Programmatic Environmental Impact Statement for the Eagle Rule Revision

United States Department of the Interior

Fish and Wildlife Service

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FINAL PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

for the

EAGLE RULE REVISION

U.S. Department of Interior (DOI), Fish and Wildlife Service (Service)

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Preferred Alternative: Alternative 5: Flyway EMUs, Conservative Take

Abstract: This Programmatic Environmental Impact Statement (PEIS) analyzes the potential impacts to the human environment that may result from implementation of proposed revisions by the Service to several eagle permit regulations that authorize take of bald and golden eagles ("eagles") and eagle nests pursuant to the Bald and Golden Eagle Protection Act (Eagle Act; 16 USC 668–668d). The preferred alternative would: (1) establish limits on the amount of eagle take that the Service could authorize under permits to levels that were analyzed and shown to be compatible with maintaining stable or increasing eagle populations with risk managed in favor of being protective of eagle populations; (2) set the four migratory bird flyways (Atlantic, Mississippi, Central, and Pacific) as discrete eagle management units (EMUs) within which the numerical take limits and the objective of population stability would apply; (3) establish a standard process for evaluating the impacts of take at the finer scale of local eagle populations with the objective of ensuring authorized take does not place the persistence of these populations at risk of extirpation; (4) require that any take of eagles be minimized to the maximum degree practicable; (5) establish a maximum duration for permits of 30 years, but with permit-take limits set, evaluated, and updated in five-year increments; and (6) set standards and objectives for compensatory mitigation that will be required when authorized take exceeds the EMU and, potentially, local eagle population take limits.

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SUMMARY

The Bald and Golden Eagle Protection Act (Eagle Act) prohibits take of bald eagles and golden eagles except pursuant to federal regulations. Eagle incidental take permit regulations provide an opportunity to secure avoidance, minimization, and compensatory mitigation measures to reduce and offset detrimental impacts to eagles while providing certainty to project proponents and other persons engaged in activities that result in incidental take of bald and golden eagles. Bald eagle populations continue to expand throughout their United States (U.S.) range. Golden eagles in the coterminous U.S. may be declining toward a lower population size. Unauthorized sources of human-caused mortality may be a significant factor affecting population trends and size for golden eagles.

This programmatic environmental impact statement (PEIS) analyzes five alternatives (including the preferred alternative) for updating eagle management objectives and permit regulations that will provide protection to eagles while streamlining regulatory compliance for those engaged in activities that may incidentally take eagles. There are five chapters that comprise the critical components of the PEIS. *Chapter 1, Purpose and Need for Agency Action* provides background and describes the purpose and need for the action, the NEPA process, the legal authorities, decisions to be made, and the organization of the PEIS. *Chapter 2, Alternatives* describes the five alternatives the Service considered:

- (Alternative 1, *No Action*) Continue implementation of current management practices and eagle permit regulations.
- Management common to all Action Alternatives includes revisions to eagle incidental take permitting regulations, consisting of: modified definitions, mitigation standards, issuance criteria, permit fees and conditions. All the Action Alternatives also include some revisions to eagle nest take regulations, and allow for permits to be issued for take of golden eagles east of the 100th meridian.
- (Alternative 2, *Current EMUs, Liberal Take*) Eagle populations would be managed using the current eagle management units (EMUs). EMUs for the bald eagle would be in a configuration that roughly approximates Service regions. EMUs for the golden eagle would be based on Bird Conservation Regions (BCRs) west of the 100th meridian, with BCRs east of the 100th meridian combined into one EMU. Unmitigated take limits would be set at 0% for golden eagles and 8% of populations for bald eagles in most EMUs, with lower rates proposed in the Southwest (4.5%) and Alaska (0.7%). Compensatory mitigation would be required for, and limited to, permits that would exceed EMU take limits. Compensatory mitigation for take above EMU take limits would be offset at a 1:1 ratio for bald and golden eagles.

- (Alternative 3, *Current EMUs, Conservative Take*) EMUs would be the same as in Alternative 2. Unmitigated take limits would be set at 0% for golden eagles and 6% of populations for bald eagles in most EMUs, with lower rates proposed in the Southwest (3.8%) and Alaska (0.8%). Incidental take permits could be issued for up to 30 years, with permit reviews every five years. Compensatory mitigation designed to offset impacts at a 1:1 ratio would be required for any permitted take that exceeds EMU take limits. Separate and distinct from compensatory mitigation to offset take above the EMU take limit, a minimum level of compensatory mitigation would be required for each take permit. A permit administration fee for longer-term permits would be assessed at $15,000 every five years to support the Service's ability to conduct the five-year evaluations.
- (Alternative 4, *Flyway EMUs, Liberal Take*) EMUs for bald eagles would be aligned with the Atlantic, Mississippi, Central, and Pacific flyways used by the Service and its partner agencies to manage other species of birds, with the Pacific Flyway divided into three EMUs: southwest, mid-latitude, and Alaska. EMUs for golden eagles would also follow the flyways, with the Mississippi and Atlantic flyways combined into one EMU. Unmitigated take limits would be set at 0% for golden eagles and 8% of populations for bald eagles in most EMUs, with lower rates proposed in the Southwest (4.5%) and Alaska (0.7%). The maximum duration of an incidental take permit would remain at five years. The local area population (LAP) cumulative effects analysis would be incorporated into the regulations. Compensatory mitigation would be required for all permits that exceed EMU take limits and for some permits that exceed LAP take limits; compensatory mitigation would be required if necessary for the permit to be compatible with the preservation of eagles, and compensatory mitigation would be at a 1:1 ratio. The definition of "compatible with the preservation of eagles" would be modified to incorporate greater protection at more local scales.
- (Alternative 5, *Flyway EMUs, Conservative Take—Preferred Alternative*) EMUs for the bald eagle would coincide with the flyways with the same modification as in Alternative 4. Unmitigated take limits would be set at 0% for golden eagles and 6% of populations for bald eagles in most EMUs, with lower rates proposed in the Southwest (3.8%). Incidental take permits could be issued for up to 30 years, with permit reviews every five years. Compensatory mitigation would be required for permits that exceed EMU take limits, and some permits that exceed LAP take limits; compensatory mitigation would also be required if necessary for the permit to be compatible with the preservation of eagles. Compensatory mitigation would be designed to offset take at a ratio of 1:1 for bald eagles and 1.2:1 for golden eagles for take that exceeds EMU take limits. The definition of "compatible with the preservation of eagles" would be modified to incorporate greater protection at more local scales. The LAP cumulative effects analysis would be incorporated into the regulations. The permit administration fee to support the Service's ability to conduct the five-year evaluations for longer-term permits

would be assessed at $8,000 every five years (changed from $15,000 in the May 6, 2016 proposed rule).

