DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R1–ES–2007–0024; 92220–1113–0000–C6]

RIN 1018–AU96

Endangered and Threatened Wildlife and Plants; Removing the Hawaiian Hawk From the Federal List of Endangered and Threatened Wildlife

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: Under the authority of the Endangered Species Act of 1973, as amended (Act), we, the U.S. Fish and Wildlife Service (Service), are removing the Hawaiian hawk (io) (*Buteo solitarius*) from the Federal List of Endangered and Threatened Wildlife. This determination is based on a thorough review of the best available scientific and commercial data, including comments received, which indicates the Hawaiian hawk no longer meets the definition of an endangered species or a threatened species under the Act. Our review of the status of this species shows that the rangewide population estimates have been stable for at least 30 years, and that the species is not currently, nor is likely to become again, an endangered species within the foreseeable future in all or a significant portion of its range.

DATES: This rule is effective February 3, 2020.

ADDRESSES: This final rule and the post-delisting monitoring plan are available on the internet at *http://www.regulations.gov* under Docket No. FWS–R1–ES–2007–0024. Comments, materials received, and supporting documentation used in preparation of this final rule will be available for public inspection, by appointment, during normal business hours, at the Service's Pacific Islands Fish and Wildlife Office, 300 Ala Moana Boulevard, Room 3–122, Honolulu, HI 96850.

FOR FURTHER INFORMATION CONTACT: Katherine Mullett, Acting Field Supervisor, telephone: 808–792–9400. Direct all questions or requests for additional information to: U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, 300 Ala Moana Boulevard, Room 3–122, Honolulu, HI 96850. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Relay Service at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. Under the Act, a species may be added to the Lists of Endangered and Threatened Wildlife and Plants (Lists) if it is endangered or threatened throughout all or a significant portion of its range. Adding a species to the Lists (''listing'') or removing a species from the Lists (''delisting'') can only be accomplished by issuing a rule.

What this document does. This rule removes the Hawaiian hawk (io, *Buteo solitarius*) from the Federal List of Endangered and Threatened Wildlife. This rule also makes available the final post-delisting monitoring plan for the Hawaiian hawk.

Basis for our action. Under the 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. We may delist a species if the best scientific and commercial data indicate the species is neither endangered nor threatened. We have determined that the Hawaiian hawk has recovered and no longer meets the definition of an endangered species or a threatened species under the Act.

Threats to the Hawaiian hawk identified at the time of listing in 1967 included low number of individuals and loss and degradation of habitat. We reviewed all available scientific and commercial information pertaining to the five factors in our status review of the Hawaii hawk, and the results are summarized below.

- We consider the Hawaiian hawk not threatened by a low number of individuals, habitat loss, or degradation because this hawk has a stable population, estimated at approximately 3,000 individuals. The population is well distributed in both native and nonnative habitat from sea level to 8,530 feet (2,600 meters) elevation across the island of Hawaii. At the time of listing it was thought that only several hundred Hawaiian hawks were in existence, and that they depended solely on native habitat. Since then, studies have shown that Hawaiian hawks nest, breed, and feed in both native and nonnative habitats, and eat a variety of nonnative prey (*e.g.,* rats, and mongooses). Additionally, many Hawaiian hawks exist on public lands managed for fish and wildlife conservation.
- The threat of harassment and shooting of Hawaiian hawks may exist as noted in the recovery plan; however, we do not find this a significant threat. The Hawaiian hawk has retained a stable population over decades and there is much public support for protecting Hawaiian hawks for cultural reasons because it is widely recognized as an aumakua or familial guardian spirit in Hawaiian culture.
- Studies have shown that Hawaiian hawks are not threatened by predation from rats, mongooses, or cats, nor are they threatened by bird diseases (*i.e.,* avian malaria, and avian pox) or environmental contaminants.
- We do not consider effects related to climate change to be a substantial threat to the species at this time, and we do not expect climate change effects to rise to the magnitude or severity such that the species will be likely to become an endangered species within the foreseeable future. While we recognize that climate change effects, such as rising ambient atmospheric temperature, increased drought, intensified hurricanes, and shift in native and nonnative species' ranges, may have potential effects on Hawaiian hawks and their habitat, the best available information does not indicate that such effects will significantly impact Hawaiian hawks or the habitat upon which they depend, now or in the foreseeable future. We expect that the Hawaiian hawk's susceptibility to climate change effects is low into the foreseeable future given the range and diversity of habitats occupied by the species, the adaptability of the species, and its resistance to bird diseases such as avian malaria and avian pox virus. The species' resistance to bird diseases is important because studies show that the range of mosquitos (the vectors of avian malaria), which is currently limited to lower, warmer elevations, will expand to higher elevations due to increased temperatures associated with climate change.
- We do not consider rapid ohia death (ROD) to be a substantial threat to the Hawaiian hawk at this time, and we do not expect the impacts from ROD to rise to the magnitude or severity such that the species will be likely to become an endangered species within the foreseeable future. While we recognize that ROD is a threat to the integrity of native ohia forests and species solely dependent on ohia trees, Hawaiian hawks are not solely dependent on native forests and are highly adaptable. We believe it is reasonable to conclude that the Hawaiian hawk will likely

adapt to future changes and maintain viability into the foreseeable future. Additionally, there is more forested area on the island of Hawaii than in the recent past. There are increased reforestation and conservation efforts, and the timber industry is shifting from nonnative to native trees, as well as using harvesting techniques that are more Hawaiian hawk and forest bird friendly.

Therefore, we find that delisting the Hawaiian hawk is warranted, and we are removing this taxon from the Federal List of Endangered and Threatened Wildlife. We prepared a final post-delisting monitoring plan to monitor the Hawaiian hawk after delisting to verify that the species remains secure.

Peer review and public comment. We sought comments on the proposed delisting rule from independent specialists to ensure that this rule is based on scientifically sound data, assumptions, and analyses. We also considered all comments and information we received during all comment periods.

Previous Federal Actions

The Hawaiian hawk was added to the U.S. Department of the Interior's list of endangered species on March 11, 1967 (32 FR 4001), in accordance with section 1(c) of the Endangered Species Preservation Act of October 15, 1966 (80 Stat. 926; 16 U.S.C. 668aa(c)). Its status as an endangered species was retained under the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 *et seq.*). A final recovery plan for the Hawaiian hawk was completed in 1984 (USFWS 1984).

The Service published a proposed rule to reclassify the Hawaiian hawk from endangered to threatened on August 5, 1993 (58 FR 41684), based on a population estimate suggesting the number of Hawaiian hawks had increased from the low hundreds reported at the time of listing (Griffin 1985, p. 25) to between 1,400 and 2,500 birds. New research had shown that although there was extensive destruction of native forests, and therefore a reduction in quality of available native habitat (USFWS 1984, pp. 10–11), the Hawaiian hawk had adapted to occupy, and nest in, nonnative forests and had exploited nonnative prey species (Berger 1981, p. 79; Griffin 1985, pp. 70–71; Scott *et al.* 1986, pp. 78–79). Further, Hawaiian hawks were reportedly not threatened by disease or contaminants (Griffin 1985, pp. 104–107, 194). During the public comment period for that 1993 proposed rule, several commenters expressed concerns that the population data used in the proposal were not current and that the hawk's breeding success was insufficiently known to warrant reclassification. Based on these comments, the Service funded an island-wide survey in 1993 to provide a contemporary rangewide assessment of the distribution and population status of the hawk, which determined the Hawaiian hawk population to be between 1,200 and 2,400 birds (Morrison *et al.* 1994, p. 23; Hall *et al.* 1997, pp. 13–14). The decision regarding whether or not to reclassify the Hawaiian hawk from endangered to threatened status was postponed.

On February 3, 1997, the Service received a petition from the National Wilderness Institute to delist the Hawaiian hawk, and we responded to that petition in a letter dated June 19, 1998, indicating that we could not immediately work on the petition due to higher priority listing and delisting actions. Also in 1997, the Service formed the Io Recovery Working Group (IRWG), the mission of which was to provide advice on aspects of the recovery of the Hawaiian hawk. Following its first meeting in December 1997, the IRWG forwarded a report to the Service, in which they recommended that, rather than focusing primarily on abundance to assess the Hawaiian hawk's overall status, field studies should look at hawk numbers in combination with trends (IRWG 1998, p. 4).

The Service funded a detailed ecological and demographic study of the Hawaiian hawk and an island-wide survey in 1998–1999 (Klavitter 2000, entire). Upon review of the study results (Klavitter 2000, entire) and other existing information, the IRWG recommended that the Hawaiian hawk be delisted due to the lack of evidence of a decline in numbers, survival rates, or productivity, and lack of evidence of current substantial loss or degradation of preferred nesting or foraging habitats (IRWG 2001, p. 3). The IRWG identified nesting and foraging habitat loss as a potential significant threat to the species and recommended that regular population and habitat monitoring take place to assess factors that may produce future declines (IRWG 2001, p. 2).

The Service funded a third island-wide survey of Hawaiian hawks that was completed in the summer of 2007, to determine if there had been any population change since the 1998–1999 surveys (Klavitter 2000, entire) and to better determine differences in hawk density by region and habitat (Gorresen *et al.* 2008, entire). There was no change in the estimated number of individuals in the population, the range was not contracting, and that Hawaiian hawks occurred in both native and nonnative habitats. The results prompted the Service to publish a proposed rule to delist the Hawaiian hawk, due to recovery and new information, on August 6, 2008 (73 FR 45680), with a 60-day comment period that closed October 6, 2008. This proposed rule constituted our 90-day finding and 12-month finding on the February 3, 1997, National Wilderness Institute's petition. The proposed delisting was based on rangewide population estimates (Griffin 1985, entire; Hall *et al.* 1997, entire; Klavitter *et al.* 2003, entire; Gorresen *et al.* 2008, entire) and demographic modeling (Klavitter *et al.* 2003, entire).

The Service reopened the comment period for the August 6, 2008, proposed delisting rule and made available a draft post-delisting monitoring plan (draft PDM plan) for the Hawaiian hawk on February 11, 2009 (74 FR 6853); the reopened comment period lasted 60 days, ending April 13, 2009 (USFWS 2008, entire). We again reopened the proposed rule's comment period, and published a schedule of public hearings on the proposed rule, on June 5, 2009 (74 FR 27004); this reopened comment period also lasted 60 days, ending August 4, 2009. We held public hearings on June 30, 2009, in Hilo, Hawaii, and on July 1, 2009, in Captain Cook, Hawaii.

We subsequently reopened the proposed rule's comment period twice: On February 12, 2014, we reopened the proposed rule's comment period for a third time (79 FR 8413), with a 60-day comment period that closed on April 14, 2014; and on October 30, 2018, we reopened the proposed rule's comment period for a fourth time (83 FR 54561), with a 30-day comment period that closed on November 29, 2018.

In total, we accepted public comments on the proposed delisting of the Hawaiian hawk for 270 days.

Summary of Changes From the Proposed Rule

In preparing this final rule, we reviewed and fully considered all comments we received during all five comment periods from the peer reviewers, State, and public on the proposed delisting rule. We have not made substantive changes in this final delisting rule based on the comments we received during the five comment periods on the August 6, 2008, proposed rule (73 FR 45680). Based on peer review, State, and public comments, we incorporated text and information into this final rule in order to clarify some of the language in the proposed rule.

These minor changes are outlined below, and discussed under Summary of Comments and Recommendations or Summary of Factors Affecting the Species. This final rule incorporates the following changes, based on comments we received on our proposed rule:

(1) The proposed rule stated the elevation range of the Hawaiian hawk was 1,000 to 8,530 feet (ft) (300 to 2,600 meters (m)). Due to a peer review comment, and subsequent literature review, we changed the elevation range to sea level to 8,530 ft (2,600 m).

(2) Due to comments we received, we conducted a preliminary in-house population viability assessment (PVA) and updated or expanded upon discussions regarding drought, hurricanes, climate change, the nonnative invasive plant strawberry guava (*Psidium cattleianum*), ROD, feral ungulates, urban development and land subdivisions, biofuel crops, rodenticides, shooting, disease, and the forestry industry in this rule (see *Recovery Plan Implementation,* Summary of Factors Affecting the Species, and Summary of Comments and Recommendations).

(3) Due to a peer review comment requesting that we provide additional information and clarification regarding the Hawaiian hawk's current and past population abundance estimates to avoid any potential confusion over apparent changes, we modestly revised the species description under *Species Information.*

(4) We incorporated the new information provided in the 2014 and 2018 notices of the reopening of the comment period on the proposed delisting rule (79 FR 8413, February 12, 2014; 83 FR 54561, October 30, 2018) under *Species Information* and Summary of Factors Affecting the Species. This includes information on trends pertaining to human population growth, land subdivisions, development, and urbanization; ROD, ohia dieback, and ohia rust; strawberry guava biocontrol; environmental impacts associated with climate change; shooting; Hawaiian hawk population viability; volcanic activity, and myriad conservation efforts.

Background

Species Information

The following discussion contains information updated from that presented in the proposed rule to remove the Hawaiian hawk from the Federal List of Endangered and Threatened Wildlife, which published in the **Federal Register** on August 6, 2008 (73 FR 45680). A thorough discussion of the species' description, population density, and abundance is also found in that proposed rule.

Species Description and Life History

The Hawaiian hawk is a small, broad-winged hawk endemic to (found only in) the Hawaiian islands, and is the only extant (still in the wild) member of the family Accipitridae endemic to the Hawaiian islands (Berger 1981, p. 83; Olson and James 1982, p. 35). The Hawaiian hawk occurs in light and dark color morphs, with intermediate plumages and much individual variation (Griffin 1985, p. 46). The light morph is dark brown above and white below, with brown flecks on the upper breast. The dark morph is dark brown above and below. The legs, feet, and cere (fleshy area between the eye and bill) are yellow in adults and bluish-green in juveniles (Griffin 1985, pp. 58–63).

The Hawaiian hawk occurs over much of the island of Hawaii, from sea level to 8,530 ft (2,600 m) elevation, and occupies a variety of habitat types, including native forest, secondary forest consisting primarily of nonnative plant species, agricultural areas, and pastures (Banko 1980, pp. 2–9, 15–16; Scott *et al.* 1986, pp. 78–79; Hall *et al.* 1997, p. 14; Griffin *et al.* 1998, p. 661; Klavitter 2000, pp. 2, 38, 42–45; Klavitter *et al.* 2003, pp. 169–170, 172, 173; VanderWerf 2008, in litt.).

Hawaiian hawks are monogamous and defend their territories year-round (Griffin 1985, pp. 119–121; Griffin *et al.* 1998, p. 660; Clarkson and Laniawe 2000, pp. 6–7). Their breeding distribution is restricted to the island of Hawaii, but there have been at least eight observations of vagrant individuals on the islands of Kauai, Oahu, and Maui since 1778 (Banko 1980, pp. 1–9), and fossil remains have been found on the islands of Molokai (Olson and James 1982, p. 35) and Kauai (Olson and James 1996, pp. 65–69; Burney *et al.* 2001, pp. 628–629). They may have once completed their life history on other islands; however, since written records, Hawaiian hawks have only been known to breed on the island of Hawaii (Banko 1980, p. 2). Egg laying generally occurs from March to June, hatching from May to July, and fledging from July to September (Griffin 1985, p. 110; Griffin *et al.* 1998, p. 656). Clutch size is usually one egg (Griffin 1985, p. 76; Griffin *et al.* 1998, p. 657; Klavitter *et al.* 2003, p. 170), but there are a few records of two or three young per nest (Griffin 1985, pp. 75, 80, Appendix 1). Hawaiian hawks take about 3 years to obtain adult plumage (Clarkson and Laniawe 2000, p. 13); however, there are few data available on the age at which Hawaiian hawks first breed. Although one researcher documented a 3-year-old female pairing with a male of unknown age and building a nest, no eggs were laid. Another researcher documented the formation of a pair bond between a 3-year-old male and a female with immature plumage. In this case, no nesting attempts were documented (Clarkson and Laniawe 2000, p. 10). Based on this information, we believe that the Hawaiian hawk first breeds at 3 or 4 years of age.

The first detailed study of the ecology and life history of the Hawaiian hawk was conducted from 1980 to 1982 (Griffin 1985, entire). During this study, researchers found no significant difference in nest success between habitats dominated by native versus nonnative vegetation (Griffin 1985, pp. 102–103; Scott *et al.* 1986, pp. 78–79). However, of 113 Hawaiian hawk nests found during a demographic study in 1998 to 1999, 81 percent were in native ohia (*Metrosideros polymorpha*) trees (Klavitter *et al.* 2003, p. 170). Additionally, Griffin (1998, p. 661) found little evidence the Hawaiian hawk was adversely affected by bird disease (avian pox and avian malaria) (Griffin 1998, p. 661). There was also no evidence the hawk was affected by introduced mammalian predators, such as cats, rats, or mongoose, or environmental contaminants such as dichloro-diphenyl-trichloroethane (DDT) (Griffin 1985, pp. 104–107, 194; Griffin *et al.* 1998, pp. 658, 661).

The Hawaiian hawk is adaptable and versatile in its feeding habits and preys on a variety of rodents, birds, and large insects (Munro 1944, p. 48; Griffin 1985, pp. 142–145, Appendix 5; Griffin *et al.* 1998, p. 659). Hawaiian hawks use still-hunting to capture prey by perching in trees or other vegetation and stooping on its prey with its wings tucked and talons forward (Clarkson and Laniawe 2000, p. 3). Of 52 successful hunting bouts observed, 48 (92 percent) were by this method, only four (8 percent) were by the hawk soaring or hovering then flying down to grasp their prey (Griffin 1985, p. 162).

Based on food items delivered by hawks to nestlings, 32 percent of the Hawaiian hawk's diet is birds and 37 percent is small mammals of two species (rats (*Rattus* spp.) and house mouse (*Mus musculus*)); the remaining proportion of food items included mongoose (*Herpestes auropunctatus*), insects, and unidentified prey items (some of which were mammals) (Griffin 1985, pp. 143–144).

Demographics

Observations made at Sia, The Comanche Nation Ethno-Ornithological Initiative, a permitted Native American raptor aviary in Oklahoma, show the lifespan of Hawaiian hawks is at least 21 years in captivity (Volker 2018, pers. comm.). This is several years more than the previously reported captive lifespan of 17 years (Clarkson and Laniawe 2000, p. 10; U.S. Department of Agriculture–Natural Resources Conservation Service (NRCS) 2007, p. 1). Sia received the two birds in 2015 from the Memphis Zoo, and in 2016, the Hawaiian hawk pair produced the first-ever Hawaiian hawk chick to hatch in captivity (USFWS 2017, in litt.; Volker 2018, pers. comm.). Sia attributes their success to their feeding methods. Staff at Sia realized the metabolism of Hawaiian hawks is much more active than other raptors of the same size, so they increased the Hawaiian hawk's food supply substantially. They found that the female Hawaiian hawk eats as much daily as a male bald eagle in captivity. The Hawaiian hawk pair are nesting again at 21 years of age, showing not only that Hawaiian hawks can live for at least 21 years, but may also reproduce at that age in captivity.

