the field. Additionally, although bees likely experience exposure to multiple chemicals in the field, most studies did not address the risk posed from the additive and synergistic effects of multiple exposures to multiple pesticides. Exposure to multiple pesticides over multiple time periods may exacerbate the toxicity of exposure to any single pesticide.

*(38) Comment:* Two commenters were concerned that the pesticide discussion fails to consider all of the information and expertise available from the government and private sources. For example, these commenters state that there is no reference to any of the EPA pesticide evaluation methods for bees, risk assessments for pesticide products, or discussions with scientists and risk managers in EPA's Office of Pesticide Programs, whose input should be essential in any science-based discussion of pesticide risks to pollinators. According to the commenters, this can lead to an emphasis on pesticides as a causal agent that may not be warranted. The commenters noted that the EPA is currently reviewing the risk of neonicotinoids to pollinators, and has released draft pollinator risk assessments for some of the compounds.

*Our Response:* The Service considered several documents that were not cited in the SSA. Although not cited in the SSA document, for example, the Service reviewed EPA's "Preliminary pollinator assessment to support the registration review of imidacloprid" (January 2016); this assessment evaluated the risk of imidacloprid to managed honey bees at both the individual and colony levels and concluded that imidacloprid can pose risks to honey bee health. Notably, the assessment did not

evaluate risks to other bee or bumble bee species, nor did it evaluate the risk when imidacloprid is mixed with other chemicals, which is a more realistic field condition. We also reviewed the summary of EPA and Health Canada’s “Re-evaluation of Imidacloprid—Preliminary Pollinator Assessment” (dated January 18, 2016 and available online at [http://www.hc-sc.gc.ca/cps-spc/pest/part/consultations/\\_rev2016-05/rev2016-05-eng.php](http://www.hc-sc.gc.ca/cps-spc/pest/part/consultations/_rev2016-05/rev2016-05-eng.php)); this assessment indicated that the results of the available Tier II colony-level feeding studies with non-*Apis* bees (non-honey bee) suggested that bumble bees may be more sensitive to imidacloprid exposure than honey bees, and that measured pollen and nectar residues were often above the lowest dose where colony effects were detected in bumble bee feeding studies, suggesting a potential for risk to bumble bees. Lastly, we reviewed “Joint PMRA/USEPA Re-evaluation Update for the Pollinator Risk Assessment of the Neonicotinoid Insecticides”(January 6, 2016), which provided a timeline of anticipated milestones for EPA’s pollinator assessments—only the imidacloprid assessment was anticipated to be in preliminary form before the Service needed to complete its proposed determination. Thus, although not cited in the SSA, we reviewed the pertinent literature that was available to us.

*(39) Comment:* Several commenters stated that the Service should analyze the potential effects of herbicides separately from insecticides and fungicides in the stressor analyses. As “pesticides” is used as a general term to describe insecticides, fungicides, and herbicides, the commenters note that the SSA analysis and supporting scientific studies are specific to the effects of neonicotinoids, a distinct class of insecticides. They

assert that the Service did not provide enough discussion or justification for including herbicides, or pesticides in general, as a primary stressor for the rusty patched bumble bee.

*Our Response:* While the SSA evaluated neonicotinoids as potential stressors to the rusty patched bumble bee, we also acknowledged that numerous other chemicals have documented lethal and sublethal effects to bumble bees. Our discussion of herbicides in the SSA primarily focused on the use of herbicides in agricultural, urban, and natural landscapes and the likely consequential loss in flowering plants and, therefore, food availability for the rusty patched bumble bee.

*(40) Comment:* One group requested that the Service provide definitive and functional guidance addressing herbicide use specifically, as distinct from pesticide or insecticide use.

*Our Response:* Functional guidance addressing herbicide use methods goes beyond the scope of this final listing document and is more appropriate for recovery planning. We will consider developing management protocols for herbicide use during recovery planning for this species. In the interim, there are guidelines available from Xerces Society and other organizations engaged in pollinator conservation and management.

*(41) Comment:* Some industry groups asserted that the information on possible effects of climate change is too speculative to use in the analysis, as the potential effects identified in the assessment have not yet occurred, and the potential impact on the rusty

patched bumble bee specifically remains unstudied and unknown. One commenter also expressed that, because the proposal does not project when such effects might occur, there is a “temporal disconnect that precludes relevance to any determination that the rusty patched bumble bee currently is ‘on the brink of extinction.’” The commenters requested that the Service provide additional information on the species’ climate change vulnerability assessment and relevant data to support the conclusion that climate change is one of the factors contributing to the proposed endangered status.

*Our Response:* Although we developed a potential future scenario in the SSA that included impacts from climate change, all the future scenarios contribute to our understanding of the risk to the species, and thus the decision to list the rusty patched bumble bee as an endangered species. The widespread, precipitous decline that has occurred to date has rendered the rusty patched bumble bee in danger of extinction. During the recovery planning process, however, we will investigate more closely the vulnerability of rusty patched bumble bee to the effects of climate change and the implications of this vulnerability.

*(42) Comment:* One commenter claimed that the Service’s assertion that the small population size of the rusty patched bumble bee and the species’ reproduction strategy make the species more susceptible to impacts from other factors is faulty, because that position assumes that the species’ population size and range have dramatically decreased. The commenter contended that the proposal does not demonstrate such a decline with reliable data.