Chapter 2, Alternatives also describes alternatives that the Service considered but dismissed from a detailed analysis. *Chapter 3, Affected Environment and Environmental Consequences* analyzes the predicted impacts of each alternative on the environmental categories that could be affected by the proposed action: bald eagles, golden eagles, eagle habitat, migratory birds, other permitted take of eagles, cultural and religious values and resources, socioeconomic resources, and the Earth's climate. The environmental analysis in *Chapter 3* indicates that Alternative 5, the PREFERRED ALTERNATIVE, (1) will not have a significant impact on the growth of bald eagle populations; (2) will add protection for local populations of both species due to the revised preservation standard and incorporation of the LAP cumulative effects analysis; (3) will help prevent or arrest a decline in current golden eagle populations and may even reverse possible negative population trends caused by unauthorized human-caused take; (4) will have little impact to eagle habitat, with possibly more beneficial effects from the increased compensatory mitigation required for golden eagle take (although probably not more than Alternative 3, which would require a minimal level of compensatory mitigation for every take permit for both species); (5) is likely to have more beneficial than adverse impacts to other migratory birds due to implementation of mitigation measures that will benefit other birds as well as eagles as more projects come under permit authorization; (6) will have no effect on other permitted take; (7) will have beneficial effects on cultural values and resources because of the beneficial impacts to eagles and the tribal consultation that will occur as more sources of unauthorized take seek permits; (8) will be beneficial overall to socioeconomic resources because of the ability to tier the NEPA analysis from this PEIS, the increased maximum permit duration, clarification of mitigation requirements, and application of the practicability standard to all permits; and (9) will have negligible or no impacts to the Earth's climate.

Chapter 4, Cumulative Impacts describes the cumulative impacts that may result from the different alternatives. *Chapter 5, Sustainability and Long-term Management* explains why the proposed action will not result in a significant irreversible or irretrievable commitment of resources, will have no significant impacts to long-term productivity, and will not result in significant unavoidable adverse effects.

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Chapter 1. PURPOSE AND NEED FOR AGENCY ACTION

This chapter presents the purpose and need for agency action, decisions to be supported by the Programmatic Environmental Impact Statement (PEIS), and background and history important in its development. Organizational information for the PEIS is also provided.

1.1 INTRODUCTION

Pursuant to the National Environmental Policy Act (NEPA), this PEIS analyzes the potential impacts to the human environment that may result from implementation of proposed revisions by the United States Fish and Wildlife Service (USFWS or Service) to several eagle permit regulations that authorize take of bald and golden eagles and eagle nests pursuant to the Bald and Golden Eagle Protection Act (Eagle Act or BGEPA; 16 United States Code [USC] 668–668d).

The NEPA analysis evaluates the environmental effects of a range of alternatives for eagle management. The NEPA analysis also:

- Evaluates up-to-date information about the status of bald and golden eagle populations;
- Enables the Service to recalculate national and regional take limits for both species (if population management will continue to incorporate regional take limits);
- Analyzes the effects of issuing permits to take golden eagles and bald eagles throughout the United States (U.S.);
- Further analyzes the effects of longer-term, incidental take permits; and
- Evaluates the effects of authorizing take of eagles up to certain levels, both at the regional and local population scales to allow for more efficient permitting at the individual project level (see *1.5.2 Tiering*).

1.2 BACKGROUND

The Eagle Act prohibits take of bald eagles and golden eagles except pursuant to federal regulations. The Eagle Act allows the Secretary of the Interior to issue regulations to authorize the "taking" of eagles for various purposes, including the protection of "other interests in any particular locality." In 2009, the Service promulgated regulations in Title 50, part 22 of the Code of Federal Regulations (CFR) that established two new permit types for take of eagles and eagle nests (74 FR 46836, September 11, 2009). One permit authorizes, under limited circumstances, the take (removal, relocation, or destruction) of eagle nests (50 CFR 22.27). The other permit type authorizes nonpurposeful take (disturbance, injury, or killing) of eagles (50 CFR 22.26) where the take is incidental to an otherwise lawful activity. The 2009 regulations provided for standard permits, which authorize individual instances of take that cannot practicably be avoided, and programmatic permits, which authorized recurring take that is unavoidable even after implementation of advanced conservation practices.

The Eagle Act requires the Service to determine that any take of eagles it authorizes is "compatible with the preservation of bald eagles or golden eagles." In the preamble to the final regulations for eagle nonpurposeful take permits, and in the Final Environmental Assessment (EA) of the 2009 regulations, the Service defined that standard to mean "consistent with the goal of stable or increasing breeding populations" (74 FR 46838).

On April 13, 2012, the Service initiated two additional rulemakings: (1) a proposed rule ("Duration Rule") to extend the maximum permit tenure for programmatic eagle nonpurposeful take permit regulations from five to 30 years (77 FR 22267), and (2) an Advance Notice of Proposed Rulemaking (ANPR) soliciting input on all aspects of those eagle nonpurposeful take regulations (77 FR 22278).

The ANPR highlighted three issues for public comment: the agency's overall eagle population management objectives; compensatory mitigation required under permits; and the nonpurposeful take programmatic permit issuance criteria. As a next step, the Service issued a Notice of Intent (NOI) to prepare an EA or EIS pursuant to NEPA (79 FR 35564, June 23, 2014). The Service then held five public scoping meetings between July 22 and August 7, 2014.

The Service finalized the Duration Rule on December 9, 2013 (78 FR 73704). However, the rule was the subject of a legal challenge, and on August 11, 2015, a federal district court vacated the provisions that had extended the maximum programmatic permit tenure to 30 years. *Shearwater v. Ashe*, No. 14CV02830LHK (N.D. Cal. Aug. 11, 2015). The court held that the Service should have prepared an EA or EIS rather than apply a categorical exclusion under NEPA. *Id*. at 77. The effect of the ruling was to return the maximum programmatic permit term to five years.