In all successful nests monitored (n=113), only one young fledged per nest (Klavitter *et al.* 2003, entire). Annual survival of juveniles and adults was high (0.50 (± 0.10) and 0.94 (± 0.04), respectively), and fecundity (fertility) was 0.23 (± 0.04) female young/breeding female in all habitats combined. Nest success in native habitat tended to be slightly higher than in exotic habitats, but juvenile survival was higher in exotic habitats than in native forest (Klavitter *et al.* 2003, p. 170). There was no significant difference in fecundity or population growth rate between native and mixed, native and exotic, or mixed and exotic habitats (Klavitter 2000, pp. 39, 56; Klavitter *et al.* 2003, pp. 170–171). The overall rate of population growth based on data from all habitat areas was 1.03 (± 0.04), which is not significantly different than 1.0, indicating that there was no detectable change in population size across habitat types from 1998 to 1999 (Klavitter 2000, pp. 40, 56; Klavitter *et al.* 2003, pp. 170–171).

We developed a preliminary in-house female-specific stochastic PVA model for the Hawaiian hawk (Vorsino and Nelson 2016, unpublished data) using the mean and variance values of age-specific survival and fecundity in native, mixed, and exotic habitats (Gorresen *et al.* 2008, p. 15; Klavitter *et al.* 2003, p. 170). Population viability was assessed for optimal (*i.e.,* areas with high hawk density: Native forest with grass understory, mature native forest, native-exotic forest, and orchards) and sub-optimal habitats (*i.e.,* areas with moderate to low hawk densities: Degraded due to strawberry guava, coffee planting, and urban expansion), where population partitioning was based on Hawaiian hawk densities within the habitat types (optimal/sub-optimal) reported in Gorresen *et al.* (2008, p. 15). The effect of catastrophic weather events on the viability of Hawaiian hawks in these various habitat types was also projected and assessed. None of the projected PVAs showed a Hawaiian hawk population that declined to either zero, or below a quasi-extinction threshold of 50 individuals, when projected over 30 years across 500 model iterations. At 30 years, an approximate doubling of the population in optimal habitat was projected, whereas the population in sub-optimal habitat decreased by approximately one third. This reduction in the sub-optimal habitats population was the result of habitat degradation and reduced habitat carrying capacity for areas affected by strawberry guava invasion, coffee planting, and urban expansion. Of the habitat threats identified in this PVA, invasion by strawberry guava of mixed native-exotic and mature native forest had the most negative impact on Hawaiian hawk habitat. This PVA provides insight regarding Hawaiian hawk viability with respect to the quality of different habitat types in relation to impacts from strawberry guava, coffee farming, urban development, and an increase in extreme weather events due to climate change. Although it does not consider any potentially positive impacts resulting from the new strawberry guava biocontrol efforts or the increase in conservation actions and acreage of land set aside for conservation in perpetuity since the Hawaiian hawk's 1967 listing, we feel it continues to be useful in our analysis. We included this PVA in our analysis of strawberry guava under our Factor A discussion, below (also see *Recovery Plan Implementation,* below).

Abundance and Distribution

At the time of listing in 1967, it was thought that the Hawaiian hawk population was in the low hundreds; however, there was little information pertaining to Hawaiian hawk abundance and distribution prior to listing, so this estimate has been questioned. Since listing, several population abundance and distribution studies have been conducted. The first preliminary population estimate of 1,400 to 2,500 birds (Griffin 1985, p. 25) was based on home range size from radio telemetry data and distribution data from island-wide bird surveys. Surveys conducted from December 1993 to February 1994 showed the Hawaiian hawk widely distributed in both native and nonnative habitats and provided a population estimate of 1,600 birds, made up of 1,120 adults, or 560 pairs (Morrison *et al.* 1994, p. 23; Hall *et al.* 1997, pp. 13–14). A detailed ecological and demographic study of the Hawaiian hawk was conducted from 1998 to 1999; this study found that Hawaiian hawks were broadly distributed throughout the island of Hawaii, and that 58.7 percent of the island (2,372 square miles (sq mi) (6,143 square kilometers (sq km))) contained habitat for the hawk. State and Federal forests, parks, and refuges, totaling 754 sq mi (1,954 sq km), supported 469 hawks, and made up 32 percent of the species' habitat (Klavitter *et al.* 2003, p. 170). The total Hawaiian hawk population in this study was estimated to be 1,457 (± 176.3 birds) (Klavitter 2000, pp. 38, 96; Klavitter *et al.* 2003, p. 170).

The most recent island-wide survey was completed in the summer of 2007 (Gorresen *et al.* 2008, entire). The researchers used updated vegetation maps and methods to calculate population and density estimates for the 1998–1999 survey data and the 2007 survey data. Using consistent maps and methods, they were then able to compare population size and density over time to see if there had been significant changes. They found that, in reanalyzing the 1998–1999 data (Klavitter 2000, entire) with the new method, the Hawaiian hawk population actually numbered 3,239 (95 percent confidence interval (CI)=2,610 to 3,868) birds in 1998, which was more than double the original estimate of 1,457 (± 176.3 birds) from 1998–1999 (Klavitter 2000, pp. 38, 96; Klavitter *et al.* 2003, p. 170). Using the 2007 survey data, they estimated the population to number 3,085 hawks (95 percent CI=2,496 to 3,680). There was no significant difference in densities found in 1998 and 2007, and no evidence that the Hawaiian hawk's spatial distribution had changed (Gorresen *et al.* 2008, p. 6). Using these new analytic methods not available during past Hawaiian hawk population surveys, the Hawaiian hawk's population size was consistently about 3,000 individuals between 1997 and 2007 (Gorresen *et al.* 2008, entire). The differences in population estimates from the earlier surveys were not actual differences but were due only to differences in analytic methods. All available data indicate that the Hawaiian hawk population had remained relatively constant over a nearly 30 year period (approximately 1980 through 2008) (Griffin 2008, in litt.). Based on our 5-factor analysis under section 4 of the Act (see Summary of Factors Affecting the Species, below), we conclude there has not been any significant change in the Hawaiian hawk's population trend over the past 10 or more years (2008 through 2019).

Recovery Planning and Recovery Criteria

Section 4(f) of the Act directs us to develop and implement recovery plans for the conservation and survival of endangered and threatened species unless we determine that such a plan will not promote the conservation of the species. Under section 4(f)(1)(B)(ii), recovery plans must, to the maximum extent practicable, include: ''Objective, measurable criteria which, when met, would result in a determination, in accordance with the provisions of [section 4 of the Act], that the species be removed from the list.'' However, revisions to the List (adding, removing, or reclassifying a species) must reflect determinations made in accordance with sections 4(a)(1) and 4(b) of the Act. Section 4(a)(1) requires that the Secretary determine whether a species is endangered or threatened (or not) because of one or more of five threat factors. Section 4(b) of the Act requires that the determination be made ''solely on the basis of the best scientific and commercial data available.'' Therefore, recovery criteria should help indicate when we would anticipate that an analysis of the five threat factors under section 4(a)(1) would result in a determination that the species is no longer an endangered species or threatened species because of any of the five statutory factors (see Summary of Factors Affecting the Species, below).

While recovery plans provide important guidance to the Service, States, and other partners on methods of minimizing threats to listed species and measurable objectives against which to measure progress towards recovery, they are not regulatory documents and cannot substitute for the determinations and promulgation of regulations required under section 4(a)(1) of the Act. A decision to revise the status of, or remove a species from, the Federal List of Endangered and Threatened Wildlife (50 CFR 17.11(h)) is ultimately based on an analysis of the best scientific and commercial data then available to determine whether a species is no longer an endangered species or a threatened species, regardless of whether that information differs from the recovery plan.

There are many paths to recovery of a species, and recovery may be achieved without all criteria being fully met. For example, one or more criteria may be exceeded while other criteria may not yet be accomplished. In that instance, we may determine that the threats are minimized sufficiently and the species is robust enough to remove from the List. In other cases, recovery opportunities may be discovered that were not known when the recovery plan was finalized. These opportunities may be used instead of methods identified in the recovery plan. Likewise, information on the species may be discovered that was not known at the time the recovery plan was finalized. The new information may change the extent to which criteria need to be met for recognizing recovery of the species. Recovery of a species is a dynamic process requiring adaptive management that may, or may not, fully follow the guidance provided in a recovery plan.

Recovery Planning

The Hawaiian hawk was listed as an endangered species in 1967 (32 FR 4001; March 11, 1967) based on a perceived low population number, purported range contraction from several Hawaiian islands to just one (the island of Hawaii), and habitat loss and degradation of native forests from agriculture, logging, and commercial development (Orenstein 1968, pp. 21–27; Berger 1981, p. 79; USFWS 1984, pp. 1–13; Klavitter *et al.* 2003, p. 165). Additionally, at the time of listing, raptors around the world were declining due to contaminants such as DDT (Newton 1979, *in* Newton 2017, p. 101).

The final recovery plan for the Hawaiian hawk was published in 1984, 17 years after listing (USFWS 1984, entire). Between 1967 (the year the Hawaiian hawk was listed as endangered) and 1984, substantial research was conducted on the life history, behavior, and habitat requirements of Hawaiian hawks (USFWS 1984, p. 24). The recovery plan notes that the results from the research studies conducted on Hawaiian hawks between 1967 and 1984 were used to develop the recovery recommendations, many of which had already been implemented and completed (USFWS 1984, p. 1). Field biologists had already documented Hawaiian hawk abundance and distribution, and had assessed several factors that were thought to be limiting Hawaiian hawk population abundance (*i.e.,* illegal shooting, habitat loss and degradation), all of which are recovery criteria to downlist the Hawaiian hawk from endangered status to threatened status, as outlined under *Recovery Plan Implementation,* below.

The Hawaiian hawk population in 1983 was estimated to be between 1,400 and 2,500 birds, based on reproductive parameters, home range, measures of forest and agricultural habitats, and distribution information collected during island-wide forest bird surveys that included hawk sightings and audio detections (Griffin 1985, p. 25; Klavitter *et al.* 2003, p. 165). Hawaiian hawks were distributed across the island of Hawaii and occupied virtually all forest types, native and nonnative, except for the extremely arid parts of the island (*e.g.,* grasslands of the northwest part of the island and Kau desert) (Scott *et al.* 1986, pp. 78–79). A subsequent 1989 publication provided an updated population estimate of 2,700 Hawaiian hawks containing 900 breeding pairs (Griffin 1989, p. 160). These population and distribution data indicated that Hawaiian hawks were more common than previously thought (Griffin 1985, entire; Scott *et al.* 1986, entire; Griffin 1989, entire; USFWS 1984, p. 8).

The primary recovery objective of the Hawaiian hawk recovery plan is to ''ensure a self-sustaining Hawaiian hawk population in the range of 1,500 to 2,500 adult birds in the wild, as distributed in 1983, and maintained in stable, secure habitat'' (USFWS 1984, p. 25). No explanation for the recovery goal of 1,500 to 2,500 birds is provided in the recovery plan, but these numbers are presumably based on the earliest population estimate (Griffin 1985, entire). A population abundance between 1,400 and 2,500 hawks was considered sufficient to maintain a self-sustaining wild Hawaiian hawk population (USFWS 1984, p. 24). The plan also states that ''for the purposes of tracking the progress of recovery, 2,000 will be used as a target to reclassify to threatened status,'' and that ''criteria for complete delisting will be further developed'' (USFWS 1984, p. 25). The recovery plan was never updated to include criteria for delisting the Hawaiian hawk.

In 1997, the Service formed the IRWG, the mission of which was to provide advice on aspects of the recovery of the Hawaiian hawk. The IRWG included scientific experts from universities and the U.S. Geological Survey (USGS), and a Service biologist. Following its first meeting in December 1997, the IRWG forwarded a report to the Service, in which they recommended that, rather than focusing primarily on abundance to assess the Hawaiian hawk's overall status, field studies should look at hawk numbers in combination with trends

(IRWG 1998, p. 4). The Service funded a detailed ecological and demographic study of the Hawaiian hawk and island-wide survey in 1998–1999 (Klavitter 2000, entire). Upon review of the 2000 study results (Klavitter 2000, entire) and other existing information, the IRWG recommended that the Hawaiian hawk be delisted due to the lack of evidence of a decline in numbers, survival rates, or productivity, and the lack of evidence of current substantial loss or degradation of preferred nesting or foraging habitats (IRWG 2001, p. 3). The IRWG identified nesting and foraging habitat loss as a potential significant threat to the species and recommended that regular population and habitat monitoring take place to assess factors that may produce future declines (IRWG 2001, p. 2). The IRWG stopped meeting after submitting their final recommendation to the Service (Nelson 2018, in litt.).

The collective survey data, including rangewide population estimates (Griffin 1985; Hall *et al.* 1997; Klavitter *et al.* 2003; Gorresen *et al.* 2008) and demographic modeling (Klavitter *et al.* 2003), indicate that the Hawaiian hawk population was, and continues to be, stable; Hawaiian hawks use both native and nonnative habitats for breeding and hunting; the species' range is not contracting; and there is no evidence of threat from environmental contaminants.

Recovery Plan Implementation

Our knowledge of the Hawaiian hawk has improved since it was listed as endangered in 1967. Although contemporary population abundance estimates may be lower than that of historical Hawaiian hawk population abundance, and the Hawaiian hawk's current range may have contracted from that of its historical range, there is no known existing data to quantify such declines. Instead, data show that the Hawaiian hawk has had a stable population that covers large areas on the island of Hawaii in varying habitat types and elevations for at least the past 30 years. The following criteria for downlisting the Hawaiian hawk have all been met or exceeded as described in the recovery plan:

(1) *Determine present distribution and abundance of the Hawaiian hawk on the island of Hawaii:* As described above, the data collected (Griffin 1985, entire; Griffin 1989, entire), Scott *et al.* (1986, entire), Hall *et al.* (1997, entire), Klavitter *et al.* (2000, entire; 2003, entire), and Gorresen *et al.* (2008, entire) have determined the present distribution and abundance of the Hawaiian hawk on the island of Hawaii. We currently estimate that the Hawaiian hawk breeding range (2,222 sq mi (5,755 sq km)) supports a population of approximately 3,000 Hawaiian hawks (Gorresen *et al.* 2008, p. 1).

(2) *Determine Hawaiian hawk habitat requirements:* Hawaiian hawks are well distributed throughout forest and adjacent habitat on the island of Hawaii (Griffin 1985, p. 70; Scott *et al.* 1986, p. 79; Hall *et al.* 1997, entire; Klavitter 2000, pp. 13, 37; Klavitter 2003, pp. 165, 167, 169–172; Gorresen *et al.* 2008, pp. 25, 39). Hawaiian hawk population density varies among habitat type and region. For example, Hawaiian hawk densities in Kau and Hamakua regions were highest in the native-exotic forest habitat, but in Kona, Hawaiian hawk density was highest in mature native forests with grass understory, followed by mature native forests, and then native-exotic (Gorresen *et al.* 2008, p. 47). While Hamakua and Kau had relatively high Hawaiian hawk densities in orchard forests (0.78 ± 0.27 and 0.58 ± 0.27 hawks per square kilometer (km^2)), respectively), Puna's highest Hawaiian hawk density was in shrubland ($0.40 + 0.12$ hawks per km^2) (Gorresen *et al.* 2008, p. 47). Hawaiian hawks prefer forests that are only modestly dense so that they have an accessible understory where prey can be seen more easily (Gorresen *et al.* 2008, p. 25).

(3) *Identify factors limiting the Hawaiian hawk population:* No factors are considered to be currently limiting the Hawaiian hawk population (USFWS 1984, p. 8; IRWG 2001, pp. 1–4; Gorresen *et al.* 2008, pp. 22–26). Factors that were considered as potential limiting factors include: Loss of nesting and foraging habitat (*e.g.,* canopy loss and conversion of forest habitats to open grassland, logging, agriculture, human population growth and associated urbanization), nonnative plants (*i.e.,* strawberry guava), effects due to climate change (*e.g.,* drought and hurricanes), ohia dieback, ROD), harassment and shooting, predation, bird disease, and environmental contaminants.

(4) *Minimize or eliminate identified detrimental factors:* Because the Hawaiian hawk has had a stable population for at least 30 years, and occupies both native and nonnative habitat, habitat loss and degradation are not currently considered a threat to the survival of Hawaiian hawks. Additionally, as noted in the document we published in the **Federal Register** on October 30, 2018 (83 FR 54561), there are ongoing and increasingly productive conservation actions, such as:

- Restoration and reforestation actions that have increased the amount of habitat for the Hawaiian hawk (*e.g.,* Hawaii Legacy Reforestation initiative, Sustainable Hawaii Initiative, Hawaii Plant Extinction Prevention Program, Hawaii Invasive Species Council, Hawaii Rare Plant Program);
- The installation of ungulate exclusion fencing;
- Landowner partnerships (*e.g.,* Three Mountain Alliance Watershed Partnership (TMA), Kohala Watershed Partnership (KWP), Mauna Kea Watershed Alliance (MKWA));
- An increase in the amount of land set aside for conservation in perpetuity (*e.g.,* The Nature Conservancy's (TNC) Kona Hema Preserve, Hakalau National Wildlife Refuge (NWR) (both Hakalau and Kona Units), and the addition of the Kahuku Unit at Hawaii Volcanoes National Park (NP)).

Additional activities implemented by the public and private organizations and partnerships on the island of Hawaii include programs that implement fencing inspections and necessary replacements, native species surveys, greenhouse and native plant propagation, prevention of the spread of ROD, and outreach. Hawaiian hawks benefit from native forest protection and restoration because it provides breeding, nesting, and foraging habitat. For more details regarding conservation measures, please see the Factor A discussion, below.

Research regarding the potential impacts of environmental pollutants (*e.g.,* heavy metals and pesticides) on Hawaiian hawk reproductive success has been evaluated (USFWS 1984, p. 21; Spiers et al. 2018, entire). In the early 1980s, abandoned Hawaiian hawk eggs and dead hawks were tested for organochlorine compounds (*e.g.,* DDT) and heavy metals. None or only trace amounts of these contaminants were found (USFWS 1984, p. 21). In 2015 and 2016, carcasses of Hawaiian hawks were tested for both first and second generation anticoagulating rodenticide exposure (Spiers et al. 2018, entire). Fifteen Hawaiian hawk carcasses were tested. No detectable levels of first generation anticoagulating rodenticides (FGARs) were found in liver, whole carcass, or kidney tissue; however, detectable levels of second generation anticoagulating rodenticides (SGARs) were found in either the whole body, liver, or kidney tissue (or a combination of these three) of all 15 Hawaiian hawk carcasses (Spiers et al. 2018, entire). Four Hawaiian hawk carcasses had detectable levels of bromadiolone, 12 had detectable levels of brodifacoum, and 4 had detectable levels of difethialone; one carcass had detectable levels of all three SGARs, and 5 carcasses had detectable levels of two SGARs. The highest and second highest residue values were for brodifacoum in Hawaiian hawk liver samples (768 nanograms per gram (ng/g) (0.768 milligrams per kilogram (mg/kg)) and 141 ng/g (0.141 mg/kg), respectively).