*Our Response:* Based on the best available data, we have determined that the rusty patched bumble bee has declined precipitously with remaining known populations documented by only a few individual bees. As explained in the SSA, a healthy population consists of multiple viable colonies, which are composed of hundreds of worker bumble bees. It is unknown what exact small population size would trigger a diploid extinction vortex phenomenon, but given the data, it is reasonable to conclude that the remaining populations are below sustainable levels, and, if they have not yet reached vortex levels, they will soon if declines are not arrested.

*(43) Comment:* Several commenters mentioned additional stressors or threats the Service did not evaluate in the assessment, including the role of natural predators, the role that managed pollinators play in spreading and amplifying diseases to bumble bees and the pathogenic effects those diseases can have on bumble bees, vehicle collisions, and invasive plant and animal species.

*Our Response:* Our analysis in the SSA focused on what we determined to be the primary stressors negatively affecting the rusty patched bumble bee: pathogens, pesticides, the effects of small population size, habitat loss and degradation, and the effects of climate change. Although we recognize there may be other factors negatively affecting the species, these factors are not likely as influential as those mentioned. We will, however, consider the role of additional stressors in our recovery planning efforts and the effects of such stressors on specific populations, as appropriate.

*(44) Comment:* One organization expressed concerns about how the Service

defined the range of individual populations of the rusty patched bumble bee. Specifically, the Service assigns a 10-kilometer (km) range for colonies in the habitat needs discussion, but the comment notes that an individual rusty patched bumble bee range is less than 1 km (0.62 miles).

*Our Response:* We used a 10-km×10-km area to delineate populations, not colonies. All records found within a 10-km×10-km area were considered to be a single population, which is composed of multiple colonies. An individual bumble bee generally occupies an area less than 1 square km, but the populations, which are composed of multiple individual bees in multiple colonies, span across a larger range.

*(45) Comment:* One organization expressed concern that the Service did not incorporate growing season hardiness zones into the range estimates, especially since the species is active early and late in the growing season. They provide the example that there may be portions of a county with a shorter floral growing season than other parts of the same county.

*Our Response:* The range of the rusty patched bumble bee represents the broad-scale occurrence of the species and was derived by plotting all records of occurrence; that is, where individual bumble bees were recorded. The suitability of any given site is influenced by a myriad of factors, including providing sufficient quantity of floral resources for the entire active season. Whether a particular spot on the landscape provides this requirement was not assessed in the SSA; however, this assessment is not needed to determine the broad range of the species.

*(46) Comment:* A few commenters stated that rusty patched bumble bee populations appear to be persisting in the Midwest or areas of high agriculture, where pesticide use is prevalent.

*Our Response:* Rusty patched bumble bee populations still exist in the Midwest. Although we have not completed a thorough site-specific analysis, and although there are some survey biases to consider, we noticed that many of the remaining populations are within urban areas where they may not be exposed to the same level of pesticides as in the rural, agricultural areas. The extent of rusty patched bumble bee persistence in agricultural areas and the corollary impact of pesticides on the species will be investigated further during recovery planning.

*(47) Comment:* A few industry commenters stated that there are ongoing studies by USDA–Agricultural Research Service and others that will aid in addressing knowledge gaps and assist the Service in making an informed decision and complying with the Act’s mandate to use the best available science. Many of these studies conclude in 2017.

*Our Response:* While we are pleased to hear of additional studies that may soon become available and assist us and our partners with a recovery plan for the species, we are required to make our listing determinations based on the best scientific and commercial data available at the time of our rulemaking. We searched the published and gray literature, and solicited peer review of our evaluation of the available data. These studies are not available for the rulemaking, but results will certainly be used in future

recovery planning efforts.

*(48) Comment:* A few commenters noted that the EPA has a statutory role to determine the ecological risk of all registered pesticides under FIFRA. They referenced the EPA's comprehensive, regulatory process for registering pesticides.

*Our Response:* We recognize the work that EPA does to protect pollinators and acknowledge the statutory role that EPA has under FIFRA. The EPA uses honey bees in its pesticide risk assessments (EPA 2014, pp. 2 and 6); however, our SSA details why we conclude that bumble bees are likely more susceptible than are honey bees to pesticides. In fact, the EPA "acknowledges the uncertainty regarding the extent to which honey bees may be a reasonable surrogate for native insect pollinators" (EPA 2015, p. 2). However, we have added an acknowledgment of FIFRA as a regulatory mechanism in the final rule.

*(49) Comment:* One commenter stated that, "considering the wide-ranging and extensive impact to farmers attempting to use pesticides vital to sustaining crop production," inconsistent recommendations from the Service and EPA could create an "impossible situation" for the agricultural community if they follow label restrictions according to one federal standard, but are then in potential violation of another federal standard for that same action.

*Our Response:* In this final rule, we provide some actions prohibited by section 9 of the Act and specifically use the phrase "where the species is known to occur." We use this phrase to clarify that there is a geographical context to potential avenues of illegal

take; that is, we want to avoid the interpretation that the general use of pesticides, for example, could be prohibited per the listing of the rusty patched bumble bee. More specifically, the rusty patched bumble bee would have to be exposed to particular actions for those actions to cause take, and the bee could only be exposed if it occurs in the project area. The Service can provide technical assistance to help determine whether the rusty patched bumble bee may be present in a specific area. If noxious weed control is needed where the rusty patched bumble bee is likely to be present, for example, the Service will work with landowners or land managers to identify techniques that avoid take or allow for it to occur legally.