We published the 2012 ANPR and 2014 NOI, conducted scoping meetings, and developed this PEIS to improve the Service's permitting and conservation framework for eagles. In the seven years since the new permits became available, new developments, changing circumstances, and new information need to be analyzed and incorporated into the Service's management objectives for eagles.

Bald eagle populations have continued to increase in most areas of the U.S. There has also been significant expansion of the wind energy industry, among other energy industries. Several developments discussed below have contributed to a perception that the current permitting framework does not provide enough flexibility to issue eagle take permits. Indeed, few programmatic permits have been issued to date. When projects go forward without permit authorization, the opportunity to obtain benefits to eagles in the form of required conservation measures is lost, and project operators are putting themselves at risk of violating the law.

Under the current management approach, established with the 2009 eagle permit regulations and Final EA, permitted take of bald eagles is capped at 5% of estimated annual productivity (successful reproduction) of the population. Because the Service lacked data to show that golden eagle populations could sustain any additional unmitigated mortality at that time, the Service set take limits for that species at zero for all regional populations. This meant that any

new authorized take of golden eagles must be at least equally offset by compensatory mitigation (specific conservation actions to replace or offset project-induced losses).

Since 2009, Service and U.S. Geological Survey (USGS) scientists have undertaken considerable research and monitoring to improve the Service's ability to track compliance with the quantitative management objectives of our eagle permitting program and to reduce uncertainty with the goal of increasing management flexibility. Of particular significance, the Service has updated population estimates for both species of eagle and quantified uncertainty in those estimates. For the bald eagle, the Service now estimates a higher population than was estimated in 2009 in the coterminous U.S., and allowable take limits will likely increase considerably across most of the country as a result. For golden eagles, recent research has confirmed the Service's assessment of status and population size in 2009. Additionally, the Service now has a much better understanding of the seasonal, annual, and age-related movement patterns of golden eagles. These data need to be incorporated into the management framework.

In the Final EA for the 2009 regulations and in the preamble to those regulations, the Service adopted a policy of not issuing take permits for golden eagles east of the 100th meridian. At the time, the Service determined there were not sufficient data to ensure that golden eagle populations were stable or increasing such that permitting take would not result in a decline in breeding pairs in this region. However, after further analysis, the Service has determined that some take can be permitted with implementation of offsetting mitigation. Rather than providing an increased level of protection for golden eagles, this policy has meant that activities that take golden eagles in the east continue to proliferate without implementation of conservation measures and mitigation to address impacts to golden eagles that would be required as the result of the permitting process.

In implementing the 2009 permit regulations, the Service has identified provisions that could be improved for the benefit of both eagles and people. Currently, the circumstances under which the Service can issue eagle nest take permits (50 CFR 22.27) are limited, which can lead to situations where landowners may be disproportionately burdened with little conservation benefit to eagles. Revised provisions are warranted that appropriately balance the protection of important nest sites for eagles with the need to minimize unnecessary regulatory burden to the public.

Another issue that has hampered efficient permit administration (of both eagle nonpurposeful take permits and eagle nest take permits) is the difficulty inherent in applying the standard that take must be reduced to the point where it is unavoidable, which the current regulations require for programmatic permits. In addition, a lack of specificity in the regulations as to when compensatory mitigation is required can lead to inconsistencies in what is required of permittees.

Finally, the five-year maximum permit term for programmatic permits has proven to be a deterrent for businesses engaged in long-term activities that have the potential to incidentally

take bald or golden eagles over the lifetime of the activity. With longer-term permits, the Service will have the ability to build adaptive management measures into the permit conditions. This approach provides a degree of certainty to project proponents because they understand what may be required to remain compliant with the terms and conditions of their permits in the future. This allows companies to plan accordingly by allocating resources so they will be available to implement additional conservation measures if needed to benefit eagles.

The Service cannot require any entity to apply for an eagle take permit (except under legal settlement agreements), with the result that some project proponents decide to "take their chances" by building and operating without eagle take permits in areas where eagles are likely to be taken. When this occurs, the opportunity to achieve mitigation and conservation measures is lost. For that reason, the Service believes that permitting long-term activities that are likely to incidentally take eagles—including working with project proponents to minimize the impacts and securing compensatory mitigation—is preferable to foregoing that opportunity because companies perceive the permit process as being more onerous than it should be. Enforcement becomes the other option when entities take eagles without permits, and the Service is actively engaged in numerous investigations focused on incidental take of eagles.

1.3 Purpose and Need

The purpose of this action is to establish updated management objectives and an amended incidental take permitting framework that will ensure the preservation of eagles while streamlining regulatory requirements and promoting compliance with the Eagle Act. The Service needs to conduct this action because the current regulations have proven difficult to implement for complex projects within a reasonable timeframe and without consuming a disproportionate share of the Service's increasingly limited resources. The Service also needs to update the regulations to account for new information on bald and golden eagles and incorporate that information into an updated permitting and management framework.

Bald eagle populations continue to expand throughout their U.S. range. Golden eagles in the coterminous U.S. are at best stable, and may be in the early stages of a decline to a lower population size. Unauthorized sources of human-caused mortality appear to be a significant factor affecting population trends and size, particularly for golden eagles. The Service's incidental take permit regulations provide an opportunity to bring many new and ongoing activities into compliance with the Eagle Act, and in doing so, secure avoidance, minimization, and compensatory mitigation measures to reduce and offset detrimental impacts to eagles. However, the current incidental take permit regulations appear to have offered insufficient incentive to bring many project proponents and developers to the table. Consequently, conservation opportunities are lost.

To satisfy the purpose and need, the selected alternative should:

- Increase compliance by simplifying the permitting framework and increasing certainty;
- Allow for consistent and efficient administration of the program by Service staff;

- Be based on best available science and data; and
- Enhance protection of eagles throughout their ranges by increasing implementation of avoidance, minimization, and mitigation of adverse impacts from human activities.

1.4 PROPOSED ACTION

The Service proposed to update its management objectives for bald and golden eagles and revise its 2009 permit regulations for incidental take of eagles and take of eagle nests. The management objective directs strategic management and monitoring actions, and ultimately, determines what level of permitted eagle take can be allowed, consistent with the Eagle Act.