Although research has not been conducted on Hawaiian hawks to determine the specific effects of secondary poisoning resulting from their consumption of rodents killed by rodenticides (*e.g.,* zinc phosphide, diphacinone, chlorophacinone, bromethalin, fumarin, FGARs, and SCARs), elsewhere, owls fed rats killed with fumarin appear to be unaffected (Mendenhall and Pank 1980, p. 313), and zinc phosphide is considered relatively safe for non-target species due to its rapid decomposition into harmless products (Hood 1972, p. 86; Gervais *et al.* 2011, in litt.). Multiple wild avian species exposed to both first and second generation anticoagulating rodenticides did not test positive for the more commonly used FGARs (warfarin, diphacinone, and chlorophacinone); however, many tested positive for SGARs (brodifacoum, bromadiolone, and difethialone), including various hawk species (California Department of Pesticide Regulation (DPR) 2013, pp. 10; 47). Due to their lethal impact on non-target animals (either directly (*i.e.,* bleed to death) or indirectly (*e.g.,* they get sick and subsequently either get hit by a car or become an easier target for depredation by other animals), SGARs were banned in the consumer market in 2008, with an effective date of June 4, 2011 (EPA 2008, pp. 7–8, 12–13, 26); however, they are still allowed for certain commercial uses in specific quantities and designated areas (*e.g.,* within and around agricultural buildings). There are 73 products containing SGARs (bromadiolone, brodifacoum, or difethialone) and 42 products containing FGARs (warfarin, chlorophacinone, or diphacinone) registered for use in Hawaii, and one product containing warfarin (*National Pesticide Information Retrieval System*-State of Hawaii 2019, entire). In 2011, the revised use law went into effect. Hawaiian hawks are likely to benefit from the reduced risk of secondary poisoning because of decreased use of SGARs. We believe the Hawaiian hawk population is robust enough to maintain viability into the foreseeable future even if some mortalities occur now or in the future resulting from SGARs, because despite the broader use of SGARs before 2008, the Hawaiian hawk population remained stable with approximately 3,000 individuals.

The human population growth predictions for Hawaii County from 2010 to 2040 were projected to be 1.6 percent growth annually; however, the annual average growth rate thus far (2010 through 2017) is just 1.1 percent (Hawaii Department of Business, Economic Development and Tourism (DBEDT) 2018, in litt.). It is predicted to briefly increase to 1.3 percent in the early 2020s, but is then anticipated to remain at 1.0 to 1.1 percent through 2045 (DBEDT 2018, p. 2). Further, new housing subdivisions within known Hawaiian hawk habitat on the island of Hawaii tapered off around 2011, with little to no change through 2018 (Amidon 2019, unpublished data). Additionally, the logging industry has adopted harvesting practices that avoid clear cutting and maintain continuous habitat (Koch and Walter 2018, in litt.). Further, although ohia dieback still exists, and we recognize that ROD is a threat to ohia forests, there is no evidence that either has altered the Hawaiian hawk's population abundance or its life-history needs.

Nonnative plants, such as strawberry guava, are not anticipated to alter Hawaiian hawk population abundance in the foreseeable future; however, we recognize that monostands of guava are not conducive to Hawaiian hawk foraging. With warming of the atmosphere due to climate change, the range of strawberry guava may shift to higher elevations and negatively impact Hawaiian hawks (Vorsino *et al.* 2014, p. 2). Our preliminary PVA indicates that if not abated, strawberry guava may impact Hawaiian hawk distribution in 30 or more years (Vorsino and Nelson 2016, unpublished data). However, since the successful deployment in 2012 of a biocontrol agent for strawberry guava (the Brazilian scale insect, *Tectococcus ovatus*) in two demonstration plots on the island of Hawaii (Chaney and Johnson in HCC 2013, p. 74), the State of Hawaii and other partners have been working to establish *Tectococcus ovatus* in strawberry guava-invaded forests throughout the islands (Chaney and Johnson 2018, in litt.; Kerr 2018, pers. comm.). *Tectococcus ovatus* is a highly host-specific, leaf-galling insect. By 2017, these efforts have resulted in established, self-reproducing insect populations on strawberry guava at multiple forest sites on five islands (Hawaii, Kauai, Lanai, Maui, and Oahu) (Chaney and Johnson 2018, in litt.). Under favorable conditions, *Tectococcus ovatus* populations have increased rapidly and spread within 33 to 262 ft (10 to 80 m) from site of application in a period of several months (Chaney and Johnson 2018, in litt.). *Tectococcus ovatus* typically weakens the trees through its feeding, reducing the ability of the tree to fruit and set seed, thereby limiting its spread (U.S. Forest Service (USFS) 2016, in litt.). *Tectococcus ovatus* is not expected to kill already established trees (Hawaii Department of Agriculture 2011, in litt.). Galling at the Waiakea site (on Hawaii island) has increased to a level that is beginning to reduce strawberry guava fruiting, although full impacts are not yet apparent. It is too early to know what effect this may have on guava tree vigor and rate of spread; however, infestations of *Tectococcus ovatus* are expected to spread gradually on the target plant, reaching damaging levels within a few years at each release site (Kerr 2018, pers. comm.). The USFS will continue to provide technical assistance and monitor the impacts of this biocontrol agent. It is expected that a noticeable decrease in the spread of strawberry guava will be observed over a period of years (Kerr 2018, pers. comm.). At this time, impacts from strawberry guava have not been shown to alter Hawaiian hawk population abundance or any stage of the species' life history.

Harassment and shooting do unfortunately occur. According to our Office of Law Enforcement's records, there have been seven documented cases that involve Hawaiian hawk gunshot wounds between 2013 and 2018. Four of these occurred in 2018.

However, shooting is not considered a significant threat because Hawaiian hawks have maintained a population of approximately 3,000 individuals over several decades and are revered in Hawaiian culture as an aumakua or familial guardian spirit. Additionally, the public has shown much support for keeping Hawaiian hawks on the State list of endangered and threatened species.

Shooting of Hawaiian hawks is not a new threat, and despite its occurrence over time, the Hawaiian hawk population has maintained a stable population. On the effective date of this rule (see **DATES**, above), shooting of Hawaiian hawks will remain illegal under both the Migratory Bird Treaty Act (MBTA; 16 U.S.C. 703–712) and Hawaii State law.

Predation has not been shown to impact the Hawaiian hawk at any life stage. Most of the nonnative species in Hawaii that are considered predators are actually prey to Hawaiian hawks (*e.g.,* rats, mice, mongooses). Cats are an exception; however, cats have not been shown to be a limiting factor of

Hawaiian hawk abundance and survival. Lastly, bird disease (*i.e.,* avian pox and avian malaria) and environmental contaminants are not known to negatively impact the Hawaiian hawk. If West Nile virus appears on Hawaii, however, relisting the Hawaiian hawk may be warranted (for more information, see our Factor C discussion, below).

(5) *Monitor Hawaiian hawk population status:* Monitoring of Hawaiian hawk population status occurred intermittently from the late 1960s through 2008.

(6) *Develop and implement a public information program to inform public agencies and private citizens about the Hawaiian hawk:* Collaborative outreach was conducted in the late 1970s and early 1980s by the Service, State, University of Hawaii College of Tropical Agriculture and Human Resources, local businesses, and nongovernmental organizations, including, but not limited to, the Conservation Council of Hawaii. Colorful brochures and posters were distributed to the public and schools. In 1982, every school in the State received Hawaiian hawk posters for National Wildlife Week. Also during this time, several news articles on the Hawaiian hawk appeared in local newspapers. In the 1990s, the Peregrine Fund (Fund) had an un-releasable, rehabilitated Hawaiian hawk that was blinded by an injury. The Fund used that hawk for public outreach events and took it to schools. The Panaewa Zoo on the island of Hawaii, near Hilo, has a permanent resident Hawaiian hawk on public display that is used for educational purposes; this zoo also works closely with permitted Hawaiian hawk rehabilitators. The Hawaii Wildlife Center and Three Ring Ranch both rehabilitate injured Hawaiian hawks and conduct public educational programs. Additionally, there is a Hawaiian hawk pair at Sia, The Comanche Nation Ethno-Ornithological Initiative, a permitted Native American raptor aviary in Oklahoma (Volker 2018, pers. comm.). These 21-year-old Hawaiian hawks are used by Sia for educational purposes (Volker 2018, pers. comm.).

(7) *Determine appropriate status of this species and downlist or delist:* The IRWG, Service, and all three peer reviewers concur that delisting is the appropriate status for Hawaiian hawks. We have considered each of the five factors, and we have determined that the Hawaiian hawk is not currently at risk of extinction throughout all or a significant portion of its range (*i.e.,* endangered), nor is it likely to become an endangered species in the foreseeable future (*i.e.,* threatened). If post-delisting monitoring shows a significant decline in Hawaiian hawk population abundance or detects that the habitat quality or quantity is being altered or destroyed such that it does not or will not properly support a self-sustaining, viable Hawaiian hawk population, a relisting may be warranted.

Summary of Factors Affecting the Species

Section 4 of the Act and its implementing regulations (50 CFR part 424) set forth the procedures for listing species, reclassifying species, or removing species from listed status. ''Species'' is defined by the Act as including any species or subspecies of fish or wildlife or plants, and any distinct vertebrate population segment of fish or wildlife that interbreeds when mature (16 U.S.C. 1532(16)). Once the ''species'' is determined, we then evaluate whether that species may be endangered or threatened because of one or more of the five factors described in section 4(a)(1) of the Act. We must consider these same five factors in delisting a species. We may delist a species according to 50 CFR 424.11(d) if the best available scientific and commercial data indicate that the species is neither endangered nor threatened for the following reasons: (1) The species is extinct; (2) the species has recovered and is no longer endangered or threatened; and/or (3) the original scientific data used at the time the species was classified were in error.

A recovered species is one that no longer meets the Act's definition of an endangered or threatened species. Determining whether a species is recovered requires consideration of the same five statutory factors specified in section 4(a)(1) of the Act. For species that are already listed as an endangered or threatened species, this analysis is an evaluation of both the threats currently facing the species and the threats that are reasonably likely to affect the species in the foreseeable future, as well as any conservation actions or regulations that ameliorate those threats.

A species is ''endangered'' for purposes of the Act if it is in danger of extinction throughout all or a significant portion of its range, and is ''threatened'' if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Following this 5-factor analysis we evaluated the status of the Hawaiian hawk.

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

The 1993 proposed rule to reclassify the Hawaiian hawk from endangered to threatened (58 FR 41684; August 5, 1993), the 2001 IRWG report (IRWG 2001, p. 3), Klavitter *et al.* (2003, p. 173), and Gorresen *et al.* (2008, pp. 9–11) all identified loss of preferred nesting and foraging habitats as a potential threat to the Hawaiian hawk. Although their specific concerns were variously stated, the causes all fit into one of the following categories: (1) Urbanization/lack of secure habitat; (2) conversion of sugarcane fields to unsuitable habitat; (3) increase in fire frequency; (4) invasion of plant species in the understory that degrade foraging habitat by concealing prey; and (5) environmental fluctuations. Below, we address the first four of these specific threats to Hawaiian hawk habitat. We discuss environmental fluctuations under Factor E.

Urbanization/Lack of Secure Habitat

The Hawaiian hawk is broadly distributed on the island of Hawaii, and 58.7 percent of the island (2,372 sq mi (6,144 sq km)) contains habitat for the hawk. Of this habitat, 55 percent is zoned for agriculture, and 44.7 percent is zoned for conservation. Approximately 754 sq mi (1,953 sq km), or 32 percent, of the Hawaiian hawk's habitat is located on protected lands in the form of State and Federal forests, parks, and refuges, and less than 1 percent is rural or urban-zoned land that has the potential to be impacted by or subjected to future development (Klavitter 2000, p. 38; Klavitter *et al.* 2003, p. 170; State of Hawaii 2007, in litt.).

The amount of urban land or land subject to potential future urbanization is generally localized in areas surrounding existing cities (County of Hawaii 2005a as amended 2014, pp. 14–2, 14–9, 14–11—Land Use Pattern Allocation Guide Map (LUPAG) 1–25), and represents less than 1 percent of Hawaiian hawk habitat on the island. Changes in zoning from one category to another (*e.g.,* agricultural to urban) are made through petitions to the State Land Use Commission. There are currently no pending petitions that would change current agriculture, conservation, or rural zones to urban on the island of Hawaii (State of Hawaii Land Use Commission 2018, in litt.). Similarly, no amendments are currently proposed to the County of Hawaii General Plan (2005a, as amended, entire) that would reflect projected future urban growth beyond what was projected in the original 2005 plan. Additionally, because the Hawaiian hawk is broadly distributed on the island and can use a variety of habitats, the potential future conversion of a relatively small amount of its habitat (less than 1 percent) surrounding existing urban uses is not a threat to the viability of the species.

We examined trends in human population, urban and exurban growth, and land subdivision over the past three decades for Hawaii County to better understand the history of habitat change on Hawaii and the potential effects of these factors on Hawaiian hawk habitat and density in the future. Previously, in 2012, the Hawaii DBEDT projected the population of Hawaii County to grow 1.6 percent annually from 2010 to 2040, a 32 percent population increase over 20 years (DBEDT 2012, pp. 1–2). However, the actual population growth for Hawaii County between 2010 and 2017 was only 1.1 percent annually (DBEDT 2018, in litt.). A brief increase to 1.3 is anticipated in the early 2020s; however, the population growth is predicted to remain between 1.0 and 1.1 percent from 2018 through 2045 (DBEDT 2018, p. 2). The number of private residential construction permits issued annually by Hawaii County for single-family dwellings more than doubled from 1995 to 2007, from 908 to 1,852 permits (County of Hawaii 2010, table 16.7). The total number of housing units built nearly doubled from 1984 to 2007, from 39,164 to 77,650 units (County of Hawaii 2010, tables 16.9 and 16.10). The pace of home construction was most rapid in the Puna and North Kona districts, with increases of 105.6 and 67.7 percent, respectively, in the total number of housing units built from 1990 to 2000 (County of Hawaii 2010, table 16.13). By 2014, there were approximately 85,173 housing units on the island of Hawaii, with 4,811 building permits issued, the highest level since 2006 (County of Hawaii 2015, p. 144). Of the 4,811 building permits, 958 were private housing, with the remaining going to nonresidential, additions, and alterations (County of Hawaii 2015, pp. 145–146). Between 2000 and 2008, the number of new single family homes on the island of Hawaii built per year oscillated between 1,000 and 2,700 new homes (County of Hawaii 2015, p. 146). This range dropped between 2009 and 2013, oscillating between 580 and 700 new homes built per year (County of Hawaii 2015, p. 146). Hilo and Kailua-Kona remain the areas with the most development (County of Hawaii 2015, p. 150). We expect residential and exurban construction for Hawaii County to continue at a similar pace in the foreseeable future as indicated by expected human population growth for Hawaii County and home construction for the island of Hawaii for the last three decades (County of Hawaii 2010, tables 16.1–16.13; County of Hawaii 2015, pp. 144–146, 149–150; DBEDT 2018, in litt.; DBEDT 2018, pp. 2–3).

We also analyzed tax-map keys (TMKs) for the years 1996 and 2009, to better understand land subdivision on Hawaii and how this might relate to potential changes in Hawaiian hawk habitat (Nelson and Metevier 2010, unpublished data). Over this time period, the number of land parcels less than 1 acre (ac) (0.4 hectare (ha)) in size increased almost three-fold from 25,925 to 74,620 parcels. This equates to an approximate three-fold increase in the land area for parcels of this size, from 7,680 ac (3,107 ha or 12 square miles (sq mi) (31 square kilometers (sq km)) to 24,458 ac (9,897 ha or 38 sq mi (100 sq km)) and is equal to approximately 1.7 percent of the hawk's current range. Overall, the largest increase in subdivisions occurred in the Puna region. Parcels of 1 ac or less in size do not require a grubbing permit if grubbing (*i.e.,* vegetation clearing) does not alter the general and localized drainage pattern with respect to abutting properties (County of Hawaii 2005b, p. 10–2).

In response to several comments made during the fourth reopened comment period (83 FR 54561; October 30, 2018), we expanded upon Nelson and Metevier's (2010, unpublished data) analysis. Amidon (2019, unpublished data) found that the number of 1 ac or smaller parcels on the island of Hawaii increased by 2,000 parcels between 2009 to 2011, but then leveled off to approximately 69,000 parcels of that size from 2011 to 2018. The overall decrease in parcels of this size is due to landowners merging smaller parcels into larger parcels. Subdivision of large land parcels in to smaller parcels is often viewed as synonymous with development. With a plateau, if not decline, in both human population growth and parcel splitting, we do not see a huge push for development on Hawaii island nor find development on Hawaii island an imminent threat to Hawaiian hawk habitat, now or in the foreseeable future.

Although trends in urban and exurban growth show upward movement, the rate of growth has slowed, and trends in subdivisions have plateaued. The human population annual growth rate on the island has also decreased. Most urban and exurban growth is occurring in or adjacent to already developed areas. The rates of subdivision, development, and human population growth in the Puna region may slow even more due to the scope of impacts to the area resulting from Kilauea's 2018 eruption (USGS 2019, in litt.).

Conversion of Sugarcane Fields to Unsuitable Habitat

Sugarcane was historically an important crop on the island of Hawaii, and Hawaiian hawks have adapted to use these croplands for foraging where nest trees and perching structures were available. With the demise of the sugarcane industry on the island in the 1990s, sugarcane plantations were primarily converted to a diversity of agricultural uses (County of Hawaii 2005a, as amended 2014, pp. 1–8, 1–11), some of which (*e.g.,* large, patchily distributed monocultures of eucalyptus or macadamia nut trees with little edge) are not compatible with Hawaiian hawk nesting or foraging (Klavitter *et al.* 2003, p. 172). We anticipate that in these localized, patchily distributed areas where eucalyptus plantations are established, Hawaiian hawks will not be able to effectively forage or nest. It remains unclear if hawks will use these areas immediately following a harvest or at the time of initial planting. However, given the short-rotation times planned for these plantations (5 to 8 years) and the rapid growth-rate of eucalyptus on Hawaii (Whitesell *et al.* 1992, pp. ii, 2), these areas might be suitable only briefly for hawk foraging.

Conversion of agricultural lands to eucalyptus forests is an ongoing threat to the Hawaiian hawk, but the scope of this threat is limited primarily to the Hamakua coastline (County of Hawaii 2005a, as amended 2014, p. 14–20). These eucalyptus monocultures are patchily distributed, with mixed agricultural and residential uses in the surrounding areas. Approximately 24,000 ac (9,712 ha) (less than 2 percent of Hawaiian hawk habitat island-wide) of former sugarcane fields were being cultivated for eucalyptus production and ''thousands of additional acres'' were being planned as of 2005 (County of Hawaii 2005a, as amended 2014, pp. 2–4, 2–20). More recently, the forest industry is shifting away from nonnative tree species to native tree species such as koa (Koch and Walter 2018, in litt.). However, even if all 80,000 ac (32,375 ha) of the potential lands for cultivating forests in the Hamakua coast were converted to eucalyptus trees (County of Hawaii 2005a, as amended 2014, p. 14–20) in the foreseeable future, that would represent less than 5 percent of Hawaiian hawk habitat island-wide. For comparison, the Hamakua District contains 235,212 ac (95,187 ha) (59 percent) of lands designated for conservation thus far and in the foreseeable future (County of Hawaii 2005a, as amended 2014, p. 14–11). The amount of forested area on the island of Hawaii has increased in recent years due to restoration, conservation, and a shift in forestry practices toward native trees and more sustainable harvesting methods (Koch and Walter 2018, in litt.).

At a regional scale, we do not anticipate significant changes in hawk densities in response to this threat because many of the plantations are patchily distributed among areas with suitable habitat for foraging, perching, and nesting (*e.g.,* small agricultural operations, fallow sugarcane fields, riparian areas, and native and nonnative forest). The total amount of habitat converted (24,000 ac (9,712 ha)) represents less than 2 percent of all available habitat (Klavitter *et al.* 2003, p. 167). Furthermore, the amount of native forest areas on the island of Hawaii is actually increasing (Koch and Walter 2018, in litt.). Therefore, while conversion of sugarcane fields has reduced the total amount of suitable habitat along the Hamakua coast, the conservation actions across the island have increased suitable habitat (see ''Urbanization/Lack of Secure Habitat,'' above). Additionally, the scope and extent of this conversion is not likely to significantly impact the distribution or density of the Hawaiian hawk in such a way that would affect its viability.