*(50) Comment:* One utility company expressed concerns that, if the rusty patched bumble bee is listed, the requirements of two regulatory agencies will be in conflict; the North American Electric Reliability Corporation requires a utility to clear vegetation that interferes with transmission and distribution lines, and the Service would prevent a utility from doing so to protect a listed species and its habitat. The commenter suggests that, because of this potential conflict between two legal requirements, the Service should work with electric cooperatives to identify a means by which they are able to meet both obligations.

*Our Response:* Listing the rusty patched bumble bee as an endangered species does not prevent utilities or any other entity from complying with other laws. If such compliance will incidentally lead to take of rusty patched bumble bees, the project proponent is required to obtain the appropriate permit or exemption before implementing

the action. 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.

*(51) Comment:* One commenter noted that the major crops grown within the range of the rusty patched bumble bee that receive neonicotinoid treatment are corn and soybeans, and that use of neonicotinoids on these crops is mainly as a seed treatment, which limits potential exposure to bees.

*Our Response:* The Service is aware that many seed treatments are widely used for corn and soybean crops. The EPA's risk assessment process for evaluating soil applications and seed treatments is similar to its assessments for foliar applications, "except that risk from contact exposure is not evaluated" (EPA 2014 p. 10). The EPA states, "For soil application, it is generally assumed that exposure of honey bees from direct contact with the pesticide is minimal, given the nature of the application to bare soil, although exceptions may occur if applications are made with bee-attractive weeds present." However, they noted that "Contact exposure of non-*Apis* bees (solitary and ground-nesting bees) may be significant with soil applications, although the extent of this potential exposure is uncertain. It is also noted that for seed treatments, exposure of bees to pesticides has been documented via drift of abraded seed coat dust when planting under certain conditions; however, there are multiple factors determining the extent to which dust-off occurs" (EPA 2014, p. 10). Because rusty patched bumble bee is a

ground-nesting species and fertilized queens overwinter in the soil, they could be susceptible to additional exposure pathways that honey bees are not (*e.g.*, neonicotinoids in the soil that have not yet been taken up by plants and thus cause an additional dermal exposure pathway). Therefore, it is reasonable to conclude that rusty patched bumble bees may be more exposed to insecticides used as seed treatments (because the chemical can move through the soils (*e.g.*, Goulson 2013, pp. 979–980)) than are honey bees, which nest above ground.

*(52) Comment:* One commenter stated that, under section 4(b) of the Act, the Service is required to take “into account those [conservation] efforts, if any, being made by any State” before making a listing decision. Moreover, the Service’s Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE) requires the Service to consider conservation efforts, including conservation efforts that have not yet been implemented or demonstrated their effectiveness, so long as the Service is certain that the conservation effort will be implemented and, once implemented, will be effective. The commenters contended that failure to comply with PECE is grounds for vacating a final listing rule. Other commenters stated that the proposed rule does not sufficiently address the significant public and private efforts currently under way to address pollinator issues that will benefit the rusty patched bumble bee.

*Our Response:* In the **Summary of Biological Status and Threats** section of this final rule, we include consideration of conservation efforts by States and other beneficial factors that may be affecting the rusty patched bumble bee. The Service’s PECE policy

applies to formalized conservation efforts (*i.e.*, conservation efforts identified in a conservation agreement, conservation plan, management plan, or similar document) that have not yet been implemented or those that have been implemented but have not yet demonstrated whether they are effective at the time of listing. We acknowledge that increased awareness of and conservation measures for pollinators in general may have fortuitous beneficial effects on rusty patched bumble bee. We are not aware of any formalized conservation efforts for any of the specific rusty patched bumble bee locations.

*(53) Comment:* One commenter supports creating environments where the rusty patched bumble bee can rebound while avoiding a regulatory framework that impedes responsible agricultural practices. They further noted that doing so would require cooperating agencies to receive adequate long-term Federal funding to promote habitat restoration or enhancements.

*Our Response:* The listing determination must be made solely on the biological status of the species. That said, the Service generally considers regulatory restrictions alone to be both insufficient and less preferred as a primary means of achieving the conservation of listed species. We seek to work collaboratively with other agencies and organizations (public and private), and with individual private landowners on proactive conservation efforts.

*(54) Comment:* One commenter, supporting the action to list the rusty patched bumble bee, urged the Service to work cooperatively with Canada on conservation efforts

for this species.

*Our Response:* We appreciate the interest in bumble bee conservation and look forward to continuing our coordination with Canada as we begin recovery planning and implementation for the rusty patched bumble bee.

*(55) Comment:* One commenter stated that accurate identification of the rusty patched bumble bee in the field may be difficult, even for a trained specialist. Voucher specimens of sterile female workers or males may be essential to understand and study pollinator populations. As such, the possibility of accidental take of a listed insect should be considered and permitted. Another commenter stated that unauthorized handling or collecting of the species is not enforceable because, as the species is difficult to identify, the specimen would require handling when conducting surveys to verify that a prohibited violation had taken place.