The current management objective for both bald and golden eagles is to ensure that the Service's authorization of eagle take is consistent with the goal of maintaining the potential for stable or increasing breeding populations over 100 years, which would span at least eight generations of eagles. We considered four primary elements when establishing the management objective: (1) the population objective and relevant timeframe for it to be met; (2) the delineation of eagle management units (EMUs), or the geographic scale over which permitted take is regulated to meet the population objective; (3) whether to also set an upper limit on take at a finer scale than the EMU to avoid creating population sinks in local breeding populations; and (4) the appropriate level of risk tolerance. The level of risk tolerance means how much risk to eagle populations the agency is willing to take in carrying out management actions (e.g., setting levels of authorized take) when information is uncertain. For example, when information is less certain, we may adopt a more conservative approach to avoid unintended outcomes. Alternatively, to provide for more flexibility in permitting, the Service could adopt a more risk-tolerant approach. These elements could be different for the two eagle species, resulting in a separate management objective for each.

To achieve these management objectives, the Service proposed a number of revisions to eagle nonpurposeful (incidental) take permit regulations (50 CFR 22.26) and eagle nest take regulations (50 CFR 22.27). One proposed revision extends the maximum permit duration from five to thirty years. The proposed actions also include revisions to the permit fee schedule at 50 CFR 13.11, several definitions in 50 CFR 22.3, and two provisions that apply to all eagle permits (50 CFR 22.4 and 22.11).

1.5 NEPA PROCESS

The Service developed this PEIS in accordance with NEPA, Council on Environmental Quality (CEQ) NEPA implementing regulations, and the Service's NEPA implementing procedures. This PEIS examines the potential direct, indirect, and cumulative environmental impacts associated with the proposed development and implementation of eagle management and the permitting framework.

The purpose of this PEIS is to inform the Service's decision makers and the public of the potential environmental consequences of the proposed action and its alternatives. An

interdisciplinary team of eagle experts, regulatory experts, and biologists prepared this PEIS. The Service received public input on the issues to be analyzed during the scoping process for this project (see *6.1 Public Participation*).

On May 6, 2016, the Service put out the Draft PEIS for a 60-day public comment period along with proposed rule revisions (81 FR 27934), and based on public input, made modifications to the rule and PEIS.

The breadth of subject matter in this NEPA document and the nature of the environmental resources potentially affected require that the Service consider many laws, regulations, and Executive Orders (EO) related to environmental protection. These authorities are addressed in various sections of this document where they are relevant to particular environmental resources and conditions. *Section 1.6 Authorities* provides a list of the applicable laws and regulations considered in development of this PEIS.

1.5.1 Programmatic Analysis

The NEPA Task Force, established by the CEQ in 2002, reported that "Programmatic NEPA analyses and tiering can reduce or eliminate redundant and duplicative analyses and effectively address cumulative effects" (CEQ, 2003). A programmatic environmental document such as this PEIS is prepared when an agency proposes to carry out a broad action, program, or policy.

The programmatic approach creates a comprehensive, analytical framework that supports subsequent analyses of specific actions at site- and ecoregion-specific locations within the nation. Programmatic analysis can save resources by providing NEPA coverage for an entire program, allowing subsequent NEPA analyses to be more narrowly focused on specific activities at specific locations.

1.5.2 Tiering

Tiering is a staged approach to NEPA described in CEQ's NEPA Implementing Regulations (40 CFR 1508.28). Tiering addresses broad programs and issues in the initial analysis and analyzes site-specific actions and impacts in subsequent NEPA tiered studies. The geographic region for this PEIS is the entire United States, thus the Service would be able to tier additional site-specific environmental analyses under NEPA as actions that would flow out of this PEIS. This PEIS is a first-tier environmental review. The Service anticipates tiering subsequent EAs for site-specific projects involving incidental take of eagles off of this PEIS. The purpose of tiering subsequent EAs is to avoid repetitive discussions of the same issues previously addressed in this PEIS and to focus on the actual issues ready for decision.

For the most part, when permitting projects that (a) will not take eagles above the EMU take limits (unless it is offset); (b) will not result in cumulative authorized take within the LAP exceeding 5%; and (c) will fulfill their compensatory mitigation requirements via methods that will offset the take (and for which the necessary metrics to achieve that offset have been analyzed and established), subsequent environmental analyses under NEPA would need to only

summarize the issues discussed in the PEIS and incorporate by reference discussions from the PEIS. One exception is the analysis of migratory birds other than eagles due to the broad-brush programmatic approach in this PEIS. The Service is in the process of developing regulations to authorize incidental take under the MBTA. The Service published an NOI to prepare an EIS on May 26, 2015, (80 FR 30032) and held four scoping meetings in different U.S. cities. For more information, go to: http://birdregs.org/. Tiered NEPA analyses should address specific migratory bird species impacts to the extent that this PEIS does not cover them. Any future environmental analyses should concentrate on the issues specific to the site and type of project.

A screening form for use by project proponents to determine if a project falls under the scope of this PEIS will be developed. A separate NEPA analysis (i.e., EA or EIS) will need to be conducted if the screening form identifies that one or more resources have not been fully addressed by this PEIS. In addition to filling out the screening form, project applicants will need to follow specific criteria and data collection requirements for permit applications and submissions as specified in the revised rule to clearly show how many eagles they anticipate taking so as to determine if a project should be able to tier from this PEIS.

1.6 AUTHORITIES

The principal federal authority for the actions analyzed in this PEIS is the Eagle Act. The Service is the federal agency with primary statutory authority for the management of bald eagles and golden eagles in the U.S. Regulations implementing the Eagle Act are in Subparts C & D of Part 22 of Title 50 of the CFR.

The proposed action is in compliance with the following federal statutes, regulations, Executive Orders, and Department of the Interior policy, including:

1.6.1 Bald and Golden Eagle Protection Act (Eagle Act) (16 USC 668–668d)

The Eagle Act provides that the Secretary of the Interior may authorize certain, otherwise-prohibited activities through promulgation of regulations. The Secretary is authorized to prescribe regulations permitting the "taking, possession, and transportation of [bald or golden eagles]…for the scientific or exhibition purposes of public museums, scientific societies, and zoological parks, or for the religious purposes of Indian tribes, or…for the protection of wildlife or of agricultural or other interests in any particular locality," provided such permits are "compatible with the preservation of the bald eagle or the golden eagle" (16 USC 668a). In accordance with this authority, the Secretary has previously promulgated Eagle Act permit regulations for scientific and exhibition purposes (50 CFR 22.21), for Indian religious purposes (50 CFR 22.22), to take depredating eagles (50 CFR 22.23), to possess golden eagles for falconry (50 CFR 22.24), and for the take of golden eagle nests that interfere with resource development or recovery operations (50 CFR 22.25). This rulemaking revises permit regulations to authorize nonpurposeful eagle take "for the protection of…other interests in any particular locality."