Another potential threat is the conversion of current agricultural lands to crops for biodiesel fuel production (Gorresen *et al.* 2008, p. 10). Up to 185,000 ac (74,000 ha) of agricultural lands on the island of Hawaii would be suitable for such crop production (Poteet 2006, pp. 27–28), which represents up to 13 percent of the Hawaiian hawk's breeding range (Gorresen *et al.* 2008, p. 10). Some of the potential crops for renewable energy include sunflowers (herb) and *Jatropha curcas* (large shrub to small trees) from which oils are extracted. However, only a small fraction of the total acreage potentially usable for biofuels has supported biofuel crop production, most of which has been phased out (Pacific Biodiesel 2013, in litt.; Tummons 2013, pp. 1–2; Long 2018, pers. comm.). Additionally, the potential biofuel crops vary in terms of their feasibility and potential impacts to the Hawaiian hawk. Some biofuel crops will continue to provide suitable foraging areas while others may not. Further, all of the areas identified as potential sites for biofuel production are either fallow sugarcane fields or are currently being used for crop production, grazing, or forestry production (*e.g.,* eucalyptus) (Poteet 2006, pp. 27–28).

The U.S. Navy and University of Hawaii's Natural Energy Institute partnered around 2014 to explore the production and use of biofuels on the island of Hawaii through the Hawaii Military Biofuels Crop Assessment Program (Rivertop Solutions and Pacific Biodiesel Technologies 2015, entire); however, they have not since shown interest in further pursuit (Long 2018, pers. comm.). Additionally, as of 2018, there remains only one biodiesel plant on the island of Hawaii (Pacific Biodiesel Technologies), and the company has no plans to acquire or lease additional agriculture lands at this time (Long 2018, pers. comm.). The industry operations have diversified and now include processing imperfect macadamia nuts for oil used in cosmetics (Long 2018, pers. comm.). There are currently no farms dedicated solely to biofuel production on the island of Hawaii (Long 2018, pers. comm.). In 2008, there was one small (approximately 750 ac) family-owned farm that grew *Jatropha curcas* on 250 ac for the purpose of biofuel (Gima 2010, in litt.; Long 2018, pers. comm.); however, the *Jatropha curcas* production was phased out, and Pacific Biodiesel has since purchased the farm and now grows papaya on it (Long 2018, pers. comm.). Conversion of current agricultural lands to crops for biodiesel fuel production is not a threat to Hawaiian hawk habitat at this time, nor is it likely to become a threat in the foreseeable future.

Invasive Plant Species, Drought, and Increase in Fire Frequency

Historically, fires on the island of Hawaii were infrequent (Smith and Tunison 1992, pp. 395–397). In some areas, primarily mesic and dry habitats, the fire regime has changed dramatically with an accumulation of fine fuels, primarily alien grasses, which spread in the 1960s and 1970s (Smith and Tunison 1992, pp. 397–398). Increased fire frequency facilitates the spread of alien grass, which increases fine fuel loads, further increasing the likelihood of more frequent and larger fires (Smith and Tunison 1992, pp. 398–399). This positive feedback loop can inhibit the establishment of tree species if fires are too frequent (Smith and Tunison 1992, p. 399).

Because Hawaiian hawks rely on forests for nesting and perching, loss of these structural components would result in the loss of habitat. Approximately 26 percent (370,658 ac (150,000 ha)) of the Hawaiian hawk's breeding range is within mesic to dry forest habitat areas that are particularly susceptible to fire (Gorresen *et al.* 2008, p. 11). The average size of 58 fires that burned in Volcanoes NP from 1968 to 1991 was 507 ac (205 ha) (Smith and Tunison 1992, p. 398). This is roughly the size of the average home range of the Hawaiian hawk (Griffin 1985, p. 173). Therefore, large fires could remove habitat in one or a few hawk territories at one time, but we expect that hawks would maintain their territory if sufficient prey and forest structure remained such that they could still hunt, nest, and perch. At a regional scale and in the foreseeable future, we do not anticipate significant changes in hawk densities in response to this threat because most fires are expected to have a patchy distribution on the landscape such that some forest structure will continue to be present around or within these burned areas (Perry *et al.* 2011, p. 704; Bond and Keane 2017, p. 6; Pyne 2010, p. 4).

Only if large-scale changes to dry forests occurred, eliminating nesting and perching areas across large swaths of the leeward portion of the island, would the viability of the species potentially be at risk. Hawaii has experienced extreme droughts for extended time periods of time (National Oceanic and Atmospheric Administration (NOAA) 2011, in litt., p. 9; U.S. Drought Monitor 2011, in litt.; U.S. Drought Monitor-Hawaii Data 2019, entire), which exacerbate the risk of fire; however, the Hawaiian hawk population has remained stable and viable.

The available information on Hawaiian hawk distribution and habitat does not suggest that dry forests on the island of Hawaii are losing trees essential for Hawaiian hawk nesting and perching, or that such loss is likely to occur in the foreseeable future (*e.g.,* Puu Waawaa watershed, see ''Urbanization/Lack of Secure Habitat,'' above). Although drought frequency and duration may increase in Hawaii due to climate change (Chu *et al.* 2010, p. 4897; Diaz and Giambelluca 2011, p. 7; Timm *et al.* 2015, p. 92), the combination of the Hawaiian hawk's demonstrated adaptability with an increase in habitat restoration efforts (*e.g.,* Puuwaawaa Forest Reserve, Puuwaawaa Forest Bird Sanctuary, TMA, TNC's Kona Hema Preserve) leads us to conclude that Hawaiian hawks will remain stable and viable for the foreseeable future.

Therefore, while an increase in fire frequency due to alien plants and drought may reduce the amount of available habitat for nesting and perching, even when we consider increased drought frequency and duration due to climate change (for which models are highly variable and associated with uncertainty (Gregg 2018, p. 21)), we conclude that the maximum scope and extent of this habitat alteration that we can reasonably anticipate is not likely to have a significant impact on the distribution or density of the Hawaiian hawk in such a way that would affect its viability in the foreseeable future.

Environmental Changes in Response to Climate Change

The ongoing and projected changes in climate, and the impacts of global climate change and increasing temperatures on Hawaii ecosystems, are the subjects of active research. Analysis of the historical record indicates the surface temperature in Hawaii has been increasing since the early 1900s, with relatively rapid warming over the past 30 years. The average increase since 1975 has been 0.48 degrees Fahrenheit (°F) (0.27 degrees Celsius (°C)) per decade for annual mean temperature at elevations above 2,600 ft (800 m) and 0.16 °F (0.09 °C) per decade for elevations below 2,600 ft (800 m) (Giambelluca *et al.* 2008, pp. 3–4). Based on models using climate data downscaled for Hawaii, the ambient temperature is projected to increase by 3.8 to 7.7 °F (2.1 to 4.3 °C) over the 21st century, depending on elevation and which of the four Representative Concentration Pathway (RCP) emissions scenarios (RCP 2.6, 4.5, 6, and 8.5) are considered (Liao *et al.* 2015, p. 4344; van Vuuren et al. 2011, p.5; Intergovernmental Panel on Climate Change 2014, p. 8). Environmental conditions in tropical montane habitats can be strongly influenced by changes in sea surface temperature and atmospheric dynamics (Loope and Giambelluca 1998, pp. 504–505; Pounds *et al.* 1999, pp. 611–612; Still *et al.* 1999, p. 610; Benning *et al.* 2002, pp. 14,246–14,248; Giambelluca and Luke 2007, pp. 13–15). On the main Hawaiian Islands, predicted changes associated with increases in temperature include a shift in vegetation zones upslope, a similar shift in animal species' ranges, changes in mean precipitation with unpredictable effects on local environments, increased occurrence of drought cycles, and increases in intensity and numbers of hurricanes (tropical cyclones with winds of 74 miles per hour or higher) (Loope and Giambelluca 1998, pp. 514–515; Vecchi and Soden 2007, pp. 1068–1069, Figures 2 and 3; U.S. Global Change Research Program (US–GCRP) 2009, pp. 10, 12, 17–18, 32–33; Emanuel *et al.* 2008, p. 360, Figure 8; Yu *et al.* 2010, p. 1371, Figure 14; Giambelluca 2013, p. 6).

Since 1871, eight hurricanes, or remnants thereof, have caused substantial damage in Hawaii. The island of Hawaii, like the island chain, has fortunately evaded most hurricanes due to the surrounding cool water. In response to climate change, such environmental conditions are changing. With a projected shift in the path of the subtropical jet stream northward, away from Hawaii, more storms will be able to approach and reach the Hawaiian Islands from an easterly direction, with Hurricane Iselle in 2014 being an example (Murakami *et al.* 2013, p. 751). Although Hurricane Iselle morphed into a tropical storm before making landfall on the island, it caused extensive canopy loss in some regions of the island (Federal Emergency Management Agency (FEMA) 2014, in litt.). Hurricane or tropical storm Iselle is the strongest tropical storm to make landfall on the island of Hawaii in recorded history. Subsequently, in 2016, Hurricane Darby made landfall on the island of Hawaii but as a much weaker tropical storm.

Although changes in environmental conditions are anticipated in response to climate change, the cumulative data suggests the Hawaiian hawk will likely be able to adapt to these changes and that the range of the Hawaiian hawk, which spans much of the island of Hawaii, will provide the species with the redundancy and resiliency necessary to maintain viability under such a stochastic or catastrophic event. In addition, Hawaiian hawks have demonstrated the ability to maintain a viable, steady population through prolonged periods of drought (Gorresen et al. 2008, entire; U.S. Drought Monitor-Hawaii Data 2019, entire), the introduction of nonnative plants and animals, changes in forest species composition, changes in prey species, and ongoing human development and agricultural practices (Gorresen et al. 2008). We acknowledge that there may be unanticipated impacts on the Hawaiian hawk associated with climate change; however, as outlined in our Post Delisting Monitoring Plan, we will be monitoring the Hawaiian hawk and its habitat for five 5-years cycles, which will begin in 2024. If post-delisting monitoring detects a significant decline in the Hawaiian hawk population, or a significant change in habitat so that it would not support a self-sustaining Hawaiian hawk population, relisting may be warranted. For additional discussion, see Future Conservation Measures, below.

Invasive Species (Nonnative Feral Ungulates)

Feral ungulates, particularly pigs, goats, and feral cattle, degrade ohia and other forest habitats by spreading nonnative plant seeds, grazing and trampling native vegetation, and contributing to erosion (Cuddihy and Stone 1990, pp. 59–67, 74; Vitousek *et al.* 1997, p. 6). An increase in conservation measures across the island of Hawaii (see below and *Recovery Plan Implementation,* above), which include feral pig and other ungulate control and removal, benefit the Hawaiian hawks by decreasing the spread of nonnative plants reducing erosion. Because of the ongoing conservation measures, and the fact that Hawaiian hawks nest and hunt in a variety of native and nonnative habitats, we do not consider impacts from ungulates a population-level threat to the species.

Invasive Species (Concealing Prey)

Vegetative cover can be more important than prey abundance in the selection of hunting sites by raptors (Bechard 1982, p. 158). The Hawaiian hawk typically uses still-hunting to capture prey by perching in trees or other vegetation (Griffin 1985, p. 162; Clarkson and Laniawe 2000, p. 3). Hunting is thought to be inhibited in areas with close-standing trees that limit the Hawaiian hawk's ability to maneuver in flight and areas where there is dense understory where prey can hide. In addition, tree monocultures may not provide sufficient structural complexity and plant species diversity to support adequate prey abundances (Felton *et al.* 2016, p. S128). However, exotic tree, shrub, and grass habitats had similar hawk densities to some native habitats (*e.g.,* mature native forest), but were lower than densities recorded in native forests with an understory of grass (Klavitter *et al.* 2003, p. 169). The relationship between cover and demographic variables is likely to be complex given that a Hawaiian hawk's home range may span several habitat types and that the effect of various invasive species on total vegetation cover has not been well studied.

Strawberry guava (*Psidium cattleianum*), a small to medium-sized tree native to Brazil, is considered a potential threat to Hawaiian hawk habitat and the species' foraging abilities (State of Hawaii 2011, p. 46; Gorresen *et al.* 2008, p. 24). Since its introduction in the early 19th century, strawberry guava has expanded into most of the native lowland forests of Hawaii, becoming the dominant species in these areas (State of Hawaii 2011, pp. 2–4). Strawberry guava forms impenetrable stands of close-standing trees to the exclusion of all native species up to elevations of 2,100 ft (640 m) in some areas in the Hamakua region of Hawaii and has begun to invade native forests on Hawaii to elevations as high as 3,200 ft (975 m) (HDOA 2011, in litt.; USFS 2016, p. 2). Land area covered by closed strawberry guava forest is 39.4 sq mi (102.14 sq km) or 1.77 percent of the Hawaiian hawk's range (Gorresen 2008, unpublished data). Projected temperature and precipitation change in Hawaii will facilitate the continued spread of strawberry guava from its present distribution in low- and middle-elevation, wet and mesic forests, into higher elevation montane forests dominated by native species (Denslow 2008, p. 1). Based on predicted temperature and precipitation changes over the next 100 years (State of Hawaii 2011, p. 4; McDermott 2009, p. 1; Price *et al.* 2009, slides 22 and 23), strawberry guava could invade native forests on Hawaii to an elevation of approximately 6,000 ft (1,828 m), encompassing virtually all current middle- and high-elevation montane native forest with large ohia trees. Our preliminary PVA indicates that if not abated, strawberry guava may impact Hawaiian hawk distribution in 30 or more years (Vorsino and Nelson 2016, unpublished data). However, as discussed below, there are measures in place to slow, if not cease, the spread of strawberry guava on Hawaii Island and across the State.

As noted under *Recovery Plan Implementation,* above, a biocontrol agent for strawberry guava was released in 2012, and the most recent data (2018) shows the scale is spreading and beginning to weaken strawberry guava trees by reducing fruiting. At this time, impacts from strawberry guava have not been shown to alter the Hawaiian hawk's population abundance or any stage of its life history. The best available data indicate that, despite the introduction of a variety of invasive plant species on the island of Hawaii, the population size and distribution of the Hawaiian hawk has remained relatively unchanged for the past 30 years.

Invasive Species (Nonnative Pathogens of Native Forest Pillar Species)

Rapid ohia death (ROD), a fungal pathogen infecting ohia, one of Hawaii's dominant forest trees, is currently spreading across the State; ROD first appeared on the island of Hawaii around 2013 (University of Hawaii College of Tropical Agriculture and Human Resources-Rapid Ohia Death 2019, entire). In 2018, ROD was detected on the island of Kauai. ROD is caused by two species of Ceratocystis fungi, *C. huliohia* and *C. lukuohia,* the latter being the more virulent pathogen (Barnes *et al.* 2018, entire; University of Hawaii College of Tropical Agriculture and Human Resources-Rapid Ohia Death 2019, entire). With rapid spread and high stand mortality, all indications thus far suggest that this particular ohia stressor could alone, or in conjunction with other stressors, have far-reaching negative consequences for ohia forests. Humans and the abundant wood boring ambrosia beetle (*Xyleborus* spp.) are thought to be the two primary vectors causing the rapid spread of ROD by inadvertently spreading spores (College of Tropical Agriculture and Human Resources (CTAHR) 2019, in litt.; University of Hawaii College of Tropical Agriculture and Human Resources-Rapid Ohia Death 2019, entire). Thousands, if not tens-of-thousands, of ohia trees (135,000 ac (54,633 ha)) have been infected with ROD in just the past few years, and openings in the tree canopy in affected areas may encourage the spread of invasive, nonnative plants, further contributing to ohia forest decline. Because Hawaiian hawks occupy both native and nonnative habitats, and reportedly do well in mixed-exotic forests (Berger 1981, p. 79; Griffin 1985, pp. 70–72), the impact of ROD on Hawaiian hawks is yet to be determined. While we recognize that ROD is a severe threat to the integrity of native ohia forests and species solely dependent on ohia trees, because Hawaiian hawks do not solely depend on native forests and are highly adaptable, it is reasonable to conclude that the Hawaiian hawk will adapt to future changes in forest tree composition and maintain its viability in the foreseeable future. Additionally, habitat monitoring is included in the PDM plan.

The primary factor behind ohia dieback is the species' trait of experiencing synchronized generational turnover following senescence of same-age trees (Mueller-Dombois 1985, p. 150; Akashi and Mueller-Dombois 1995, pp. 449–450). Ohia dieback in itself does not appear to be a significant threat in native forest areas; however, dieback events in some cases may create conditions for nonnative plants to gain a foothold in native forests. Because Hawaiian hawks have maintained a stable population of approximately 3,000 individuals over decades, despite the presence of ohia dieback, we do not consider ohia dieback a threat to the survival of Hawaiian hawks.

Ohia rust is a plant pathogen caused by the fungus species *Puccinia psidii,* which affects hundreds of plants in the Myrtaceae family including *Eucalyptus* spp., *Melaleuca* spp., and Hawaii's native ohia. The strain of ohia rust currently present in Hawaii likely causes very little impact to ohia trees. Risk to Hawaiian hawks, however, includes the possibility of a more potent strain being introduced, and/or the possibility of ohia rust acting in concert with other ohia stressors such as drought, the effects of climate change, or ohia wilt to compound cumulative effects resulting in overall ohia forest decline. However, because Hawaiian hawks have maintained a stable population of approximately 3,000 individuals over at least three decades, despite the presence of ohia rust, we do not consider ohia rust a threat to the survival of Hawaiian hawks.

Conservation Actions That Benefit the Hawaiian Hawk and its Habitat

Since the Hawaiian hawk was listed as an endangered species (32 FR 4001; March 11, 1967), there has been a marked increase in protection of native forests, lands set aside for conservation in perpetuity, and ongoing on-the-ground conservation efforts. Cumulatively, these actions have resulted in increased protection for the Hawaiian hawk by securing potential nesting, breeding, and hunting habitat (Gorresen *et al.* 2008, p. 26). Multiple landscape-scale conservation efforts are, or have been, implemented across the island of Hawaii by Federal, State, and private landowners, often in collaborative efforts. For example, in the north Kona region, conservation actions (*e.g.,* outplanting native plants, nonnative species removal, and fencing) have been, and continue to be, implemented by myriad partners in Waimea (8 ac (3.2 ha)), the Lai Opua Dryland Preserve (70 ac (28 ha)), the Kaupulehu dryland forest (76 ac (31 ha)), the Palamanui Dry Forest Preserve (72 ac (29 ha), and the Puu Waawaa watershed (*e.g.,* the multi-agency 38,885-ac (15,736-ha) Hawaii Experimental Tropical Forest, and the 3,800-ac (1,538-ha) forest bird sanctuary) (Hawaii Forest Institute 2019, entire; Kaahahui O Ka Nahelehe 2019, entire; U.S. Forest Service-Pacific Southwest Research Station 2019, entire; DLNR 2003, p. 70).