*Our Response:* Under section 10 of the Act, the Service may permit limited take of listed species for scientific purposes or to enhance the propagation or survival of the species. The Service will consider incidental take for otherwise legal activities in our permitting (*e.g.*, section 10 recovery permits) processes. Because the objectives of surveys may vary across the range of these species, we recommend contacting the Service's Ecological Services Field Office in your State to discuss the appropriate survey protocol to use for particular projects, habitat types, and geographic areas. To facilitate effective cooperation among agencies, organizations, and individuals interested in the distribution of the rusty patched bumble bee, the Service will consider maintaining a list

of individuals who meet certain qualifications for conducting reliable identification for the target species.

*(56) Comment:* A commenter remarked that there are several other apparently declining species of bumble bee including yellow-banded bumble bee (*B. terricola*) and American bumble bee (*B. pennsylvanicus*) that need evaluation and monitoring.

*Our Response:* As part of its ongoing efforts to improve the effectiveness and implementation of the Act and provide the best possible conservation for our nation's imperiled wildlife, the Service has developed a National Listing Workplan (Workplan) for addressing listing and critical habitat decisions over the next 7 years. The yellow-banded bumble bee (*B. terricola*), for example, is in the Workplan schedule for evaluation under the Act.

*(57) Comment:* Several commenters asserted that the Act has failed to recover or delist 98 percent of all listed species, and that those that have been removed were due to extinction or data error. Therefore, they contend, listing the rusty patched bumble bee as an endangered species will have no positive impact on its recovery. The commenters feel that listing the rusty patched bumble bee as endangered may negatively impact current pollinator conservation efforts being undertaken across the country.

*Our Response:* The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. Protection under the Act has prevented the extinction of more than 98 percent of listed species. Once a species is listed as either endangered or threatened, the Act provides protections from

unauthorized take and many tools and opportunities for funding to advance the conservation of such listed species. Further, receiving protections under the Act facilitates conservation planning and the development of conservation partnerships. The Act has been and continues to be extremely effective in preventing the extinction of species. The statement that the commenter made that “the Act has failed to recover or delist 98 percent of all listed species, and that those that have been removed were due to extinction or data error” is erroneous—there are notable exceptions to this statement where species have been removed due to successful recovery, such as the bald eagle and peregrine falcon.

The listing of a species does not obstruct the development of conservation agreements or partnerships to conserve the species. Once a species is listed as either endangered or threatened, the Act provides many tools to advance the conservation of listed species. Conservation of listed species in many parts of the United States depends on working partnerships with a wide variety of entities, including the voluntary cooperation of non-Federal landowners. Building partnerships and promoting cooperation of landowners are essential to understanding the status of species on non-Federal lands, and may be necessary to implement recovery actions such as reintroducing listed species, habitat restoration, and habitat protection.

*(58) Comment:* Several commenters stated that the Service should recognize current national attention on pollinators, and that these ongoing conservation efforts should allow a warranted but precluded listing because the wide array of conservation

actions for other pollinators may lead to recovery of the rusty patched bumble bee.

*Our Response:* In making our determination as to whether the rusty patched bumble bee meets the Act's definition of an endangered or threatened species, we considered the current conservation measures available to the species (see **Summary of Biological Status and Threats—Beneficial factors**). The increased effort to conserve pollinators may have an incidental positive impact on the rusty patched bumble bee. However, we are not aware of specific conservation measures for bumble bees at any of the current rusty patched bumble bee locations in the United States. Although general pollinator conservation efforts can provide some benefits to the rusty patched bumble bee, bumble bees like this species have unique life-history characteristics and biological requirements that are not addressed by these general efforts. Because the rusty patched bumble bee has experienced such severe population declines throughout its range, there is a need to develop and implement regionally appropriate, bumble bee-specific recommendations to aid in recovery of the species.

*(59) Comment:* Numerous commenters expressed concern about the decline of pollinators and the need to prevent extinction of the rusty patched bumble bee to protect biodiversity and address pollinator declines. These commenters cited the value of bumble bees as important pollinators of wildflowers (and other wild plants) and as the chief pollinator of many economically important crops. Another commenter stated that, although they agreed that the rusty patched bumble bee is an important pollinator, there are still numerous other species, wind, and other methods that act as pollinators.

*Our Response:* Although these comments do not directly address information pertaining to the listing determination of the rusty patched bumble bee, we want to acknowledge their validity and importance. In the United States and globally, native bees are responsible for most pollination of plants that require insect pollination to produce fruits, seeds, and nuts. As such, they not only pollinate economically important crops, but provide the foundation of functioning ecosystems; pollination is required for plant reproduction, and plants are the base of the food chain. The plight of the rusty patched bumble bee is not an isolated occurrence, but a symptom of widespread decline of many insect pollinators. Measures to identify and address threats and prevent the extinction of the rusty patched bumble bee will help conserve other native pollinators. It is important to recognize that the rusty patched bumble bee occurs in very few locations. Measures to identify and address threats to pollinators is needed beyond the current occurrences of the rusty patched bumble bee—they are needed throughout the United States. It is true that there are other forms of pollination as mentioned (*e.g.*, wind, other insect species, birds, and mammals). However, the Act requires us to determine whether listing is warranted based on whether a species meets the definitions of an endangered or threatened species because of any of the section 4(a)(1) factors, not on the basis of whether it fulfills a unique ecosystem function.