The analysis in this PEIS evaluates whether the proposed permit revisions and their implementation, including limits on annual take, are compatible with the preservation of the bald eagle and the golden eagle.

1.6.2 National Environmental Policy Act (NEPA) (42 USC 4321–4347)

Agencies must complete environmental documents pursuant to NEPA before implementing federal actions. NEPA requires careful evaluation of the need for action, and that federal actions are considered alongside all reasonable alternatives, including the No-Action alternative. NEPA also requires the action agency to consider the potential impacts on the human environment of each alternative. The decision maker(s) must consider the alternatives and impacts prior to implementation, and must inform the public of these deliberations.

The Service has prepared this PEIS in compliance with NEPA; the President's CEQ Regulations, (40 CFR 1500–1508); and the NEPA-compliance requirements in the Department of the Interior's Departmental Manual (DM) and the Service's Manual (FW) (516 DM 8, 550 FW 1–3, 505 FW 1–5).

Pursuant to NEPA and CEQ regulations, this PEIS documents the analysis of a proposed federal action and all reasonable alternatives, including the No-Action alternative. The PEIS evaluates impacts anticipated from all alternatives; informs decision-makers and the public; and aids decision-making by ensuring that NEPA and CEQ regulations have been incorporated into federal agency planning and decision-making. The Service prepared this PEIS using an interdisciplinary approach to address all aspects of the natural and social sciences relevant to the potential impacts of the project. The PEIS analyzes the direct, indirect, and cumulative effects of the proposed action and alternatives.

1.6.3 Endangered Species Act of 1973, as amended (ESA) (16 USC 1531–1544)

It is federal policy under the ESA that all federal agencies shall seek to conserve endangered and threatened species and shall utilize their authorities in furtherance of the purposes of the ESA (§ 2(c)). Federal action agencies must consult with the Service under Section 7 of the ESA to ensure that "any action authorized, funded, or carried out by such an agency… is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat of such species. Each agency shall use the best scientific and commercial data available" (§ 7(a)(2)). Whether the Service's future issuance of an individual eagle permit will trigger a duty by the Service to consult under the ESA will depend on whether the Service has included any particular conditions or required changes to a project that may affect listed species or critical habitat. If the Service's proposed permit conditions or requirements may affect listed species or critical habitat, the Regional Permit Office will coordinate intra-Service Section 7 consultations at the permit stage.

1.6.4 Migratory Bird Treaty Act, as amended (MBTA) (16 USC 703–712)

The MBTA implements the United States' commitment to four international treaties (with Canada, Japan, Mexico, and Russia) for the protection of a shared migratory bird resource. Each of the treaties protects most species of birds that are common to both countries. Under the MBTA, it is illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird unless authorized under regulations or by a permit. Both bald and golden eagles are protected under the MBTA. However, for activities that would take eagles, a separate MBTA authorization in addition to an Eagle Act authorization is not required because 50 CFR 22.11(a) exempts those who hold Eagle Act permits from the requirement to obtain an MBTA permit.

1.6.5 National Historic Preservation Act of 1966, as amended (NHPA) (54 U.S.C 300101 et seq.)

Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties. Federal agencies accomplish this by following the Section 106 regulations, "Protection of Historic Properties" (36 CFR Part 800). The Section 106 regulations set forth a process by which agencies: (1) evaluate the effects of any federal undertaking on historic properties (properties included in, or eligible for inclusion in, the National Register of Historic Places (National Register)); (2) consult with State Historic Preservation Officers (SHPO), Tribal Historic Preservation Officers (THPOs), and other appropriate consulting parties regarding the identification and evaluation of historic properties, assessment of effects on historic properties, and the resolution of adverse effects; and (3) consult with appropriate American Indian tribes (tribes) and Native Hawaiian Organizations (NHOs) to determine whether they have concerns about historic properties of religious and cultural significance in areas of these federal undertakings.

For the purposes of eagle take permits, the federal undertaking is the issuance of the permit authorizing take and the associated conservation measures required in order to maintain compliance with the permit, specifically the avoidance, minimization, and mitigation measures. The Area of Potential Effect (APE), as defined in 36 CFR 800.16(d), should include the areas where the Service has authorized take and influenced the project through negotiation of the avoidance, minimization, and mitigation measures, as well as the activities associated with their implementation.

1.6.6 American Indian Religious Freedom Act (AIRFA) (42 USC 1996)

AIRFA sets forth federal policy to protect and preserve the inherent right of American Indians to express and exercise their traditional religions, including, but not limited to, access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites. Given the special trust relationship between the federal government and federally-recognized Indian tribes, the accommodation of tribal religious practices is in furtherance of the duty of the federal government to promote tribal self-determination. AIRFA

will be construed in conjunction with the Service's trust responsibility to federally recognized tribes.

1.6.7 Executive Order 13007, Indian Sacred Sites (61 FR 26771, May 29, 1996)

In managing federal lands, each executive branch agency with statutory or administrative responsibility for the management of federal lands shall, to the extent practicable, permitted by law, and not clearly inconsistent with essential agency function, (1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and (2) avoid adversely affecting the physical integrity of such sacred sites. When deemed necessary, each Regional Permit Office will coordinate with the Regional Historic Preservation Officer and Regional Native American Liaison (NAL) to ensure implementation of the proposal is in compliance with this Order.

1.6.8 Executive Order 13175, Consultation and Coordination with Tribal Governments (65 FR 67249, Nov. 9, 2000)

This EO emphasizes the need for regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications, the responsibility to strengthen the U.S. government-to-government relationships with Indian tribes, and the responsibility to reduce the imposition of unfunded mandates upon Indian tribes. Each Service Regional Director, in coordination with the Service Regional NAL, conducts government-to-government consultation with the tribes in their region and will do so on permits under this proposal.