The 32,733-ac (13,247-ha) Hakalau Forest NWR (north Hilo region) was established by the Service in 1985, with the primary purpose of promoting the recovery of endangered forest birds and their habitat. The 5,300-ac (2,145-ha) Kona Forest Unit was added to the Hakalau Forest NWR in 1997. The Hakalau Forest NWR now provides 38,033 ac (15,391 ha) of habitat for endangered forest birds and the Hawaiian hawk, as well as numerous threatened and endangered plants, insects, and the Hawaiian hoary bat (opeapea, *Lasiurus cinereus semotus*). In 2003, Hawaii Volcanoes NP, in collaboration with TNC, added the 115,828-ac (46,874-ha) Kahuku Unit (previously Kahuku Ranch), increasing the park's size by 50 percent (Martin 2003, in litt.). The Nature Conservancy also established the 8,089-ac (3,274-ha) Kona Hema Preserve (south Kona region) between 1999 and 2003. Additionally, in a collaborative effort, Hawaii DLNR's Division of Forestry and Wildlife (DOFAW) and the USFS' Institute of Pacific Island Forestry established the protected Laupahoehoe natural area reserve (12,300 ac (4,979 ha)) along the Hamakua Coast, which is part of the Hawaii Experimental Tropical Forest Project (U.S. Forest Service 2018, in litt.).

The KWP has been removing nonnative species (primarily plants, rodents, and ungulates) and actively restoring forested watershed habitat on the island of Hawaii since 2003. The MKWA and TMA have been conducting similar work since 2008. Combined, these efforts have improved over 19,000 ac (7,689 ha) of forested watershed habitat on the island of Hawaii (DLNR 2011, p. 16). Collectively, these three watershed partnerships encompass approximately 1,668,300 ac (675,137 ha) (Hawaii Association of Watershed Partnerships 2019, entire). The TMA is the largest watershed partnership in Hawaii, encompassing 45 percent of the island of Hawaii. Within the land area covered by the TMA lies some of the largest expanses of intact native forests remaining in the islands, equating to approximately 50 percent of the State's remaining native habitat (Hawaii Association of Watershed Partnerships 2019, entire). The overall mission for all three of these island of Hawaii-based watershed partnerships (32 partners in total) is to increase the effective management and protection of upper elevation watershed areas. The TMA's management goals for native forests damaged by ungulate browsing and grazing are to restore ecosystem structure to improve and maintain watershed values and promote native species diversity (TMA 2007, p. 26).

The State of Hawaii's initiative, The Rain Follows the Forest, identified priority watersheds and outlined on-the-ground actions and projects required to sustain Hawaii's critical water sources (DLNR 2011, p. 1). At the time of inception, only 10 percent of the priority watershed areas were protected; however, The Rain Follows the Forest sought to double the amount of protected watershed areas, including some areas on island of Hawaii, in just 10 years. This initiative has been replaced by the Sustainable Hawaii Initiative discussed below.

In response to the 2016 World Conservation Congress Legacy Commitment, the Governor of Hawaii initiated the Sustainable Hawaii Initiative: 30 by 30 Watershed Forests Target, which seeks to protect 30 percent (253,000 ac (102,385 ha)) of Hawaii's highest priority watershed forests by 2030 (Sustainable Hawaii Initiative 2019, entire). Building upon the conservation efforts conducted under The Rain Follows the Forest, watershed efforts accelerated, and by 2017, approximately 15 percent of priority areas had a high level of protection (Sustainable Hawaii Initiative 2019, entire); State of Hawaii 2017, in litt.). This initiative includes, among other objectives, fencing priority areas, control of ungulates and other invasive species, planting native tree and shrub species, and limiting the spread of ROD.

Forest restoration programs like the Hawaiian Legacy Reforestation Initiative, USDA's Forestry Program, and Hawaii's Forest Stewardship Program also benefit the Hawaiian hawk through restoration of relatively intact native forests and reforestation of pasture areas. The focus of these programs over the last few decades has been the development of a native hardwoods forestry industry with native koa (*Acacia koa*) as the species of primary interest. Many nonnative timber plantations are switching to native timber species post-harvest (Koch and Walter 2018, in litt.; Walter 2018, pers. comm.). Although suitability of koa plantations for Hawaiian hawk foraging and nesting has not been studied, and hawk use of these areas may be variable, koa plantations may be suitable depending upon the age of koa stands, stand density, and overstory characteristics related to harvest methods used. More research is needed, as such characteristics of koa plantations likely vary.

Overall, State and private foresters report that the forested area on the island of Hawaii is increasing, particularly in native forest cover (Koch and Walter 2018, in litt.). Starting at the turn of the century, several large landowners (private, Federal, and State) ended their pastoral leases and have been steadily promoting natural regeneration to take the place of old pastures (Koch and Walter 2018, in litt.). The State is moving away from planting exotic timber tree species and toward native species when economically feasible (Koch and Walter 2018, in litt.). Additionally, through the Hawaii Forest Stewardship Program, small (*e.g.,* 18 ac (7 ha)) private landowners are working with the State to convert old pasture land to native forest (DLNR 2017, in litt.).

The ongoing conservation actions across the island of Hawaii provide Hawaiian hawks potential breeding, nesting, and foraging habitat. The above-mentioned actions highlight many of the landscape-scale efforts underway that benefit Hawaiian hawks; however, there are many more conservation efforts on the island (too numerous to list here) that also contribute to the conservation of Hawaiian hawks.

Summary of Factor A

A comparison of island-wide survey data in 2007 to similar data from 1998 to 1999 indicates that the population numbers, densities, and spatial distribution of Hawaiian hawks on the island of Hawaii did not significantly change over the span of a decade. Also, the best available data indicate that the population size and distribution of the Hawaiian hawk remained relatively unchanged for 30 or more years despite being exposed to myriad threats (Service 1984; Griffin 1985, p. 25; Scott *et al.* 1986, p. 79; Morrison *et al.* 1994, p. 23; Hall *et al.* 1997, pp. 13–14; Klavitter 2000, pp. 38, 96; Klavitter *et al.* 2003, p. 170; Gorresen *et al.* 2008, p. 6). Although new information shows some potentially negative habitat trends due to urbanization, nonnative plant species invasion, climate change, and ROD, there are myriad conservation efforts and lands that have been set aside for conservation in perpetuity that benefit the Hawaiian hawk by providing potential breeding, nesting, and foraging habitat. Although some habitat loss is expected in the future, this loss is likely to be a small percentage of the Hawaiian hawk's habitat and is likely to be patchily distributed such that hawks are expected to continue to be widely distributed on Hawaii.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Historically, some Hawaiian hawks were taken for scientific collection (*e.g.,* Henshaw 1902, pp. 197–198; Banko

1980, p. 2) and may also have been taken by the early Hawaiians for either food or feathers (Clarkson and Laniawe 2000, p. 12). Neither of these factors is known to currently threaten the Hawaiian hawk.

Shooting was considered among the primary factors contributing to a suspected population decline of the Hawaiian hawk, but there has been no data that would suggest that shooting was the primary factor for the population decline (Berger 1981, p. 79; Griffin 1985, p. 108). People shot Hawaiian hawks because they mistakenly believed that the hawks were ''chicken hawks'' (note: In the past, a dead Hawaiian hawk (cause of death unknown) was used as a ''scarecrow'' to discourage predation on domestic poultry flocks sometime in the late 1960s or early 1970s (Banko 1980, p.6)).

According to our Office of Law Enforcement's records, seven Hawaiian hawks were shot between 2013 and 2018, most occurring in the Puna region. Four of these cases occurred in 2018. Incidences of Hawaiian hawk shootings have occurred for decades yet the Hawaiian hawk population remained stable despite such incidences. There is little evidence that shooting is a current threat to the Hawaiian hawk at a regional scale. With increased community outreach regarding the Hawaiian hawk's status on the island of Hawaii, there no longer appears to be a substantive threat to the species from shooting (Mello 2007, pers. comm.).

C. Disease or Predation

Neither disease nor predation is currently known to substantively affect the Hawaiian hawk population (Griffin 1985, pp. 104–107, 194; Griffin *et al.* 1998, pp. 658, 661; Klavitter 2000, p. 45). Introduced mammalian predators (*i.e.,* rats, cats, and mongooses) could potentially prey on Hawaiian hawks or their eggs and are known to have serious impacts on other species of native Hawaiian birds (Atkinson 1977, pp. 120–122, 127–130; Scott *et al.* 1986, pp. 363–364; VanderWerf and Smith 2002, pp. 77–80). However, there is no evidence of predation by these species on Hawaiian hawks or their eggs. There is evidence, on the other hand, that introduced mammalian species are a food resource for the hawk (Munro 1944, p. 48; Griffin 1985, pp. 142–145, Appendix 1; Griffin *et al.* 1998, p. 659).

Although the Hawaiian hawk population is not currently known to be substantively affected by any diseases, there has been observation of ''pox-like'' lesions on 2 of 44 captured hawks (Griffin 1985, pp. 104–105). No bacteriological or virological samples were collected; therefore, these lesions were not confirmed as avian pox.

Disease has been identified as a potential factor that might lead to a decline in the size of the Hawaiian hawk population by reducing future reproduction and survival. In their report (IRWG 2001, p. 3), they state, ''disease could have a serious negative impact on [the] Hawaiian hawk as the population does not appear to be separated into disjunct subpopulations that could more easily evade an outbreak. The panmictic nature of the population (*i.e.,* a population where all individuals are potential partners) may also limit genetic variability that could contribute to pockets of disease resistance, although genetic attributes have not been directly studied.''

The Hawaiian hawk does not appear to be susceptible to diseases currently established on the island of Hawaii, such as avian pox or malaria, that have devastated many other endemic Hawaiian forest birds (Griffin 1985, pp. 104–106; Griffin *et al.* 1998, pp. 658, 661).

Emergent diseases, such as West Nile virus, have the potential to influence Hawaiian hawk viability in the future, but we cannot predict if or when that may occur. West Nile virus (WNV), which is primarily transmitted by infected mosquitoes, has been reported in all of the 48 conterminous United States and is potentially fatal to many species of birds, including members of the genus *Buteo* (Centers for Disease Control and Prevention (CDC) 2005, in litt.; 2007, in litt.). Transmission of WNV to Hawaii could occur via the arrival of migrating bird species; via transport of infected mosquitoes on boats and planes; and through infected birds, animals, and humans.

Through 2013, Hawaii and Alaska were the only two States with no reported occurrences (human or bird) of WNV (State of Hawaii 2006, in litt.; CDC 2007, in litt.; CDC 2017, in litt.; CDC 2019, in litt.). By the end of 2014, the CDC received one human WNV disease case reported by the State of Hawaii (CDC 2017, in litt.); however, this incidence originated through exposure outside of the State, and there has not been a subsequent report (State of Hawaii Department of Health 2018, in litt.; CDC 2019, in litt.). Surveillance for WNV in Hawaii from 2002 to 2009, during which over 10,000 individual birds were tested, found no infected birds.

To help prevent WNV from spreading to Hawaii, the State's Department of Agriculture has established a pre-arrival isolation requirement and a Poultry and Bird Import Permit issued through the Livestock Disease Control Branch for all birds entering the State. Furthermore, the Hawaii State Department of Health has an ongoing, multi-agency WNV surveillance program in place on all of the main Hawaiian Islands, which involves surveillance for infected mosquitoes and dead birds, as well as live-bird surveillance at major ports of entry, equine surveillance, and human surveillance (State of Hawaii 2006, in litt.).

To date, no cases of WNV have been reported in Hawaii; however, there is currently no certainty that the disease can be prevented from arriving and spreading. Should this disease arrive on the island of Hawaii, native birds may be particularly susceptible, as they are likely to be immunologically naive to arboviruses such as WNV, and because they evolved in the absence of biting insects (van Riper *et al.* 1986, p. 340). Furthermore, there are a number of introduced birds (*e.g.,* house sparrows and house finches) and mosquitoes (*e.g., Culex quinquefasciatus*) that could support WNV amplification in Hawaii and transport it from low to middle to high elevations (Marra *et al.* 2004, p. 398) throughout the range of the Hawaiian hawk. Nevertheless, the short- and long-term impacts of WNV on wildlife are uncertain (Marra *et al.* 2004, p. 394), and it is uncertain whether the virus will ever arrive on the island of Hawaii. Since the arrival of WNV on the west coast of the United States in 2002 it has not been detected in Hawaii, which suggests Hawaii's isolation from areas where WNV is already established may provide some level of protection to its introduction in Hawaii.

If WNV or another pathogenic avian disease for which mosquitos are vectors reaches Hawaii, pig rooting will aid in the transmission of disease. Rooting pigs create wallows and other optimal breeding sites for mosquitoes that transmit bird disease. Although the Hawaiian hawk does not appear to be affected by avian malaria or avian pox, should a novel disease such as West Nile virus be introduced to Hawaii, risk of disease spread would be enhanced in areas with feral pig activity. Emerging technology may help to reduce mosquito abundance and thereby also reducing the prevalence of the diseases the mosquitoes transmit. An increase in conservation measures across the island of Hawaii (also see *Recovery Plan Implementation,* above), which include feral pig control and removal, benefit the Hawaiian hawk by decreasing the spread of mosquito breeding habitat.

Summary of Factor C

Neither predation nor bird diseases currently established on Hawaii are known to threaten the Hawaiian hawk. West Nile virus and other emergent bird diseases have the potential to affect the species if they become established on Hawaii. However, it is uncertain whether such diseases will ever arrive. The State is currently implementing a prevention program to reduce the risk of WNV arrival. The State is also implementing a surveillance program so that it can detect the virus if it arrives, and take appropriate and timely action.

D. The Inadequacy of Existing Regulatory Mechanisms

A variety of regulatory mechanisms, managed by State and Federal resource agencies, are in place to protect the Hawaiian hawk and the habitats upon which it depends. Although we are delisting the Hawaiian hawk as of the effective date of this final rule (see **DATES**, above), the Hawaiian hawk will still be protected by the Migratory Bird Treaty Act (MBTA; 16 U.S.C. 703–712). The MBTA and its implementing regulations (50 CFR parts 20 and 21) prohibit take, possession, import, export, transport, sale, purchase, barter, or offering for sale, purchase, or barter, of any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit (50 CFR 21.11).

The Hawaiian hawk and its habitat will continue to benefit from the National Wildlife Refuge System Improvement Act of 1997 (Pub. L. 105–57, October 9, 1997) that established the protection of biodiversity as the primary purpose of the NWR System. This has led to various management actions to benefit federally listed species, including development of comprehensive conservation plans (CCPs) on NWRs. The CCPs typically set goals and list needed actions to protect and enhance populations of key wildlife species on NWR lands. Where Hawaiian hawks occur on NWR lands (Hakalau Forest), their habitats in these areas are protected from large-scale loss or degradation due to the Service's mission ''to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans'' (16 U.S.C. 668dd(a)(2)).

The Hawaiian hawk and its habitat will also continue to benefit from the Hawaii National Park Act of 1916. Congress established Hawaii National Park (later to become, separately, Hawaii Volcanoes National Park and Haleakala National Park) on August 1, 1916 (39 Stat. 432), ''for the benefit and enjoyment of the people of the United States'' (16 U.S.C. 391) and to provide for, ''the preservation from injury of all timber, birds, mineral deposits, and natural curiosities or wonders within said park, and their retention in their natural condition as nearly as possible'' (16 U.S.C. 394). Since that time, the enabling legislation of the park has been modified several times, both to establish the national parks on the islands of Hawaii and Maui as separate parks and to expand the boundary of Hawaii Volcanoes National Park. Hawaii Volcanoes National Park protects 330,086 ac (133,581 ha) of public land on Mauna Loa and Kilauea volcanoes on the southeastern side of Hawaii Island (NPS 2017, p. 3).

Although we are not aware of any intent to use Hawaiian hawks for falconry, regulations at 50 CFR 21.29 and 21.30 specifically authorize the issuance of permits to take, possess, transport, and engage in commerce with raptors for falconry purposes and for propagation purposes. Certain criteria must be met prior to issuance of these permits, including a requirement that the issuance will not threaten a wildlife population (50 CFR 13.21(b)(4)).

Another regulatory mechanism that will continue to provide protection to the Hawaiian hawk is the requirement that pesticides be registered with the Environmental Protection Agency (EPA). Under the authority of the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 *et seq.*), the Environmental Protection Agency requires environmental testing of all new pesticides. Testing the effects of pesticides on representative wildlife species prior to pesticide registration is specifically required. Only pesticides that have been determined not to pose unreasonable adverse effects on the environment may be used in the United States. This protection from effects of pesticides will not be altered by delisting the Hawaiian hawk.

On June 28, 1979, the Hawaiian hawk was included in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). This treaty was established to prevent international trade that may be detrimental to the survival of plants and animals. International trade is regulated through a system of CITES permits and certificates. CITES permits and certificates may not be issued if trade will be detrimental to the survival of the species or if the specimens being imported or exported were not legally acquired. This protection will not be altered by delisting the Hawaiian hawk.

Federal delisting of the Hawaiian hawk will automatically remove this species from the State of Hawaii threatened and endangered species lists under Hawaii Revised Statute (HRS) 195D–4. However, as a native species, the hawk will continue to be afforded the protection of the State in accordance with HRS 195–1, which states that (1) the State of Hawaii possesses unique natural resources, such as geological and volcanological features and distinctive marine and terrestrial plants and animals, many of which occur nowhere else in the world, that are highly vulnerable to loss by the growth of population and technology; (2) these unique natural assets should be protected and preserved, both for the enjoyment of future generations, and to provide base lines against which changes which are being made in the environments of Hawaii can be measured; (3) in order to accomplish these purposes the present system of preserves, sanctuaries and refuges must be strengthened, and additional areas of land and shoreline suitable for preservation should be set aside and administered solely and specifically for the aforesaid purposes; and (4) that a statewide natural area reserves system should be established to preserve in perpetuity specific land and water areas which support communities, as relatively unmodified as possible, of the natural flora and fauna, as well as geological sites, of Hawaii. [L 1970, c 139, pt of § 1] Under State of Hawaii Administrative Rules (HAR), it is prohibited to ''catch, possess, injure, kill, destroy, sell, offer for sale, or transport'' any indigenous wildlife, as well as to export any such species (HAR 13–124–3), unless authorized by permit (HAR 13–124–4).

Multiple regulatory mechanisms protect the Hawaiian hawk, and these regulatory mechanisms (*i.e.,* the MBTA, National Wildlife Refuge System Improvement Act of 1997, Hawaii National Park Act of 1916, EPA, CITES, HRS 195–1, 50 CFR 21.29 and 21.30, and the State's HAR 13–124–3 and HAR 13–124–4) will continue to provide protection to the Hawaiian hawk in the future after delisting. Approximately 754 sq mi (1,953 sq km), or 32 percent, of the Hawaiian hawk's habitat is located on protected lands in the form of State and Federal forests, parks, and refuges.

E. Other Natural or Manmade Factors Affecting Its Continued Existence

Single Island Endemism

Species that are endemic to a single island, such as the Hawaiian hawk, are inherently more vulnerable to extinction than widespread species because of the higher risks posed to a single population by random demographic fluctuations and localized catastrophes such as fires, hurricanes, and disease outbreaks (IRWG 2001, p. 3). However, the Hawaiian hawk is adaptable to a variety of habitats and is relatively abundant and widespread in suitable habitat on much of the island, making it resilient to random demographic fluctuations or localized catastrophes (*e.g.,* volcanic eruption). Even a large-scale catastrophe such as a major hurricane or fire is unlikely to cause the extinction or endangerment of a hawk that can effectively use regenerating forests as foraging areas and can nest in relatively small patches of older forests that are likely to remain intact following such an event.