*(60) Comment:* Several commenters noted how the rusty patched bumble bee would benefit from listing under the Act. Those commenters noted such benefits as the following: (1) protecting remaining populations from site-specific threats, (2) the bees'

habitat will benefit from critical habitat designation, (3) developing a recovery plan, (4) Federal agencies will need to address threats to the species, (5) increased research into the causes of decline, (6) increased economic benefits to U.S. farmers who benefit from the ecosystem service of crop pollination by wild bees.

*Our Response:* As these commenters stated, there are many potential benefits to a species in being listed under the Act. For additional information, please refer to the **Available Conservation Measures** section of the preamble to this final rule.

*(61) Comment:* Several commenters requested that the Service act quickly in providing protection to the rusty patched bumble bee and asked if there is a way to expedite the listing process. Some of those commenters expressed concern that the Service might have not acted fast enough in protecting the rusty patched bumble bee, and that the ability to prevent the species' extinction may already be diminished. Other commenters, particularly those representing industry, requested that the Service extend the final listing decision deadline by 6 months or withdraw the proposed rule to provide additional time needed to evaluate the rusty patched bumble bee appropriately; consider new information and data provided in comments; collect and evaluate additional data; and consider results of ongoing studies that are anticipated to be completed in 2017.

*Our Response:* Given the precipitous decline and the few populations that remain, we are hopeful that, by affording the species protection now and working expeditiously with all partners, the rusty patched bumble bee will be saved from extinction. See our response to comment 15 for information about our use of the best

available science.

We do not find substantial disagreement regarding the sufficiency or accuracy of the available scientific data relevant to this determination. Therefore, we are not extending the period for making a final determination for the purposes of soliciting additional data. However, we agree that results from ongoing studies would further our understanding and help us with recovery planning and implementation. We will consider further research needs in our recovery planning efforts.

*(62) Comment:* Several commenters agreed that critical habitat is not determinable at this time, contending that there is insufficient scientific understanding of the rusty patched bumble bee's biology, current occurrences and threats to allow the Service to identify the requisite physical and biological features necessary to designate critical habitat. Some commenters expressed concern that designating critical habitat may impact agriculture or other industries. Others commented that, if critical habitat is ultimately designated, only occupied habitat should be included. A comment from bumble bee experts provided information on physical and biological features and habitat types (including information on forage; nesting sites; overwintering sites; habitats that are protected from pesticides and disease) to consider when designating critical habitat.

*Our Response:* We will consider this information when we designate critical habitat for this species.

*(63) Comment:* Several commenters stated that the Service should acknowledge the benefits to the rusty patched bumble bee and other pollinators from habitat

management.

*Response:* We agree that compatible habitat management is beneficial for rusty patched bumble bee conservation. Indeed, we will be working with conservation partners to implement good management practices for bumble bees as we work towards preventing the extinction, and working toward recovery, of this species.

*(64) Comment:* Some utility groups commented that specific activities should be excluded from activities that may result in “take.” The activities specifically requested to be excluded as “take” were the use of herbicides to maintain electronic transmission rights-of-way when applied in accordance with label requirements and seasonal recommendations, and utility infrastructure construction or rights-of-way maintenance practices. The commenters provided reasons why such activities would not lead to “take.” The commenters also sought acknowledgement that herbicide use to maintain utility rights-of-way is likely to benefit, rather than harm, pollinator insect species, including the rusty patched bumble bee.

*Our Response:* It is the policy of the Service to identify, to the extent known at the time a species is listed, specific activities that are unlikely to result in violation of section 9 of the Act. To the extent possible, we also strive to identify the activities that are likely to result in violation. Activities that may lead to take, even those having a net benefit, cannot be authorized without a section 10 permit or section 7 exemption. For certain activities, the Service will assist the public in determining whether they would constitute a prohibited act under section 9 of the Act.

We acknowledge that proper herbicide use can reduce invasive or unwanted plant species from rusty patched bumble bee habitat, but label restrictions alone may not be protective of the rusty patched bumble bee. For example, one common herbicide label allows a mixture with imidacloprid, which has documented sublethal and lethal effects to bees. It is unclear which populations could be affected by these activities, what the effects might be, and how the effects might be minimized. The Service can provide technical assistance to help determine whether the rusty patched bumble bee may be present in a project area. If noxious weed control is needed where the rusty patched bumble bee is likely to be present, for example, the Service will work with landowners or land managers to identify techniques that avoid take. As we work to conserve the rusty patched bumble bee, we will provide landowners and land managers with information to assist with understanding what activities are likely to cause take of the species and what actions may be implemented to conserve the species.

*(65) Comment:* A few commenters requested that the Service clarify what constitutes “unauthorized use” of biological control agents in the following statement, “The unauthorized release of biological control agents that attack any life stage of the rusty patched bumble bee, including the unauthorized use of herbicides, pesticides, or other chemicals in habitats in which the rusty patched bumble bee is known to occur is listed in the proposed rule as an activity that may result in a violation of section 9 of the Act.” Specifically, they request clarification as to whether this includes using or releasing registered pesticides in a manner consistent with its EPA-approved labeling

instructions.

*Our Response:* We use the word “unauthorized” here to mean those activities that have not been permitted or exempted from the section 9 prohibitions due to their appropriate and full consideration under section 10 or section 7 of the Act.

*(66) Comment:* Several commenters noted that pathogens discussed in the proposal are also commonly found in honey bees and commercial bumble bees, and thus honey bees and commercial bumble bees could be seen as an unauthorized release of nonnative species under section 9 of the Act. The commenters expressed concern that restricted use of commercial bees would harm that industry.