In order to ensure consistent, appropriate consultation, the implementation guidance for this proposal, which will also be available for public comment, will contain guidelines on government-to-government consultation. To facilitate coordination of our multiple responsibilities, the Service's tribal consultations will advise the tribes that it is providing them notice under all applicable federal mandates, and the Service will list them: AIRFA, the Eagle Act, EO 13007 (if applicable), EO 13175, and NHPA. The Service will also indicate that notice and invitation to consult is being provided in an effort to carry out our trust responsibility to tribes, with regard to the unique, traditional religious and cultural significance of eagles to Native American communities, and in furtherance of the reserved rights of native communities with respect to eagles.

1.6.9 Department of the Interior Secretarial Order 3317, Policy on Consultation with Indian Tribes (Dec. 1, 2011)

The purpose of this Order is to update, expand, and clarify the Department's policy on consultation with American Indian and Alaska Native tribes; and to acknowledge that the provisions for conducting consultation in compliance with EO 13175, Consultation and Coordination with Indian Tribal Governments, and applicable statutes or administrative actions are expressed in the Department of the Interior Policy on Consultation with Indian tribes.

The policy strives to include elements that:

- Honor the government-to-government relationship;
- Involve the appropriate level of decision maker in a consultation process;
- Promote innovations in communication by including a Department-wide tribal governance officer;
- Detail early tribal involvement in the design of a process implicating tribal interests; and
- Capture a wide range of policy and decision-making processes under the consultation umbrella.

1.6.10 Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (66 FR 3853, Jan. 17, 2001)

This EO specifies the need to avoid or minimize adverse impacts on migratory bird resources when conducting agency actions, as well as the need to restore and enhance the habitat of migratory birds. The proposed action, through its standards for incorporation of avoidance and minimization measures, is consistent with the goals of this EO. The local Ecological Services and Regional Offices will review any mitigation proposals to ensure they do not adversely affect populations of other migratory bird species.

1.6.11 Department of the Interior Departmental Manual 522 DM 1 Adaptive Management Implementation Policy

This policy from the Department of the Interior states that bureaus should incorporate the operational components identified in the report, *Adaptive Management (AM): The U.S. Department of the Interior Technical Guide* (Williams et al., 2009). These components are as follows: the AM definition, the conditions under which AM should be considered, and the process for implementing and evaluating AM effectiveness. The proposed action will be consistent with the Order.

1.6.12 Tribal and State Statutes

Four states still list the bald eagle endangered, and 13 consider it threatened under state statutes (see *Appendix A, State Status and NatureServe Conservation Status Rank for Bald Eagles and Golden Eagles*). Two states consider the golden eagle endangered, and one state considers it as a threatened species. Nothing in the proposed regulation revisions will prohibit individual states or tribes from considering either eagle species as threatened or endangered according to their statutes, nor will the proposed regulation prohibit states or tribes from developing more stringent protection for either species.

Take of eagles may not be allowed without having obtained necessary tribal and state permits and/or certificates or registration. It is beyond the scope of this document to provide specific information regarding each tribe's or state's permit requirements. However, it is the responsibility of each applicant to contact the respective tribal and state wildlife agency to determine permitting requirements.

The Service will determine, upon application, whether there is a valid justification for the permit. In addition, permits will include this proviso: "The authorization granted by permits issued under this section is not valid unless you are in compliance with all other federal, tribal, state, and local laws and regulations that are required to conduct the permitted activity." Permittees found to be out of compliance with such other laws and regulations are subject to revocation of their permits under the Eagle Act.

Each Service region will coordinate and consult with its respective tribes and states on a case-by-case basis; however, it is the Service's intent that this management framework increase regular communication with states and tribes on overall eagle management programs.

1.7 DECISIONS TO BE MADE

The decisions being made are whether to authorize specific revisions to eagle rule regulations, and what underlying management objectives to adopt. Specifically, the decisions include:

- Whether to retain the current EMUs as the scale for assessing the effects of permitting actions on national eagle populations.
- Whether to define "compatible with the preservation of the bald eagle or the golden eagle" to incorporate a local population scale analysis.
- What level of risk tolerance to adopt in managing eagles.
- Whether to make adjustments to the level of take the Service may authorize for either or both species of eagle within EMUs.
- What level or levels of compensatory mitigation to require for eagle take permits.
- Whether to revise various provisions of the eagle nonpurposeful take permit regulations for purposes of providing clarity, promoting compliance, and facilitating implementation.
- Whether to amend the permit regulations for take of eagle nests to provide more flexibility to issue permits to remove nests that have low biological value.

With its final decision, the Service will approve its preferred alternative. The preferred alternative is the alternative that the Service believes would best fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical, and other relevant factors.

1.8 ENVIRONMENTAL ISSUES

Specific topics were considered for impact analyses and to allow comparison of the environmental consequences of each alternative. These impact topics were identified based on federal laws, regulations, and EOs, and from issues raised during internal and external scoping. A brief rationale for the selection of each impact topic is provided in this section, as well as the rationale for dismissing specific topics from further consideration.

1.8.1 Topics Discussed in Detail

1.8.1.1 Bald Eagle

Permitted take, based on eagle management objectives, including population objectives, EMUs, and the level of risk tolerance, would directly affect bald eagle populations. Therefore, bald eagles are addressed as an impact topic in this PEIS.

1.8.1.2 Golden Eagle

Permitted take, based on eagle management objectives, including population objectives, EMUs, and the level of risk tolerance, would directly affect golden eagle populations. Therefore, golden eagles are addressed as an impact topic in this PEIS.

1.8.1.3 Eagle Habitat

Conservation and mitigation measures required as part of standard and programmatic permits would affect eagle habitat. Therefore, eagle habitat is addressed as an impact topic in this PEIS.

1.8.1.4 Migratory Birds

Eagle conservation measures can potentially have direct or indirect impacts on migratory birds. Therefore, migratory birds are addressed as an impact topic in this PEIS.

1.8.1.5 Other Permitted Take

The level of take for both bald and golden eagles may affect the number of eagle permits available for other permitted take, if requests for permits exceed the number compatible with the preservation of eagles. Therefore, other permitted take is addressed as an impact topic in this PEIS.