Wind Facilities

There are currently three wind facilities on the island of Hawaii: Hawi, located near Hawi (16 wind turbine generators), Pakini Nui, lnear South Point (14 turbines), and Lalamilo near Kamuela, (5 turbines). While wind turbines kill numerous bird and bat species across the United States (Hutchins 2016, in litt.; USFWS 2017, in litt.), including in Hawaii, we have no reports of Hawaiian hawk fatalities caused by wind turbine collision. Canine-assisted, standardized compliance monitoring for fatalities is conducted at Pakini Nui at 7-day intervals, but the Lalamilo and Hawi projects do not currently have a standardized monitoring program at this time. To our knowledge, only one Hawaiian hawk has been observed among all three Hawaii island wind facilities. In 2013, one Hawaiian hawk was observed at the Hawi wind facility. A draft Habitat Conservation Plan (HCP) framework for Hawi included a request for an incidental take permit to coverage for up to three Hawaiian hawks (*e.g.,* adult, egg, fledgling) over a period of 20 years; however, the project does not currently have an HCP nor has an application for an HCP been submitted. We consider the potential impacts from Lalalimo and Pakini Nui wind facilities on Hawaiian hawks to be negligible, while Hawi has the potential to impact individual Hawaiian hawks. Lalamilo is in the draft stage of State and Federal HCP preparation and Pakini Nui is in the process of finalizing an HCP and incidental take permit; however, neither HCP include Hawaiian hawks as they are not anticipate to cause take of Hawaiian hawks. Considering only a single observation of a Hawaiian hawk has been reported over the last decade, we do not consider wind turbines to pose a threat to the Hawaiian hawk's viability at this time. Monitoring at Hawi will keep us informed if more Hawaiian hawks are observed in the area and most certainly if a Hawaiian hawk is harmed. Hawaiian hawks will continue to be protected by the Migratory Bird Treaty Act (see Factor D, above).

The cumulative data show that the Hawaiian hawk has a low sensitivity to environmental fluctuations and the Hawaiian hawk viability is not currently jeopardized by the location of the three current wind farms on Hawaii island. The Hawaiian hawk has maintained a stable, self-reproducing population through fluctuations in human population growth, urban and exurban development, forestry practices, conservation actions, type of prey, and pesticide use. An individual's sensitivity to environmental changes contributes substantially to its fitness, where a reduced sensitivity increases the fitness (Melbinger and Vergassola 2015, p. 2). We conclude that Hawaiian hawk viability is not currently at risk from environmental fluctuations. Similarly, despite broad use of pesticides, including SGARs, and detection of SCARs in Hawaiian hawk tissue, Hawaiian hawks maintained a stable self-reproducing population during a time period when SCARS were more commonly used (see Recovery Plan Implementation, above).

Cumulative Effects

We examined each of the five factors above individually and have determined that none of these threats is substantive and none of these threats jeopardizes the survival of the Hawaiian hawk. We also examined the potential for the cumulative impact of such unsubstantive threats to be greater than the impact from each individual threat. The Hawaiian hawk has maintained a stable, self-sustaining population of between 2,500 and 3,000 individuals for decades, with the most recent population estimate at 3,000 individuals sustained over at least 10 years. The Hawaiian hawk has maintained viability while experiencing varying degrees of habitat destruction or modification (urbanization, agriculture, nonnative plant and animal species, fire, drought, climate change, volcanic eruption, and ROD); overutilization of the species for commercial, recreational, scientific, or educational purposes (shooting); disease (avian pox and avian malaria) or predation (nonnative rats, mice, mongoose, cats, and dogs); inadequate regulatory mechanisms; and other natural or manmade factors (small range, single-island endemism, wind turbines, and contaminants and pesticides). Therefore, considering the potential impacts from any number of combinations of the threats outlined in this rule, we find that the viability of the Hawaiian hawk is not at risk from cumulative effects. Post-delisting monitoring will monitor the status of the Hawaiian hawk population and its habitat to detect any changes in status that may result from removing the Hawaiian hawk from the List of Endangered and Threatened Wildlife (50 CFR 17.11(h)).

Summary of Comments and Recommendations

In total, we received 195 comment letters on the proposal to delist the Hawaiian hawk and the draft post-delisting monitoring (PDM) plan. Four comments were from peer reviewers, three of these on the proposed rule and one on the PDM plan. Seven comment letters were from offices of the State of Hawaii, one comment letter was from the County of Hawaii, and 183 comments were from the general public. All substantive information provided during the comment periods has been incorporated directly into this final determination (see Summary of Changes from the Proposed Rule, above) or is addressed below.

In accordance with our peer review policy published on July 1, 1994 (59 FR 34270), we received expert opinion from four knowledgeable individuals with scientific expertise that included familiarity with the Hawaiian hawk and its habitat, biological needs, and threats.

We reviewed all comments we received from the peer reviewers for substantive issues and new information regarding the proposed delisting of the Hawaiian hawk. The peer reviewers generally agreed with our analysis in the proposed rule and provided additional information, clarifications, and suggestions to improve the final rule. Peer reviewer comments are addressed in the following summary and incorporated into the final determination as appropriate.

Peer Review Comments

(1) *Comment:* All three of the peer reviewers who commented on the proposed rule agreed with the analysis used for proposing delisting. Reasons they provided for supporting our analysis include the lack of evidence

that the species' range is contracting, survey information indicates the Hawaiian hawk population has been stable over the last 20 to 30 years, and Hawaiian hawks use both native and nonnative habitats for breeding and hunting. Two of the peer reviewers stated that although ongoing threats to habitat continue, this is not of sufficient magnitude that Hawaiian hawk would become endangered or threatened in the foreseeable future (defined as 20 years in the proposed rule). One peer reviewer stated that the rule could be substantially improved in several ways to make our analysis more clear. Suggestions were to clarify that the most current population analysis (Gorresen *et al.* 2008, entire), which used updated methodology, corrected for errors in past abundance estimates and showed the population abundance of Hawaiian hawks has been approximately 3,000 birds for the past 30 years; and to better convey the severity of the threats associated with loss or degradation of habitat, WNV, and conversion of agricultural land to eucalyptus. Another peer reviewer commented they were not convinced eucalyptus would be incompatible with Hawaiian hawk foraging and nesting; rather, the size, juxtaposition, and density of the woodland will determine the use by Hawaiian hawks.

Our Response: We concur that there is no evidence that the Hawaiian hawk's range is contracting, that data indicate the species' population is stable, and that Hawaiian hawks breed and forage in both native and nonnative habitats. In addition, we have modified our language under Summary of Factors Affecting the Species to better clarify the potential threats. We concur that it is important to ensure this rule clearly explains that the most current data show the Hawaiian hawk population has remained stable with a population abundance of approximately 3,000 birds for the past 30 or more years. We also agree that the forest structure is an important component of Hawaiian hawk habitat.

(2) *Comment:* One peer reviewer commented conducting surveys along roadways and using audio playback recordings may have biased Hawaiian hawk population survey results.

Our Response: During the 1998 to 1999 surveys, movements by Hawaiian hawks in response to playback recordings were observed. A correction factor for undetected movements was developed based on distances at which Hawaiian hawks were first seen or heard by paired observers. This correction factor was used for the analysis of all 1998 to 1999 and 2007 survey data (Klavitter and Marzluff 2007, entire; Gorresen et al. 2008, entire). The 2007 surveys (Gorresen *et al.* 2008, entire) closely followed the same routes and locations as were counted in 1998–1999 (Klavitter 2000, entire). While stations mostly followed roads due to the need to survey many widely dispersed stations throughout the range of the Hawaiian hawk, counts were conducted at locations away from the road to ensure traffic noise was limited. Stations located along transects that did not follow roads were also included in both surveys. Thus, any potential bias in the analysis that could exist from the survey point locations would be the same in both datasets, allowing for direct comparison of population trend between the two counts. No significant difference in densities was found between years at either regional or island-wide scales. Thus, the population trend appears to be stable.

(3) *Comment:* One peer reviewer suggested we conduct a population viability assessment (PVA) to better understand demographic patterns and Hawaiian hawk population trajectory for the foreseeable future.

Our Response: A preliminary PVA that evaluated variations in survival and breeding success for female Hawaiian hawks was developed (Vorsino and Nelson 2016, unpublished data) for native, mixed, and exotic habitat (Gorresen *et al.* 2008, p. 15; Klavitter *et al.* 2003, p. 170). Although valuable data resulted from the PVA with respect to Hawaiian hawk viability in specific habitats over 30 years, it did not include all of the threats outlined in the proposed rule or this final rule, nor did it consider ongoing conservation successes (*e.g.,* strawberry guava biocontrol efforts, an increase in conservation actions, and an increase in overall acreage on which conservation occurs and lands are set aside for conservation in perpetuity (see *Recovery Plan Implementation,* above)). Therefore, we have incorporated this PVA into the relevant analyses, but have not based our decision solely on it, based on its limited scope and uncertainty. For details regarding the PVA, please see ''Demographics,'' above.

State Comments

(4) *Comment:* We received four comment letters from the State of Hawaii Department of Land and Natural Resources (DLNR), three regarding the proposed rule and one regarding the draft PDM plan. In 2008, the DLNR supported delisting the Hawaiian hawk, but stressed the importance of adequate monitoring to detect any potential changes in the population status of Hawaiian hawks in a timely way. In 2009, the DLNR stated their appreciation to the Service for developing the PDM plan to adequately monitor the Hawaiian hawk once removed from the Federal List of Endangered and Threatened Wildlife. In 2014 and 2018, the DLNR supported reclassifying the species as threatened (not delisting) and stated concern regarding the possible introduction of WNV. The DLNR also stated concern that it is unclear given current information whether the small Hawaiian hawk population is sufficient to ensure genetic viability into the future, and recommended determining genetic attributes of the species.

Our Response: We agree that regular population monitoring is important to detect any changes to the Hawaiian hawk population and to quickly identify the presence of new threats (*e.g.,* WNV) or the worsening of currently minor threats. We recognize the existence of potential future threats such as WNV (see Factor C discussion, above); however, to our knowledge, WNV is not present in Hawaii and, therefore, not currently a threat. The PDM plan includes conducting island-wide surveys every 5 years through 2044 to monitor for changes in the species' status. We have no evidence that the Hawaiian hawk population is suffering from small population effects such as inbreeding depression. The population of Hawaiian hawks is stable, and has been stable for the past several decades.

(5) *Comment:* We received two comments from the State of Hawaii Office of Hawaiian Affairs (OHA). In these, OHA stated the cultural significance of the Hawaiian hawk to the Hawaiian people. Office of Hawaiian Affairs also stated concern regarding the amount of agriculturally zoned and non-protected Hawaiian hawk habitat and instances in which agriculturally zoned parcels have been rezoned for subdivisions and large residential lots, which may have an adverse effect on Hawaiian hawks. In addition, OHA stated concern that the current population of approximately 3,000 Hawaiian hawks was inadequate to delist the species at least partially due to the species' vulnerability to a single large catastrophic event given Hawaiian hawks currently exist only on Hawaii. Office of Hawaiian Affairs suggested reintroducing Hawaiian hawks to other islands as a way to reduce risk from a large-scale catastrophic event.

Our Response: We acknowledge and greatly appreciate the cultural significance of Hawaiian hawks to the Hawaiian people. We believe that the recovery of the hawk was made possible by the collective ongoing conservation actions implemented by the private, State, and federal partners outlined under *Recovery Plan Implementation* and Factor A, above. According to State and private foresters, forest areas on the island have increased, particularly native forest areas.

There have not been substantial changes in zoning designations from conservation lands to agriculture in recent decades. However, there have been many instances of applications for administrative approval for zoning changes from larger agricultural acreage to smaller agricultural acreage, agricultural to single family residential, and single family residential to general commercial. Building of subdivisions on agriculture lands will likely have adverse effects on Hawaiian hawks because of loss of trees for nesting and perching, and possible effects of human disturbance. However, there are also many conservation efforts to protect habitat on the island of Hawaii (see *Recovery Plan Implementation* and the Factor A discussion, above), and our analysis considers those.

We acknowledge the current population of approximately 3,000 Hawaiian hawks may be considered small and is possibly vulnerable to a single large catastrophic event, such as an extremely large hurricane directly hitting the island or the introduction of WNV; however, we do not believe that it is likely that a hurricane will occur at a scale that would endanger the Hawaiian hawk in the foreseeable future, nor is it likely that WNV will arrive on Hawaii island due to the efforts being made to prevent the introduction of WNV. In determining whether a species in danger of extinction within the foreseeable future, we need to be able to reasonably determine that both the future threats and the species' responses to those threats are likely. We placed primary emphasis for our five-factor analysis on threats currently present and those we could reliably predict to occur in the foreseeable future. In part because of potential threats (*e.g.,* a major hurricane or new disease) we intend to monitor the status of the Hawaiian hawk, in cooperation with DOFAW, the NPS, and USGS–BRD, through periodic (every 5 years starting in 2024) island-wide surveys. The Act requires post delisting monitoring for no less than 5 years. If data from these surveys or from some other source indicates significant declines in Hawaiian hawk distribution and abundance, the Service will consider initiating procedures to re-list the Hawaiian hawk.

While we agree reintroducing Hawaiian hawks to other islands is a way to reduce risk to Hawaiian hawks from a large-scale catastrophic event, because breeding populations of Hawaiian hawks have not occurred on other islands in Hawaii for hundreds of years (if ever), establishing Hawaiian hawks on other islands must be considered with caution as it could disrupt ecosystems on other islands (*e.g.,* predator-prey relationships).

(6) *Comment:* We received one comment from the Council of the County of Hawaii containing a resolution in support of maintaining the Hawaiian hawk on the Federal List of Endangered and Threatened Wildlife based on concerns about the limited range (only the island of Hawaii) of the Hawaiian hawk; broad-scale loss of nesting, fledgling, and perching habitat for the hawk; development of agricultural lands; cutting of native forests; and urbanization.

Our Response: We evaluated the County's concerns and addressed them in our threats analysis and throughout the preamble of this rule (see *Recovery Plan Implementation* and Factor A discussion, above).

Public Comments

(7) *Comment:* Several commenters provided evidence of loss of Hawaiian hawk habitat to housing development. Several commenters said they saw fewer Hawaiian hawks than previously in areas with recent development.

Our Response: We examined the evidence and conducted further research on degradation and loss of Hawaiian hawk habitat as a result of housing development, agriculture, and urban development under Factor A of our threats analysis. Mean Hawaiian hawk density in native forests is almost four times greater than Hawaiian hawk density in areas with housing development (Gorresen *et al.* 2008, pp. 10–11, 47). The reason for higher densities of Hawaiian hawks in native forest is greater abundance of prey and nest sites and lack of human disturbance or harassment (Klavitter 2000, p. 14). While some studies on other *Buteo* species found evidence of reduced reproductive rates in areas with human habitation (Bosakowski *et al.* 1992, p. 444; England *et al.* 1995, p. 179), other studies on *Buteo* species outside of Hawaii have found that reproductive success was not affected by the degree of urbanization around nest sites, and that reproductive rates of *Buteo* species in areas of human habitat were not affected by urbanization (Rottenborn 2000, p. 18; Dyukstra *et al.* 2000, p. 401).

Despite the steady urbanization of coastal and lowland dry ecosystem areas on the island of Hawaii over the past 30 years, Hawaiian hawks have maintained a stable, viable population. Additionally, the human population growth rate on the island of Hawaii is less than previously anticipated and expected to level off in the early 2020s, and subdivisions on the island have plateaued (see *Recovery Plan Implementation* and Factor A discussion, above). Further, there are many ongoing conservation efforts to restore native habitats on the island of Hawaii that benefit Hawaiian hawks by providing potential breeding, nesting, and foraging habitat (*e.g.,* perches). To better explain these conservation efforts, we added information under our Factor A discussion, above.

(8) *Comment:* Several commenters provided information on applications for administrative approval for zoning changes from agricultural to residential and for subdivision of agricultural lands. These commenters stated concern that this will encourage housing development.

Our Response: We agree that zoning changes from agricultural to residential and subdivision of agricultural lands will encourage housing or other development in these areas, which may negatively affect Hawaiian hawk habitat. However, despite such zoning changes occurring steadily over the past several decades, Hawaiian hawks have maintained a stable and viable population for at least 30 years. See *Recovery Planning Implementation* and our Factor A discussion, above, as well as our response to Comment (7).

(9) *Comment:* Several commenters provided information on forest clearing in the Puna and Kona regions, and provided evidence of the building of large home-type dwellings in the Kona region in areas zoned for agricultural use.

Our Response: We examined information on forest loss, forest gain, and percentage of forest cover for Hawaii County, which was gathered using high-resolution satellite imagery, for the years 2000 to 2012 (Hansen *et al.* 2013, entire), to better understand potential effects of forest clearing on Hawaiian hawk habitat. Satellite images revealed many small areas of recent forest clearing in both the Puna and Kona regions. Most of this was within already existing suburban areas; however, some was in adjacent mixed native-exotic and mature native forest. Some forest loss in the Kona region was in areas zoned for agricultural use, and large residential-type homes were built in recently cleared areas. In general, we found forest clearing to negatively affect Hawaiian hawk habitat through the removal of trees that the Hawaiian hawk uses for perching and nesting, but these effects are to individual birds who can move to new territories and not to the population as a whole. In 2018, both State and private foresters on the island of Hawaii reported that forested areas on the island have increased, particularly native forest areas. We address forest loss and gain further and provide information on related conservation actions under our Factor A discussion, above.

(10) *Comment:* Many commenters suggested agricultural practices may be having a negative effect on Hawaiian hawk habitat.

Our Response: Agricultural practices have a negative effect on Hawaiian hawk habitat when the result is a net loss of forest and nesting habitat and fewer perching sites from which the hawk may hunt (Gorresen *et al.* 2008, p. 23; Klavitter and Marzluff 2007, p. 172). Approximately 55 percent of the land area within the Hawaiian hawk's range is designated for intensive agriculture, and a small portion of this for industrial and urban use. The remaining 45 percent is designated for conservation (County of Hawaii 2005a, as amended, pp. 14–3–14–6; Gorresen *et al.* 2008, pp. 22, 44).

In the past, agricultural practices have resulted in a net loss of forest and nesting habitat and fewer perching sites from which the Hawaiian hawk may hunt. However, as of 2018, both State and private foresters report there is an increase in forested areas on the island, particularly native forest areas, and that many old pasturelands are slowly being converted to native forests (see *Recovery Plan Implementation* and Factor A discussion, above). Large orchards have lower hawk densities than smaller orchards because these have fewer trees for perching and from which to hunt. Orchard areas in the Kona region had significantly lower Hawaiian hawk density than native forest and mixed native exotic forest for the same region. Approximately 2.1 percent (47 sq mi (121 sq km)) of the Hawaiian hawk's range is in orchards planted in coffee, papaya, and macadamia nuts (Melrose and Delparte 2012, p. 34). Based on the best available information for acreage trends for coffee, papaya, and macadamia nuts, and State and private forester reports of increased forest areas (particularly native forest) across the island, we expect only a small increase (less than 0.5 percent) in areas of intensive agriculture in the foreseeable future. We consider such an increase would have discountable impacts to Hawaiian hawks and their habitat.

(11) *Comment:* Some commenters stated concerns that cattle grazing may cause forest degradation that is harmful to Hawaiian hawks.