*Our Response:* Our response to comment 65 clarifies the term “unauthorized” as used in this final listing rule. We recognize that honey bee and bumble bee species naturally carry high pathogen loads and that under normal circumstances this characteristic will not affect their fitness. In the case of any pathogen that is found to adversely affect listed species, we need to investigate the source of the pathogen and undertake actions to ameliorate its negative effects. If commercial bumble bees, or wild bees, are found to transmit pathogens that cause take of rusty patched bumble bees, the Service will work with the industry to identify and implement conservation measures that will support the survival or recovery of the species while being practicable from the industry’s perspective. We emphasize, however, that under the Act, our concern is the continued existence of this endangered species.

*(67) Comment:* The unauthorized discharge of chemicals or fill material into any

wetlands in which the rusty patched bumble bee is known to occur is listed in the proposed rule as an activity that may result in a violation of section 9 of the Act. A few commenters mentioned that they assume the reference to “fill material” in this phrase is a reference to the term as used in the Clean Water Act (CWA), which broadly includes soil, plants, and other biological material. They stated that, given this broad scope, it is unclear how “fill material” poses a risk to the rusty patched bumble bee.

*Our Response:* The commenter is correct that the reference to “fill material” is a reference to the term as used in the CWA. The unauthorized discharge of fill material in wetland areas utilized by the rusty patched bumble bee may result in habitat loss or destruction, for example through the loss of floral resources, which could lead to death or harm of rusty patched bumble bees.

*(68) Comment:* Several commenters expressed concerns that listing the rusty patched bumble bee may affect private property rights and restrict land use. For example, one commenter was concerned that listing would inhibit the use of Federal crop insurance, because recipients must allow government access to private land for bumble bee habitat restoration efforts. Others suggested that landowners who enhance their lands could become susceptible to restrictions or lawsuits from private special interest groups.

*Our Response:* Programs are available to private landowners for managing habitat for listed species, and permits can be obtained to protect private landowners from the take prohibition when such taking is incidental to, and not the purpose of, carrying out an otherwise lawful activity. In addition, presence of a listed species does not

authorize government access to private lands. Private landowners may contact the U.S. Fish and Wildlife Ecological Services Field Office in their State to obtain information about these programs and permits.

*(69) Comment:* One commenter contends that consultations on actions affecting critical habitat cause delay and extra expenses to proposed projects. The commenter believes there is also a risk that landowners may unintentionally violate the regulations.

*Our Response:* The Service has determined that critical habitat is not determinable at this time. Section 7 of the Act requires Federal agencies to use their legal authorities to promote the conservation purposes of the Act and to consult with the Service to ensure that effects of actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of listed species. This added requirement may result in a delay in the project, but we will work as expeditiously as possible to complete the required section 7 consultation process in a timely manner. Furthermore, coordination with the Service early in the project development can help expedite the project and minimize the likelihood of delays.

*(70) Comment:* Several commenters expressed concern that listing this species may hinder research and conservation efforts for the rusty patched bumble bee rather than protect it and may hamper conservation of other native pollinators overall.

*Our Response:* Research that is conducted for the purpose of recovering a species is an activity that can be authorized under section 10 of the Act, normally referred to as a recovery permit, or can be conducted by certain State conservation agencies by virtue of

their authority under section 6 of the Act. We will continue to support research important for recovery of the rusty patched bumble bee. Similarly, management efforts that support the species but may result in some level of take can be authorized through use of incidental take statements or permits. It is not the intent of the Service to hamper conservation of other natural resources through its efforts to recover listed species, and we strive to prevent undue impediments.

*(71) Comment:* One commenter expressed concern that listing the rusty patched bumble bee could restrict vital uses of pesticides that promote public health and safety, protect our nation's infrastructure, and create healthy homes and greenspaces.

*Our Response:* Although we are required to base listing determinations solely on the best available scientific and commercial data, we will continue to work with organizations and agencies in reviewing the effects of specific pesticides on bumble bees during recovery planning and in section 7 consultations for this species. In so doing, we will work closely with involved parties to craft effective recovery strategies that benefit the species without incurring unnecessary restrictions or risking public health and safety.

## **Determination**

Section 4 of the Act (16 U.S.C. 1533), and its implementing regulations at 50 CFR part 424, set forth the procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. Under section 4(a)(1) of the Act, we may list a species based on (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. Listing actions may be warranted based on any of the above threat factors, singly or in combination.

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the rusty patched bumble bee. Habitat loss and degradation from residential and commercial development and agricultural conversion occurred rangewide and resulted in fragmentation and isolation of the species from formerly contiguous native habitat. Habitat loss and degradation have resulted in the loss of the diverse floral resources needed throughout the rusty patched bumble bee's long feeding season, as well as loss of appropriate nesting and overwintering sites. Although much of the habitat conversion occurred in the past, the dramatic reduction and fragmentation of habitat have persistent and ongoing effects on the viability of populations; furthermore, conversion of native habitats to agriculture (*i.e.*, monocultures) or other uses is still occurring today (Factor A).