1.8.1.6 Cultural and Religious Resources

Eagles are important to most tribes for religious and cultural reasons. Establishing limits for eagle take permits may affect the occasional availability of permits for Native American religious and cultural use. Numerous tribes, conservationists, or anyone who might perceive authorized take of bald eagles as compromising the nation's symbol are concerned about the Service's permitted take of eagles. Therefore, cultural and religious resources are addressed as an impact topic in this PEIS.

1.8.1.7 Socioeconomic Resources

Permit availability, limits, and permit issuance criteria and conditions may affect the planning and implementation of projects. Therefore, socioeconomic resources are addressed as an impact topic in this PEIS.

1.8.1.8 Climate Change

An important category of actions for which eagle permits have been requested is wind energy development. Because an important objective of wind energy development is to avoid

greenhouse gas emissions (which are the primary anthropogenic contributor to global climate change), to the extent that the proposed action could lead to additional deployment of wind energy, the indirect impacts of the proposed action on climate change are addressed as an impact topic in this PEIS.

1.8.2 Topics Considered but Dismissed

1.8.2.1 Environmental Justice

EO 12898, *General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing the disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. Native Americans are considered a potentially affected environmental justice community. The impacts of the proposed action on Native Americans are discussed in detail in *3.7 Cultural and Religious Issues*. Beyond that, the action project would not have disproportionate health or environmental effects on minorities or low-income populations or communities as defined in the U.S Environmental Protection Agency's (EPA) 1997 guidance, *Environmental Justice: Guidance Under the Environmental Policy Act* (December 1997). Therefore, environmental justice was dismissed from further consideration in this PEIS.

1.8.2.2 Prime and Unique Farmlands

In August 1980, the CEQ directed that federal agencies must assess the effects of their actions on farmland soils classified by the U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service as prime or unique. Prime or unique farmland is defined as soil that particularly produces general crops, such as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops, such as fruits, vegetables, and nuts. Proposed actions would not affect farmland as defined in Title 7, Chapter 73, Section 4201 (c)(1) of the Farmland Protection Policy Act. Therefore, this topic was dismissed from further consideration in this PEIS.

1.8.2.3 Floodplains

EO 11988, *Floodplain Management*, requires an examination of impacts to floodplains and potential risks involved in placing facilities within floodplains. No impacts are anticipated to occur to floodplains from the proposed actions. Because there would be no impact to floodplains, this topic was dismissed from further consideration in this PEIS.

1.8.2.4 Wetlands

EO 11990, *Protection of Wetlands*, directs that wetlands be protected, and that wetlands and wetland functions and values be preserved. These orders and policies further direct that impacts to wetlands be avoided when practicable alternatives exist. No impacts are anticipated to occur to wetlands from the proposed actions. Because there would be no impacts to wetlands, this topic was dismissed from further consideration in this PEIS.

1.8.2.5 Threatened and Endangered Species

The ESA of 1973 requires federal action agencies to ensure that "any action authorized, funded, or carried out by such an agency…is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat of such species" (§ 7(a)(2)). The Service's rulemaking will neither affect nor jeopardize the continued existence of any species designated as endangered or threatened or modify or destroy its critical habitat, because none of the proposed alternatives here could authorize, fund, or carry out any activity as a threshold matter. Moreover, none of the proposed alternatives here authorize, fund, or carry out any activity that could affect listed species or critical habitat because an eagle take permit is not required to construct or operate a project. Rather, an eagle permit merely authorizes eagle take that may result from a project's construction or operation. Any effects on endangered or threatened species or critical habitat that may occur as a result of developing and implementing permit conditions required for a specific project will be analyzed at the individual project level, as appropriate. The Service's rulemaking also is consistent with conservation programs for those species.

1.8.2.6 Safety

Safety of humans and eagles may be affected under a proposed revision to 22.27(a)(1)(iii) (provision for removal of nests that render a human engineered structure inoperable) to allow issuance of a permit for removal of inactive nests in order to maintain or provide necessary upgrades to public utilities, cell phone towers, and other public service infrastructure. This would include nests being built or currently attended (and therefore "active" under the current definition) but where no eggs have been laid. Also, the existing provision would be revised to allow removal of a nest that will lead to a structure becoming inoperable. These revisions should increase public safety and safety of eagles by allowing for nest removal prior to an emergency becoming manifest and before eggs have been laid in the nest. Because impacts on safety would be minimal, this topic was dismissed from further consideration in this PEIS.

1.9 ORGANIZATION OF THE PEIS

This PEIS consists of eight chapters and three appendices. Information in the chapters and appendices are organized as follows.

- *Chapter 1, Purpose and Need for Agency Action* provides an introduction to the purpose and need for action, background, and the methods through which the public has been and can continue to be involved with the preparation of the document and the decision-making process.
- *Chapter 2, Alternatives* provides descriptions of the Action Alternatives and how they were developed, a description of alternatives initially considered that were subsequently eliminated from detailed study in this PEIS, and a summary of environmental impacts by alternative.

- *Chapter 3, Affected Environment and Environmental Consequences* first describes the potentially affected environment for the impact topics addressed, including bald eagle, golden eagle, eagle habitat, other permitted take, cultural and religious resources, socioeconomic resources, and climate change. This information is provided as the baseline against which the impacts of each of the alternatives can be compared. Then, the potential impacts of the proposed action and alternatives are discussed for each impact topic.
- *Chapter 4, Cumulative Impacts* describes the cumulative impacts of each proposed action. The chapter presents information regarding the cumulative impacts of past, present, and foreseeable future actions and trends by the Service and other entities.
- *Chapter 5, Sustainability and Long-term Management* addresses potential future irreversible and irretrievable commitments of resources.
- *Chapter 6, Consultation and Coordination* describes agencies and tribes consulted in the process of creating this PEIS.
- *Chapter 7, References* contains references cited in this PEIS.
- *Chapter 8, Acronyms and Glossary* defines terms used in this PEIS.
- *Appendix A, State Status and NatureServe Conservation Status Rank for Bald Eagles and Golden Eagles* provides information about the status of bald and golden eagles at the state level.
- *Appendix B, Comments Received on the Draft Programmatic Environmental Impact Statement and Responses* reports comments on the Draft PEIS and provides responses from the Service to them.
- *Appendix C*, *Government Agencies and Organizations Consulted* lists government agencies and non-governmental organizations that submitted comments on the Draft PEIS.