Our Response: Open canopy native forest with a grass understory supports the highest densities of Hawaiian hawks because it provides many large ohia trees for perching and nesting, ample small prey for food, and open forest understory that provides fewer places for prey to hide (Gorresen *et al.* 2008, p. 47). Intensive cattle grazing in dry and mesic forest leads to a reduction of overstory canopy and the conversion over time of native forest to open grassland that is unusable by Hawaiian hawks because of the lack of trees for perching, nesting, and hunting (Blackmore and Vitousek 2000, pp. 625, 627, 629; Klavitter 2003, p. 170). However, starting at the turn of the century, several large landowners (private, Federal, and State) ended their pastoral leases and are steadily promoting natural regeneration to take the place of old pastures (Koch and Walter 2018, in litt.). Further, State and private foresters report that there is actually an increase in forested areas on the island, particularly native forest areas (see *Recovery Plan Implementation* and Factor A discussion, above).

(12) *Comment:* Several commenters stated concerns that commercial forestry, particularly eucalyptus, may negatively affect Hawaiian hawk habitat by replacing moderate quality agricultural lands, which provide large trees for perching and open sites for hunting, with forest monocultures.

Our Response: We examined the extent of commercial forestry in Hawaii County and the quality of commercial forest in providing hunting and nesting opportunities for Hawaiian hawks. Large monocultures of eucalyptus are only marginally usable habitat for Hawaiian hawks because forest monocultures do not provide the complex forest structure that likely supports greater prey abundance and the more open understory the Hawaiian hawk needs for hunting. Approximately 11.6 sq mi (30 sq km) of mostly fallow agricultural lands have been converted to forestry plantations on Hawaii since the year 2000. More and more timber plantations are shifting their cultivation to native trees, mostly koa (*Acacia koa*), and harvest timber in patchwork patterns versus clear cutting to maintain habitat for native birds such as the Hawaiian hawk. Additionally, the State is moving away from planting exotic timber tree species and toward planting native species when economically feasible (Koch and Walter 2018, in litt.). Island-wide, there has been an increase in forested areas, particularly native forest areas (Koch and Walter 2018, in litt.). The shift in forestry practices listed above, in conjunction with the increase in conservation measures and lands set aside for conservation in perpetuity (see *Recovery Plan Implementation* and Factor A discussion, above), leads us to conclude that current forestry practices do not threaten the continued survival of Hawaiian hawks.

(13) *Comment:* Several commenters stated concerns that planned growth for renewable energy production in Hawaii County may negatively affect Hawaiian hawk habitat and that wind energy production by on-shore wind turbines could cause Hawaiian hawk mortality.

Our Response: We examined current renewable energy production in Hawaii County and potential effects of renewable energy on Hawaiian hawks and their habitat. Potential sources of renewable energy on Hawaii primarily include biofuel and wind energy production. Some of the potential crops for renewable energy include sunflowers (herb) and *Jatropha curcas* (large shrub to small trees) from which oils are extracted. All of the lands considered for biofuel crop production are already zoned for agriculture. Examples include fallow sugarcane fields and areas currently being used for diversified agriculture, grazing, and timber production. Some renewable biofuel (crops/lands) may continue to provide suitable habitat for Hawaiian hawks, whereas, depending on the crop, others may not. There is currently only one biofuel plant on the island of Hawaii, and we are unaware of plans for additional biofuel plants. Further, of the total available lands on the island that meet the minimum requirements for biofuel crop production (757,518 ac), only 11 percent (82,000 ac) are suitable (Hawaii Military Biofuels Crop Program (Task 6) 2015, p. 18). As of 2018, there are no farms on the island of Hawaii dedicated solely to biofuel production (Long 2018, pers. comm.) (see also ''Conversion of Sugarcane Fields to Unsuitable Habitat,'' above). There are three on-shore wind farms on Hawaii that generate energy using wind turbines. All downed endangered or threatened birds and bats are reported to our office. We are unaware of any downed Hawaiian hawks resulting from wind turbines. Therefore, we do not consider biofuel production (crops or facilities) or wind turbines to be a threat to Hawaiian hawks.

(14) *Comment:* Several commenters stated concerns that drought and invasion of fire-tolerant nonnative grasses pose a threat to Hawaiian hawk habitat by increasing fire frequency and intensity. Some of these commenters also commented that climate change will increase drought frequency and intensity.

Our Response: We address the risk of fire and drought under ''Invasive Plant Species, Drought, and Increase in Fire Frequency,'' above. We also added a discussion on drought to our fire risk analysis. Additionally, we examined the effects of a drying climate and drought on Hawaiian hawk habitat, as discussed in our October 30, 2018, **Federal Register** publication (83 FR 54561) to reopen the proposed delisting rule's comment period, and have subsequently added to our discussions in this rule under ''Invasive Plant Species, Drought, and Increase in Fire Frequency'' and ''Invasive Species (Concealing Prey)'' as it pertains to strawberry guava. Although fire and drought pose risks to Hawaiian hawks and their habitat, fires and prolonged periods of droughts have occurred on the island of Hawaii, including between survey periods (Hawaii Wildfire Management Organization 2019, in litt.; U.S. Drought Monitor 2019, in litt.), and the Hawaiian hawk population remained stable. Therefore, at this time, we conclude that neither drought nor fire is a risk to the survival of Hawaiian hawks.

(15) *Comment:* Many commenters stated concerns that Hawaiian hawk habitat is threatened by invasion of nonnative, ecosystem-altering plant species, such as strawberry guava.

Our Response: We examine effects of nonnative plant species on Hawaiian hawk habitat under ''Invasive Plant Species, Drought, and Increase in Fire Frequency'' and ''Invasive Species (Concealing Prey),'' above. Additionally, we added to this rule a discussion regarding the potential impacts of strawberry guava under ''Demographics,'' *Recovery Plan Implementation,* and ''Invasive Species (Concealing Prey).'' Although nonnative species and other factors may potentially impact Hawaiian hawks and their habitat, many ongoing conservation actions taking place counter such negative impacts (see our Factor A discussion, above). Additionally, forest habitat (particularly native forest areas) is increasing now on the island of Hawaii (Koch and Walter 2018, in litt.).

(16) *Comment:* Several commenters stated concerns that Hawaiian hawk habitat may be negatively affected by volcanic gas (vog).

Our Response: According to the USGS (2019, in litt.), ''the sulfuric acid droplets in vog have the corrosive properties of dilute battery acid. When vog mixes directly with moisture on the leaves of plants it can cause severe chemical burns, which can damage or kill plants. Sulfur dioxide gas can also diffuse through leaves and dissolve to form acid conditions within plant tissues.'' The USGS also reports that farmers on the island of Hawaii, particularly in the Kau district, have reported loss of agricultural crops and flowers as a result of sulfur dioxide emissions from a gas vent at Kilauea's summit. Most agricultural damage occurs just down slope of the volcano (*e.g.,* Kau) (Nelson and Sewake 2008, p. 1), as well as in the Kona area (Kratky 1997, in litt.; USGS 2019, in litt.).

Some agricultural crops have demonstrated resistance to vog (Nelson and Sewake 2008, p. 2; USGS 2019, in litt.). Native plants in Kilauea and surrounding areas have evolved to live with frequent volcanic eruptions and associated vog (Nelson and Sewake 2008, p. 2). Ohia, one of the dominant forest trees across the main Hawaiian Islands, can close its stomata (gas exchange cells) during periods of high sulfur dioxide exposure to protect itself from vog damage (USGS 2019, in litt.). Additionally, the nonnative plants that provide or contribute toward Hawaiian hawk habitat have become established species despite the active volcano and associated vog. Because both native and nonnative plants persist despite multiple eruptions and periods of high vog emissions, we conclude that vog is not detrimental to plant species that contribute toward or support (*e.g.,* native-mixed forest) Hawaiian hawks and, therefore, does not constitute not a threat to the survival of the Hawaiian hawk.

(17) *Comment:* Many commenters stated concerns that Hawaiian hawk habitat may be destroyed by lava flows.

Our Response: The majority of Hawaiian hawk habitat is on the active volcanoes of Mauna Loa, Kilauea, and Hualalai. The land area covered by lava during past volcanic eruptions for these volcanoes has been as much as 1 percent of the Hawaiian hawk's range.

Kilauea is one of the most active volcanoes in the world. Kilauea had nearly continuous activity during the 19th century and early part of the 20th century, and since 1952, there have been 34 eruptions (USGS 2018, in litt.). In 1983, an eruption along the East Rift Zone of Kilauea began and has not stopped to this day (Rubin 2018, in litt.). Periodically since 1983, both natural and human habitats in and around Kilauea have been destroyed by lava. Kilauea's most recent increase in activity began in May 2018, and by mid-August 2018, the increase in activity decreased in some areas and ceased in others. During its most recent activity, Kilauea exuded enough lava to cover hundreds of human-made structures and approximately half of the Malama Ki Forest Reserve (1,514 ac (613 ha)) (DLNR 2018, in litt.; West Hawaii Today 2018, in litt.). Half of the Malama Ki Forest Reserve makes up only a fraction of Hawaiian hawk habitat.

Hawaiian forests have evolved alongside Kilauea. Once lava cools, native plants quickly recolonize through a process called primary succession, which refers to the progressive establishment of vegetation on a barren substrate (*e.g.,* lava flow or glacial retreat). On the island of Hawaii, primary succession usually starts with lichens and fungi, followed by ferns and then ohia trees and other native plants (Kitayama *et al.* 1995, pp. 215–219; Muller-Dombois and Boehmer 2013, entire).

Although ongoing volcanic eruptions have the potential to destroy much or all of the habitat in Hawaii Volcanoes National Park and surrounding areas, Hawaiian hawks have evolved alongside volcanic activity on the island of Hawaii, and despite past volcanic activity, Hawaiian hawks have maintained a stable population of approximately 3,000 individuals for at least 30 years. We conclude that the recent increase in Kilauea's activity is not a threat to the survival of the Hawaiian hawk.

(18) *Comment:* Many commenters felt we had not adequately addressed potential impacts of hurricanes on Hawaiian hawks, especially because current data suggest that Hawaii will have more frequent and intense hurricanes due to climate change.

Our Response: Large portions of the Hawaiian hawk's range on Hawaii are in montane upland areas that are potentially more vulnerable to damage from hurricanes, Should the eye of a powerful hurricane strike the island of Hawaii it would cause widespread damage to ohia trees and other trees Hawaiian hawks use for nesting and perching, which would create conditions that may allow for expansion of nonnative, ecosystem-disrupting plants. A strong hurricane would not only alter Hawaiian hawk habitat, it would likely cause an increase in mortality of nestlings and young birds for a period of time. However, despite current data indicating an increase in frequency and intensity of hurricanes in Hawaii, it is unknown when or if a major hurricane will occur on the island of Hawaii on a scale that would decrease the viability of the species. Additionally, the cumulative data indicates that the range of the Hawaiian hawk, which spans much of the island of Hawaii, will provide the species with the redundancy and resiliency necessary to maintain viability under such a stochastic or catastrophic event. Please also see Factor A, above.

(19) *Comment:* Several commenters felt we had not adequately addressed potential impacts of disease and feral ungulates to ohia.

Our Response: In response to these comments, we examined a number of factors affecting ohia, including effects of feral ungulates, ohia dieback, ohia rust, and rapid ohia death (ROD). While nonnative feral ungulates and the aforementioned diseases do impact ohia forest habitat, the Hawaiian hawk has adapted to use both native, nonnative, and mixed forest habitats for both nesting and hunting. Further, despite the presence of ohia dieback and ohia rust, Hawaiian hawk numbers have remained stable. For further details of this analysis, please see Factor A, above.

(20) *Comment:* Many commenters noted they had heard of Hawaiian hawks being shot by farmers and hunters. Several of these commenters reported Hawaiian hawks were shot because they are considered a threat to poultry.

Our Response: We have evaluated gunshot wound cases under *Recovery Plan Implementation* and our Factor B discussion, above. According to our records, there have been seven documented cases that involve Hawaiian hawk gunshot wounds between 2013 and 2018. Four of these occurred in 2018. This information shows some level of persecution; however, it appears this is not occurring over a large scale or affecting large numbers of Hawaiian hawks. Outreach to farmers and hunters regarding the State-protected status of the Hawaiian hawks and their cultural importance may help reduce negative perceptions and subsequent incidence of persecution. When this rule is effective (see **DATES**, above), shooting of Hawaiian hawks will remain illegal under both the MBTA and Hawaii State law.

(21) *Comment:* Several commenters thought at least one motivation for proposed delisting was to remove protections in order to allow greater latitude to manage Hawaiian hawks should one attack an endangered Hawaiian crow (alala; *Corvus hawaiiensis*) that is planned for reintroduction.

Our Response: We are delisting the Hawaiian hawk because the species no longer meets the definition of an endangered species or a threatened species under the Act. The Io Recovery Working Group (IRWG), in a report submitted to the Service in 2001 (IRWG 2001, pp. 2–3), stated neither Hawaiian hawk behavioral modification nor Hawaiian hawk removal will be a successful strategy to reduce predation on alala; therefore, we do not anticipate Hawaiian hawk management to be a viable method for recovering the alala.

(22) *Comment:* Several commenters stated concern that delisting Hawaiian hawks would remove the protections of the Endangered Species Act; therefore, Hawaiian hawks would be hunted and suffer other forms of persecution. One of these commenters specified that pigeon fanciers may want to harm or harass Hawaiian hawks to prevent Hawaiian hawks from killing pigeons. One commenter reported hearing ''air rifles'' when pigeon fanciers were flying birds and Hawaiian hawks were in the air.

Our Response: After the effective date of this rule (see **DATES**, above), the Hawaiian hawk will still be protected under the MBTA, the Hawaii Revised Statute (HRS) 195–1, and the Hawaii Administrative Rules (HAR) 13–124–3. The MBTA and its implementing regulations (50 CFR parts 20 and 21) prohibit take (killing or harming), possession, import, export, transport, selling, purchase, barter, or offering for sale, purchase or barter, any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit (50 CFR 21.11). The HAR 13–124–3 provides similar protections. HRS 195–1 requires the State to protect and preserve indigenous species of marine and terrestrial animals and plants.

(23) *Comment:* Several commenters noted a threat to Hawaiian hawks from the possible introduction of novel bird diseases including West Nile virus (WNV) and the importance of environmental screening for these threats.

Our Response: Hawaiian hawks do not appear to be susceptible to diseases currently established on the island of Hawaii, such as avian pox or avian malaria. Since 2002, the State has implemented an active WNV surveillance program at all ports, and no WNV has been detected in Hawaii to date. The State's Department of Agriculture has established a pre-arrival isolation requirement and a Poultry and Bird Import Permit issued through the Livestock Disease Control Branch for all birds entering the State. Furthermore, the Hawaii State Department of Health has an ongoing, multi-agency WNV surveillance program in place on all of the main Hawaiian Islands, which involves surveillance for infected mosquitoes and dead birds, as well as live-bird surveillance at major ports of entry, equine surveillance, and human surveillance (State of Hawaii 2006, in litt.). See our discussion above under Factor C for further details. Because WNV is not currently in Hawaii, we do not consider it a threat to the survival of Hawaiian hawks.

(24) *Comment:* Some commenters stated concerns that Hawaiian hawks might be poisoned by rodenticides and the broad-scale killing of rats may result in less food for Hawaiian hawks.

Our Response: Rodenticides are widely used in agriculture and residential areas to prevent crop and property damage and to protect human health. These rodenticides vary in their toxicity to the natural environment and risk to non-target animal exposure. A recent study was commissioned by the Service to quantify the exposure of a bat and several bird species, including Hawaiian hawks, to rodenticides in Hawaii. Some of the Hawaiian hawk carcasses tested positive for rodenticides; however, as of 2011, the most environmentally toxic rodenticides (SGARs) have been banned except for specific uses (*e.g.,* around agricultural buildings). For more information on the study and its results, see *Recovery Plan Implementation,* above. Killing rats may reduce available food for Hawaiian hawks in some areas; however, there are other foods available for the Hawaiian hawk including birds and insects. Because Hawaiian hawks have maintained a stable population of approximately 3,000 individuals over at least three decades, despite the more widespread use of SGARs prior to 2011, we do not consider rodenticides to be a threat to the survival of the Hawaiian hawk.

(25) *Comment:* Several commenters felt because the Hawaiian hawk population is small, the species should not be delisted. Some of these also commented that Hawaiian hawk females typically only produce one to three eggs per year, and most frequently only one.

Our Response: The Hawaiian hawk population of approximately 3,000 individuals has been stable for at least 30 years. Although historical sightings and fossil records show the Hawaiian hawk may have once bred on adjacent islands in Hawaii, there are no quantitative data to show an actual range contraction or decrease in population abundance. The Hawaiian hawk still occupies its entire historical range. The Hawaiian hawk does have a slow reproductive rate, often producing only one offspring per year; however, despite this slow reproductive rate, the Hawaiian hawk has maintained a viable, stable population. After assessing the best available information, we concluded the Hawaiian hawk does not meet the definition of an endangered or threatened species.

(26) *Comment:* Many commenters expressed concern that the Hawaiian hawk's range is limited to a single island. Some of these commenters felt because the Hawaiian hawk's range once may have included other Hawaiian islands, it should be reestablished on these islands before being considered for future status change.

Our Response: Although the Hawaiian hawk may have once occurred on other Hawaiian islands, there are no quantitative data to show an actual range contraction or decrease in population abundance. Additionally, there is no evidence that a breeding population of Hawaiian hawks once existed on another island, and introducing a predator to an ecosystem in which it was not naturally occurring may result in negative consequences to other native species. See also our responses to Comments (5) and (25). Because we do not believe that the historical range of the Hawaiian hawk included other islands, we do not find it appropriate to reintroduce Hawaiian hawks outside of its known native range. In addition, the species no longer meets the definition of an endangered species or a threatened species.

(27) *Comment:* Several commenters stated that because of differences among population estimates, and the wide confidence intervals for these, that Hawaiian hawks should not be considered for delisting.

Our Response: Although the earliest surveys were conducted using some methods that may have contributed to inaccuracies in the population estimates and later surveys have wide confidence intervals, early population survey results consistently indicate the Hawaiian hawk population remained between 2,000 and 2,500 individuals between 1983 and 1997, while the more recent survey data from 1998 and 2007–2008 indicate that the Hawaiian hawk has maintained a self-sustaining population of approximately 3,000 individuals for approximately 10 years. In order to clarify the trends in population status, we added language under *Species Information.* Additionally, we based our analysis on the five factors outlined in section 4 of the Act, as discussed in this rule under Summary of Factors Affecting the Species.

(28) *Comment:* Several commenters said the Hawaiian hawk is an aumakua, or family guardian, for some Hawaiian families. Many commenters felt it inappropriate to delist the Hawaiian hawk because it is culturally important to native Hawaiians and should, therefore, retain protections under the Act.

Our Response: We acknowledge and appreciate the cultural importance of the Hawaiian hawk to the Hawaiian people. Although the cultural and spiritual significance of a species listed under the Act is not part of the five-factor analysis we must employ when evaluating species for a possible change in listing status, we carefully assess the best scientific and commercial data available regarding the status of the species to make our listing determination.

(29) *Comment:* Many commenters stated that there are insufficient data to delist the Hawaiian hawk.