The species' range (as measured by the number of counties occupied) has been reduced by 87 percent, and its current distribution is limited to just one to a few populations in each of 12 States and Ontario, with an 88-percent decrease in the number of populations known historically. Of the 103 known current populations, 96 percent have been documented by 5 or fewer individual bees; only 1 population has had more

than 30 individuals observed in any given year. Drought frequency and increased duration of high temperatures are likely to increase due to climate change, further restricting floral resources, reducing foraging times, and fragmenting or eliminating populations (Factor E). Fungi such as *N. bombi*, parasites such as *Crithidia bombi* and *Apicystis bombi*, deformed wing virus, acute bee paralysis, and bacteria are all suspected causes of decline for the rusty patched bumble bee (Factor C).

Pesticide use, including the use of many insecticides that have known lethal and sublethal effects to bumble bees, is occurring at increasing levels rangewide (Factor E). Similarly, herbicide use occurs rangewide and can reduce available floral resources (Factor A). Additionally, the rusty patched bumble bee is not able to naturally recolonize unoccupied areas that are not connected by suitable dispersal habitat (Factors A and E).

The rusty patched bumble bee's reproductive strategy makes it particularly vulnerable to the effects of small population size. The species can experience a "diploid male vortex," where the number of nonviable males increases as abundance declines, thereby further reducing population size (Factor E). There is virtually no redundancy of populations within each occupied ecoregion, further increasing the risk of loss of representation of existing genetic lineages and, ultimately, extinction.

These threats have already resulted in the extirpation of the rusty patched bumble bee throughout an estimated 87 percent of its range, and these threats are likely to continue or increase in severity. Although the relative contributions of pesticides, pathogens, loss of floral resources, and other threats to the species' past and continued

decline are not known, the prevailing data indicate that threats are acting synergistically and additively and that the combination of multiple threats is likely more harmful than a single threat acting alone. Regardless of the sources of the decline, the last 16 years of population data are not indicative of healthy colonies or healthy populations. Thus, the species is vulnerable to extinction even without further external stressors acting upon the populations.

Existing regulatory mechanisms vary across the species' range. The rusty patched bumble bee is listed as State endangered in Vermont (which prohibits taking, possessing, or transporting) and as special concern (no legal protection) in Connecticut, Michigan, and Wisconsin, and is protected under Canada's Species at Risk Act. Although these and other regulatory mechanisms exist, they do not currently ameliorate threats to the rusty patched bumble bee, as evidenced by the species' rapid, ongoing decline.

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 throughout all or a significant portion of its range within the foreseeable future." We find that the rusty patched bumble bee is presently in danger of extinction throughout its entire range. Relative to its historical (pre-2000s) condition, the abundance of rusty patched bumble bees has declined precipitously over a short period of time.

Further adding to the species' imperilment, its reproductive strategy (haplodiploidy) renders it particularly sensitive to loss of genetic diversity, which is

further exacerbated by decreasing population size (for example, diploid male vortex). The persisting colonies are few in number and continue to be affected by high-severity stressors, including pathogens, pesticides, habitat loss and degradation, effects of climate change, and small population dynamics, throughout all of the species' range. These stressors are acting synergistically and additively on the species, and the combination of multiple stressors is more harmful than a single stressor acting alone. Due to the above factors, the species does not have the adaptive capacity in its current state to withstand physical and biological changes in the environment presently or into the future, and optimistic modeling suggests that all but one of the ecoregions are predicted to be extirpated within 5 years (Szymanski *et al.* 2016, Table 7.3).

In conclusion, the species' spatial extent has been considerably reduced and the remaining populations are under threat from a variety of factors acting in combination to significantly reduce the overall viability of the species. The risk of extinction is currently high because the number of remaining populations is small, most of those populations are extremely small in size (all but 2 have 10 or fewer individuals), and the species' range is severely reduced. Therefore, on the basis of the best available scientific and commercial information, we are listing the rusty patched bumble bee as an endangered species in accordance with sections 3(6) and 4(a)(1) of the Act. We find that a threatened species status is not appropriate for the rusty patched bumble bee because (1) given its current condition, the species presently lacks the ability to withstand physical and biological changes in the environment; (2) based on the prediction that all but one ecoregion will be

extinct within 5 years, the species presently has a high probability of extinction; and (3) even if the current stressors were to be reduced or eliminated, the species would still be at high risk of extinction based on small population size effects alone.

Under the Act and our implementing regulations, a species may warrant listing if it is endangered or threatened throughout all or a significant portion of its range. Because we have determined that the rusty patched bumble bee is endangered throughout all of its range, no portion of its range can be “significant” for purposes of the definitions of “endangered species” and “threatened species.” See the 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 37577; July 1, 2014).

### **Critical Habitat**

Section 4(a)(3) of the Act, as amended, and implementing regulations in 50 CFR 424.12, require that, to the maximum extent prudent and determinable, we designate critical habitat at the time the species is determined to be an endangered or threatened species. 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 the 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 (for example, 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. Critical habitat designation does not allow the government or public to access private lands, nor does it 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 under section 7(a)(2) of the Act, but even if consultation leads to a finding that the action would likely cause destruction or adverse modification of critical habitat, the resulting obligation of the Federal action agency and the landowner is not to restore or recover the species, but rather to 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) that are essential to the conservation of the species and (2) that 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, 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 if we determine that such areas are essential for the conservation of the species.

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. For example, 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.