Our Response: After reviewing the best available scientific and commercial data, we conclude that the Hawaiian hawk has recovered such that it does not meet the definition of a threatened species or endangered species. The Hawaiian hawk was likely more abundant at the time of listing than data at that time indicated, and the species has maintained a stable population of approximately 3,000 individuals for decades. Additionally, there are increasingly more conservation efforts that have been implemented on the island of Hawaii and across the State, as well as increasingly more lands set aside for conservation in perpetuity. The Hawaiian hawk will continue to be monitored as outlined in the PDM plan, which has been updated after undergoing peer review.

(30) *Comment:* A few commenters stated that this rule is arbitrary and capricious.

Our Response: We based our proposed rule and this rule on the best scientific and commercially available data, and we sought peer review and public comment on the proposed rule during five comment periods, over a total of 270 days. The cumulative data suggest that the Hawaiian hawk's viability is not currently threatened by any of the five factors outlined in section 4(a)(1) of the Act and currently maintains a self-sustaining population.

(31) *Comment:* Two commenters stated the PDM plan is weak, one noting further that it does not address delisting criteria.

Our Response: Based on peer review and other relevant comments, we have revised the PDM plan to include habitat monitoring. According to the updated 2018 PDM plan guidance co-authored by the Service and the National Oceanic Atmospheric Administration, post-delisting monitoring refers to activities undertaken to verify that a species delisted due to recovery remains secure from risk of extinction after the protections of the Act no longer apply. The primary goal is to monitor the species to ensure the status does not deteriorate, and if a substantial decline in the species (number of individuals or populations) or an increase in threats is detected, to take measures to halt the decline so that re-proposing it as endangered or threatened is not needed.

The Act does not require the development of a formal PDM plan. However, the Service finds that planning documents substantially contribute to the effective implementation of section 4(g) of the Act by guiding collection and evaluation of pertinent information over the monitoring period and articulating the associated funding needs. If post-delisting monitoring detects a significant decline in the Hawaiian hawk population, or a significant change in habitat so that it would not support a self-sustaining Hawaiian hawk population, relisting may be warranted. For additional discussion, see Future Conservation Measures, below. For information on how to view the updated PDM plan, see *Post-Delisting Monitoring Plan Overview,* below.

(32) One commenter stated there is not enough biosecurity in Hawaii to protect the Hawaiian hawk from introduced harmful nonnative species and diseases.

Our Response: Biosecurity is an ongoing challenge in Hawaii; however, biosecurity is not currently considered a threat to the Hawaiian hawk. See our discussions in this rule under *Recovery Plan Implementation,* Factor C, and Factor D.

(33) *Comment:* One commenter expressed concern over predation of Hawaiian hawks by nonnative animals such rats, mice, cats, and mongooses.

Our Response: Hawaiian hawks are top predators, and most nonnative species that are predators of other native animal species are actually prey to Hawaiian hawks (*e.g.,* rats, mice, mongoose). Cats (domestic and feral) are the exception; however, data indicate that cats are not currently a factor impeding Hawaiian hawk population success. Please see our discussion above under Factor C.

(34) *Comment:* One commenter stated that there are inadequate regulatory mechanisms, and therefore, the Hawaiian hawk should not be delisted.

Our Response: Regulatory mechanisms are only needed if other factors are found to threaten the continued existence of the species. Because we have determined that no threats remain that would endanger the Hawaiian hawk, either now or in the future, we find that the existing regulatory mechanism are adequate to protect the Hawaiian hawk in the absence of the Act's protections. Please see our discussion above under Factor D.

(35) *Comment:* One commenter expressed concern that little fire ants are blinding Hawaiian hawks.

Our Response: The nonnative little fire ant has spread across the island of Hawaii (Lee *et al.* 2015, p. 100; Hawaii Invasive Species Council. 2019b), and little fire ants are known to cause significant injuries and developmental problems in adults and chicks of ground-nesting seabirds and other species of ground-nesting birds (Plentovich 2019, in litt.). Because little fire ants climb, and sometimes nest, in trees, they could potentially harm a Hawaiian hawk. However, we are unaware of any blinding of Hawaiian hawks by little fire ants, or any other harm to hawks caused by little fire ants. The post-delisting status of Hawaiian hawks will be monitored as outlined in the PDM plan.

(36) *Comment:* One commenter stated that the Migratory Bird Treaty Act (MBTA) is not as efficient as the Endangered Species Act and expressed concern that decreased protections for Hawaiian hawks will result in intentional harm to them.

Our Response: The MBTA implements various treaties and conventions between the United States and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the MBTA, taking, killing, or possessing migratory birds is unlawful. Unless allowed by regulations, the MBTA provides that it is unlawful to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or imported, deliver for transportation, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export, any migratory bird, any part, nest, or egg of any such bird, or any product, whether or not manufactured.

To enforce the MBTA, authorized Department of the Interior employees may: Without a warrant, arrest a person violating the MBTA in the employee's presence or view; execute a warrant or other process issued by an officer or court to enforce the MBTA; and search any place with a warrant. All birds, parts, nests or eggs that are captured, killed, taken, offered or sold, bartered, purchased, shipped, transported, carried, imported, exported, or possessed contrary to the MBTA will be seized and, upon conviction of the offender or upon court judgment, be forfeited to the United States and disposed of by the Secretary (see 16 U.S.C. 706).

According to the MBTA at 16 U.S.C. 707, a person, association, partnership, or corporation that violates the MBTA or its regulations is guilty of a misdemeanor and subject to a fine of up to $15,000, jail up to 6 months, or both. Anyone who knowingly takes a migratory bird and intends to, offers to, or actually sells or barters the bird is guilty of a felony, with fines up to $2,000, jail up to 2 years, or both. All guns, traps, nets, vessels, vehicles, and other equipment used in pursuing, hunting, taking, trapping, ensnaring, capturing, killing, or any attempt on a migratory bird in violation of the MBTA with the intent to sell or barter, must be forfeited to the United States and may be seized and held pending prosecution of the violator. The property is to be disposed of and accounted for by the Secretary.

(37) *Comment:* One commenter expressed concern that Hawaiian hawks will be negatively impacted by sea level rise resulting from climate change.

Our Response: Hawaiian hawks occur across the island of Hawaii, which is the largest of all the Hawaiian islands. Hawaii is so large that all of the other Hawaiian islands could fit into the boundaries of the island. Hawaiian hawks nest in forested areas, which are usually away from the coastline (approximately between 100 ft (30 m) above sea level to 5,578 ft (1,700 m) elevation) (Griffin 1985, p. 69–71). Further, under a scenario in which sea-level rise reaches 6 ft (1.8 m), we estimate only 0.1 percent (1830 ac (741 ha) of 1,422,132 ac (575517 ha) of Hawaiian hawk habitat will be lost (Harrington 2019, in litt.). Although Hawaiian hawks may forage near the coast, it is unlikely that sea level rise will have any negative impacts on Hawaiian hawks in the foreseeable future.

(38) *Comment:* One commenter stated that the recovery plan criteria have not been met, and that the Service never produced delisting criteria in the recovery plan or PDM plan. This commenter also stated that we did not adhere to either the Act or Administrative Procedure Act.

Our Response: As discussed under *Recovery Plan Implementation,* the recovery criteria for downlisting have all been met. Although criteria for delisting were not included in the recovery plan, a species may be delisted if it no longer meets the definition of an endangered species or a threatened species under the Act, whether or not all of the recovery criteria or action items in a PDM plan are completed. Further, recovery plans and PDM plans are guidance documents. The Hawaiian hawk is more abundant than previously thought at the time of listing. More refined survey, modeling, and other analytical computer programs have enhanced our understanding of the Hawaiian hawk population. Although the Hawaiian hawk occurs on a single island, it is a very large island and the hawk's range encompasses most of it. We held five comment periods, the most recent in 2018, to obtain new information to inform our final determination. We did not receive any new data, from any of the five comment periods or two public hearings, that indicate the Hawaiian hawk's status meets the Act's definition of endangered species or the Act's definition of threatened species. If future data or event(s) change this status, we will re-evaluate the status of the Hawaiian hawk. Otherwise, we will monitor the species as described in the final PDM plan.

Determination of Hawaiian Hawk Status

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

Status Throughout All of Its Range

After evaluating threats to the species and assessing the cumulative effect of the threats under the section 4(a)(1) factors, we reviewed the information available in our files and other available published and unpublished information, and we consulted with recognized experts and other Federal, State, and Native Hawaiian organizations. Due to implementation of recovery actions and other conservation efforts that have facilitated a better understanding of the Hawaiian hawk's ecology and threats, we have learned that the Hawaiian hawk is broadly distributed throughout the island of Hawaii, has been stable in number for at least 30 years, nests and forages successfully in both native and altered habitats, and has large areas of habitat in protected status. The Hawaiian hawk is not currently threatened by habitat loss or degradation, overutilization, disease, predation, lack of adequate regulatory mechanisms, or other factors. Thus, after assessing the best available information, we conclude that the Hawaiian hawk is not in danger of extinction throughout all of its range.

Having found that the Hawaiian hawk is not in danger of extinction throughout its range, we next evaluated whether the species is in danger of extinction in the foreseeable future throughout its range. Under the Act, a threatened species is any species that is ''likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' 15 U.S.C. 15532(20).

The Act does not define the term ''foreseeable future.'' Our implementing regulations at 50 CFR 424.11(d) set forth a framework within which we evaluate the foreseeable future on a case-by-case basis. The term foreseeable future extends only so far into the future as the Services can reasonably determine that both the future threats and the species' responses to those threats are likely. Analysis of the foreseeable future uses the best scientific and commercial data available and considers the timeframes applicable to the relevant threats and to the species' likely responses to those threats in view of its life-history characteristics. While historically Hawaiian hawk have been affected by various threats, as outlined, under the Summary of Factors Affecting the Species, most of the threats have been ameliorated or are no longer thought to be threats.

The threats with the potential to cause population declines relate to habitat loss due to human population growth and its associated development, and invasive plants, such as strawberry guava. Hawaii County projected human growth rate from 2010 to 2040 to be 1.6 percent growth annually; however, the annual average growth rate from 2010 through 2017 was just 1.1 percent (Hawaii Department of Business, Economic Development and Tourism (DBEDT) 2018, in litt.). We found this level of population growth and associated development not to be an imminent threat. In addition, the current successful management of strawberry guava which involves use of the biocontrol agent, *Tectococcus ovatus* is expected to result in a noticeable decrease in the spread of strawberry guava in the future. We conclude there is a reasonable likelihood of these trends continuing at least over the next 20 years, which we consider the foreseeable future for the Hawaiian hawk.

Status Throughout a Significant Portion of Its Range

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range (SPR). Where the best available information allows the Services to determine a status for the species rangewide, that determination should be given conclusive weight because a rangewide determination of status more accurately reflects the species' degree of imperilment and better promotes the purposes of the Act. Under this reading, we should first consider whether the species warrants listing ''throughout all'' of its range and proceed to conduct a ''significant portion of its range'' analysis if, and only if, a species does not qualify for listing as either an endangered or a threatened species according to the ''throughout all'' language.

Having determined that the Hawaiian hawk is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range, we now consider whether it may be in danger of extinction or likely to become so in the foreseeable future in an SPR. The range of a species can theoretically be divided into portions in an infinite number of ways, so we first screen the potential portions of the species' range to determine if there are any portions that warrant further consideration. To do the ''screening'' analysis, we ask whether there are portions of the species' range for which there is substantial information indicating that: (1) The portion may be significant; and (2) the species may be, in that portion, either in danger of extinction or likely to become so in the foreseeable future. For a particular portion, if we cannot answer both questions in the affirmative, then that portion does not warrant further consideration and the species does not warrant listing because of its status in that portion of its range. We emphasize that answering these questions in the affirmative is not a determination that the species is in danger of extinction or likely to become so in the foreseeable future throughout a significant portion of its range—rather, it is a step in determining whether a more detailed analysis of the issue is required.

If we answer these questions in the affirmative, we then conduct a more thorough analysis to determine whether the portion does indeed meet both of the SPR prongs: (1) The portion is significant; and (2) the species is, in that portion, either in danger of extinction or likely to become so in the foreseeable future. Confirmation that a portion does indeed meet one of these prongs does not create a presumption, prejudgment, or other determination as to whether the species is an endangered species or threatened species. Rather, we must then undertake a more detailed analysis of the other prong to make that determination. Only if the portion does indeed meet both SPR prongs would the species warrant listing because of its status in a significant portion of its range.

At both stages in this process—the stage of screening potential portions to identify any portions that warrant further consideration and the stage of undertaking the more detailed analysis of any portions that do warrant further consideration—it might be more efficient for us to address the ''significance'' question or the ''status'' question first. Our selection of which question to address first for a particular portion depends on the biology of the species, its range, and the threats it faces. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the second question for that portion of the species' range.

For the Hawaiian hawk, we chose to evaluate the status question (*i.e.,* identifying portions where the Hawaiian hawk may be in danger of extinction or likely to become so in the foreseeable future) first. To conduct this screening, we considered whether the threats are geographically concentrated in any portion of the species' range at a biologically meaningful scale.

We examined the following threats: Habitat destruction or modification (urbanization, agriculture, nonnative plant and animal species, fire, drought, climate change, ROD); overutilization of the species for commercial, recreational, scientific, or educational purposes (shooting); disease (avian pox, avian malaria) or predation (nonnative rats, mice, mongoose, cats, dogs); inadequate regulatory mechanisms; and other natural or manmade factors (small range, single island endemism, contaminants and pesticides), including cumulative effects. We found no concentration of threats in any portion of the Hawaiian hawk's range at a biologically meaningful scale.

If both (1) a species is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range and (2) the threats to the species are essentially uniform throughout its range, then the species could not be in danger of extinction or likely to become so in the foreseeable future in any biologically meaningful portion of its range. For the Hawaiian hawk, we found both: The species is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range, and there is no geographical concentration of threats so the threats to the species are essentially uniform throughout its range. Therefore, no portions warrant further consideration through a more detailed analysis, and the species is not in danger of extinction or likely to become so in the foreseeable future in any significant portion of its range. Our approach to analyzing SPR in this determination is consistent with the court's holding in *Desert Survivors* v. *Department of the Interior,* No. 16–cv–01165–JCS, 2018 WL 4053447 (N.D. Cal. Aug. 24, 2018).

Determination of Status

Our review of the best available scientific and commercial information indicates that the Hawaiian hawk does not meet the definition of an endangered species or a threatened species in accordance with sections 3(6) and 3(20) of the Act. Therefore, we are delisting the Hawaiian hawk from the List of Endangered and Threatened Wildlife.

Future Conservation Measures

Section 4(g)(1) of the Act requires us, in cooperation with the States, to implement a monitoring program for not less than 5 years for all species that have been recovered and delisted. Although section 4(g) of the Act explicitly requires cooperation with the States in development and implementation of PDM programs, we remain responsible for compliance with section 4(g) and, therefore, must remain actively engaged in all phases of post-delisting monitoring (PDM). We also seek active participation of other entities that are expected to assume responsibilities for the species' conservation, post-delisting. The purpose of this PDM is to verify that a species remains secure from risk of extinction after the protections of the Act are removed, by developing a program that detects the failure of any delisted species to sustain itself. If, at any time during the monitoring period, data indicate that protective status under the Act should be reinstated, we can initiate listing procedures, including, if appropriate, emergency listing under section 4(b)(7) of the Act.

Post-Delisting Monitoring Plan Overview

The Service developed a final PDM plan in cooperation with the Hawaii DLNR, DOFAW. In addition, DOFAW, the National Park Service (NPS), and USGS agreed to cooperate with us in the implementation of the PDM plan. The PDM plan is designed to verify that the Hawaiian hawk remains secure from the risk of extinction after delisting by detecting changes in its status and habitat throughout its known range. The final PDM plan consists of: (1) A summary of the species' status at the time of delisting; (2) an outline of the roles of PDM cooperators; (3) identification of what will be monitored (*e.g.,* demographics, threats, species' response to threats); (4) a description of monitoring methods; (5) an outline of the frequency and duration of monitoring; (6) an outline of data compilation and reporting procedures; and (7) a definition of thresholds or triggers for potential monitoring outcomes and conclusions of the PDM effort.

The PDM plan guides monitoring of the Hawaiian hawk population following the same sampling protocol used by the Service prior to delisting. Monitoring will consist of three components: Hawaiian hawk distribution and abundance, potential adverse changes to Hawaiian hawk habitat due to environmental or anthropogenic factors, and the distribution of nonnative plants in Hawaiian hawk habitats. The PDM period consists of five 5-year cycles, which will begin in 2024. Monitoring through this time period will allow us to address any possible negative effects to Hawaiian hawks associated with changes to their habitat. As funding allows, we will collect data on Hawaiian hawks across the island of Hawaii, which will allow time to observe fluctuations in population abundance that may be attributed to residual stressors.

The PDM plan identifies measurable management thresholds and responses for detecting and reacting to significant changes in Hawaiian hawk habitat, distribution, and persistence. If monitoring detects declines equaling or exceeding these thresholds, the Service in combination with other PDM participants will investigate causes of these declines, including considerations of habitat changes, substantial human persecution, stochastic events, or any other significant evidence. Such investigation will determine if the Hawaiian hawk warrants expanded monitoring, additional research, additional habitat protection, or relisting as an endangered or a threatened species under the Act. If relisting the Hawaiian hawk is warranted, emergency procedures to relist the species may be followed, if necessary, in accordance with section 4(b)(7) of the Act.

We will post the final PDM plan and any future revisions on *http://www.regulations.gov* under Docket No. FWS–R1–ES–2007–0024 and on the Pacific Islands Fish and Wildlife Office's website (*http://www.fws.gov/pacificislands/*).

Effects of the Rule

This rule revises 50 CFR 17.11(h) by removing the Hawaiian hawk from the Federal List of Endangered and Threatened Wildlife. As such, as of the effective date of this rule (see **DATES**), the prohibitions and conservation measures provided by the Act, particularly through sections 7 and 9, no longer apply to this species (including those contained in any existing conservation agreements, all safe harbor agreements, and all biological opinions for this species). There are no habitat conservation plans related to the Hawaiian hawk. Removal of the Hawaiian hawk from the Federal List of Endangered and Threatened Wildlife relieves Federal agencies from the need to consult with us under section 7 of the Act to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of this species. There is no critical habitat designated for this species.

The Hawaiian hawk continues to be protected under the Migratory Bird Treaty Act (16 U.S.C. 703–712), CITES (Article IV), and State of Hawaii law (HRS 195–1).

Required Determinations

National Environmental Policy Act

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*), need not be prepared in connection with regulations pursuant to section 4(a) of the 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 all references cited in this rule is available at *http://www.regulations.gov* at Docket No. FWS–R1–ES–2007–0024, or upon request from the Pacific Islands Fish and Wildlife Office (see **ADDRESSES**).

Authors

The primary authors of this rule are staff members of the Service's Pacific Islands Fish and Wildlife Office (see **ADDRESSES**) and Pacific Regional Office, Portland, Oregon.

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 follows:

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

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

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

§ 17.11 [Amended]

■ 2. Amend § 17.11(h) by removing the entry for ''Hawk, Hawaiian'' under BIRDS from the List of Endangered and Threatened Wildlife.

Dated: November 21, 2019.

Margaret E. Everson,

Principal Deputy Director, U.S. Fish and Wildlife Service, Exercising the Authority of the Director, U.S. Fish and Wildlife Service.

[FR Doc. 2019–27339 Filed 12–31–19; 8:45 am]

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