Our regulations (50 CFR 424.12(a)(1)) state that the designation of critical habitat is not prudent when any of the following situations exist: (i) 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 (ii) such designation of critical habitat would not be beneficial to the species. The regulations also provide that, in determining whether a designation of critical habitat would not be beneficial to the species, the factors that the Services may consider include but are not limited to: Whether the present or threatened destruction, modification, or curtailment of a species' habitat or range is not a threat to the species, or whether any areas meet the definition of "critical habitat" (50 CFR 424.12(a)(1)(ii)).

We do not know of any imminent threat of take attributed to collection or vandalism for the rusty patched bumble bee. The available information does not indicate that identification and mapping of critical habitat is likely to initiate any threat of collection or vandalism for the bee. Therefore, in the absence of finding that the designation of critical habitat would increase threats to the species, if there are benefits to the species from a critical habitat designation, a finding that designation is prudent is warranted.

The potential benefits of designation may include: (1) Triggering consultation under section 7 of the Act, in new areas for actions in which there may be a Federal nexus where it would not otherwise occur because, for example, it is unoccupied; (2) focusing conservation activities on the most essential features and areas; (3) providing educational benefits to State or county governments or private entities; and (4) preventing people from causing inadvertent harm to the protected species. Because designation of critical habitat will not likely increase the degree of threat to the species and may provide

some measure of benefit, designation of critical habitat may be prudent for the rusty patched bumble bee.

Our regulations (50 CFR 424.12(a)(2)) further state that critical habitat is not determinable when one or both of the following situations exists: (1) Information sufficient to perform required analysis of the impacts of the designation is lacking; or (2) the biological needs of the species are not sufficiently well known to permit identification of an area as critical habitat.

Delineation of critical habitat requires identification of the physical or biological features, within the geographical area occupied by the species, essential to the species' conservation. In considering whether features are essential to the conservation of the species, the Service may consider an appropriate quality, quantity, and spatial and temporal arrangement of habitat characteristics in the context of the life-history needs, condition, and status of the species. These characteristics include but are not limited to space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, or rearing (or development) of offspring; and habitats that are protected from disturbance. Information regarding the rusty patched bumble bee life-history needs is complex, and complete data are lacking for most of them. For example, little is known about the overwintering habitats of foundress queens; however, information is currently being collected that may provide important knowledge on this topic. Consequently, a careful assessment of the biological information is still ongoing,

and we are still in the process of acquiring the information needed to perform that assessment. The information sufficient to perform a required analysis of the impacts of the designation is lacking, and therefore, we find designation of critical habitat to be not determinable at this time.

#### *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 the 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.

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 address 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 draft and final 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 downlisting or 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. When completed, the draft recovery plan and the final recovery plan will be available on our website (<http://www.fws.gov/endangered>), or from our Twin Cities Ecological Service Field 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 (for example, 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 Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, and Wisconsin are eligible for Federal funds to implement management actions that promote the protection or recovery of the rusty patched 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 this species. 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**).

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 proposed or 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 consultation as described in the preceding paragraph include management and any other landscape-altering activities on Federal lands, for example, lands administered by the National Park Service, U.S. Fish and Wildlife Service, and U.S. Forest Service.

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 listed 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 proposed listing on proposed and ongoing activities within the range of the species proposed for listing.

Based on the best available information, the following activities may potentially result in a violation of section 9 of the Act; this list is not comprehensive:

- (1) Unauthorized handling or collecting of the species;
- (2) The unauthorized release of biological control agents that attack any life stage of the rusty patched bumble bee, including the unauthorized use of herbicides, pesticides, or other chemicals in habitats in which the rusty patched bumble bee is known to occur;
- (3) Unauthorized release of nonnative species or native species that carry pathogens, diseases, or fungi that are known or suspected to adversely affect rusty patched bumble bee where the species is known to occur;
- (4) Unauthorized modification, removal, or destruction of the habitat (including vegetation and soils) in which the rusty patched bumble bee is known to occur; and

(5) Unauthorized discharge of chemicals or fill material into any wetlands in which the rusty patched bumble bee is known to occur.

Questions regarding whether specific activities would constitute a violation of section 9 of the Act should be directed to the Twin Cities Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

### **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 (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).

### **References Cited**

A complete list of references cited in this rulemaking is available on the Internet at <http://www.regulations.gov> and upon request from the Twin Cities Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

## **Authors**

The primary authors of this final rule are the staff members of the Twin Cities Ecological Services Field Office and the Region 3 Regional 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; 4201–4245, unless otherwise noted.

2. In § 17.11(h), add an entry for “Bumble bee, rusty patched” to the List of Endangered and Threatened Wildlife in alphabetical order under INSECTS to read follows:

#### **§ 17.11 Endangered and threatened wildlife.**

\* \* \* \* \*

(h) \* \* \*

Common name	Scientific name	Where Listed	Status	Listing Citations and Applicable Rules
* * * * *				
INSECTS				
* * * * *				
Bumble bee, rusty patched	<i>Bombus affinis</i>	Wherever found	E	82 FR [insert <b>Federal Register</b> page where the document begins], [Insert date of publication in the <b>Federal Register</b> ].
* * * * *				

\* \* \* \* \*

Dated: **December 27, 2016.**

Teresa R. Christopher,

*Acting Director, U.S. Fish and Wildlife Service.*

**Billing Code 4333-15**

[FR Doc. 2017-00195 Filed: 1/10/2017 8:45 am; Publication Date: 1/11/2017]