Chapter 2. ALTERNATIVES

2.1 INTRODUCTION

This chapter considers alternatives that provide a reasonable range of options for population management parameters and revisions to regulations that permit take of bald eagles and golden eagles. The alternatives provide different approaches for:

- Take rates and risk levels for bald and golden eagles;
- Geographic scale/eagle management units (EMUs);
- Mitigation requirements for eagle take permits;
- Maximum permit duration (tenure) for incidental eagle take permits;
- Incidental eagle take permit criteria and conditions; and
- Eagle nest take permit provisions.

The PEIS discusses the biological foundations for permit take limits for bald eagles and golden eagles and analyzes the effects of different alternatives for preserving eagle populations, while authorizing incidental (nonpurposeful) take of eagles. The document also analyzes the effects of proposed revisions to eagle permit regulations, summarizes key aspects of the alternatives, and identifies the Service's Preferred Alternative.

2.2 ALTERNATIVE 1: NO ACTION

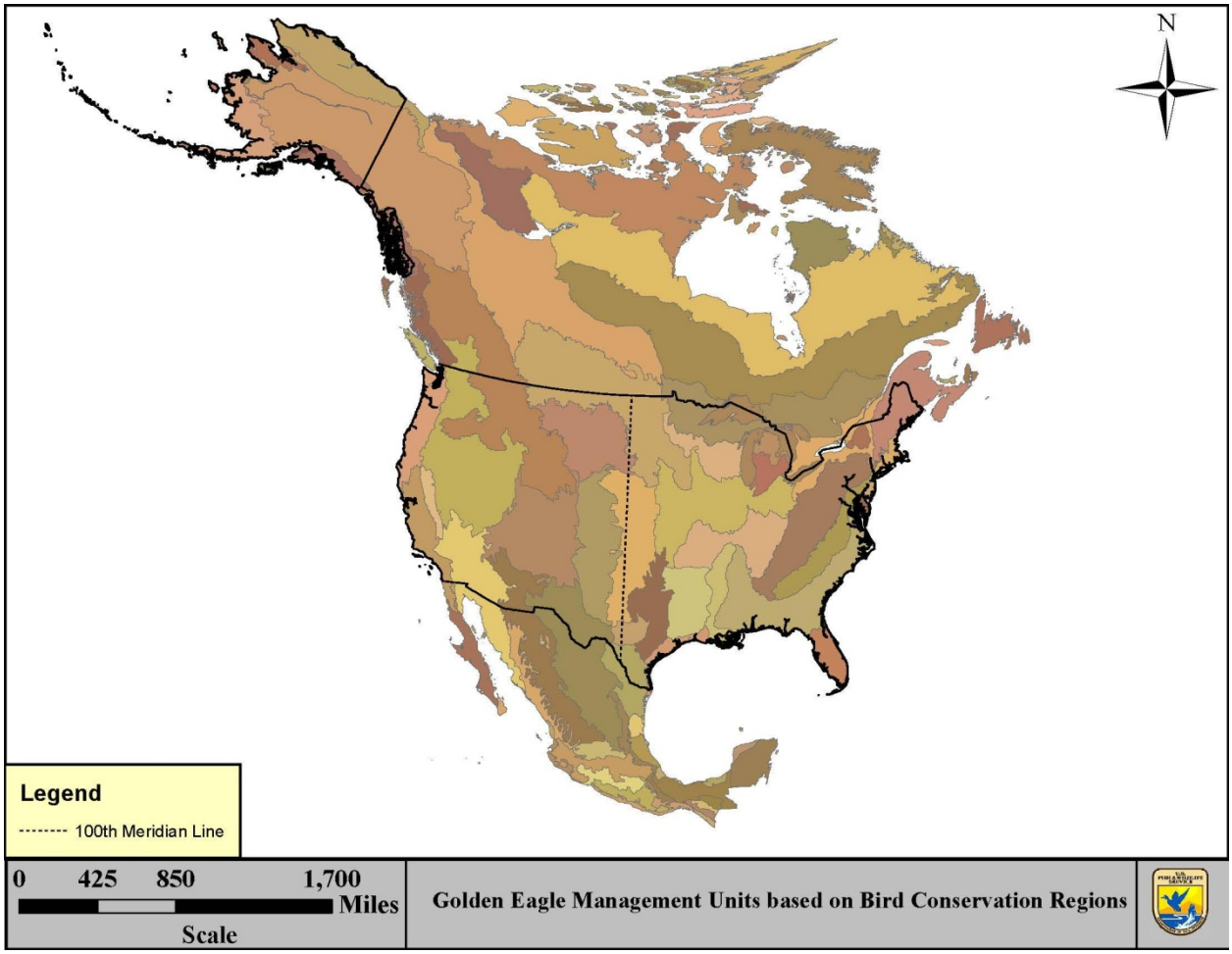
The current management objective if the current regulations are left in place, is to manage populations consistent with the goal of stable or increasing breeding populations (USFWS, 2009a). The baseline population size for both species is the number of estimated eagles in 2009 populations.

2.2.1 EMU

The geographic scale the Service uses to evaluate eagle populations is referred to as an eagle management unit (EMU). EMUs for the golden eagle were set at the BCR level (Figure 2-1) because the Service's monitoring for golden eagles is designed to yield BCR-scale population estimates. Additionally, no permits can be issued east of the 100th meridian for golden eagles.

To establish management populations for bald eagles, the Service used maps of known nesting territories and information on natal dispersal distances to delineate more-or-less geographically distinct breeding populations. Natal dispersal refers to the movement between a hatching location and first breeding or potential breeding location. Because the populations delineated by this approach roughly correspond to the Service's regional organizational structure, the Service has been managing bald eagles based on populations within the eight Service regions (Figure 2-2), with some shared populations. Estimates of bald and golden eagle population size in each EMU were calculated, and EMU-specific estimates of demographic rates were used in

models to determine rates of authorized take that are compatible with maintaining the potential for stable breeding populations.



Note: Shaded areas on the map represent individual BCRs. Go to http://iwjv.org/resource/map-bird-conservation-regions-nabci-bcr-map to view a map with BCR region descriptions.

Figure 2-1. EMUs for golden eagles based on BCRs.

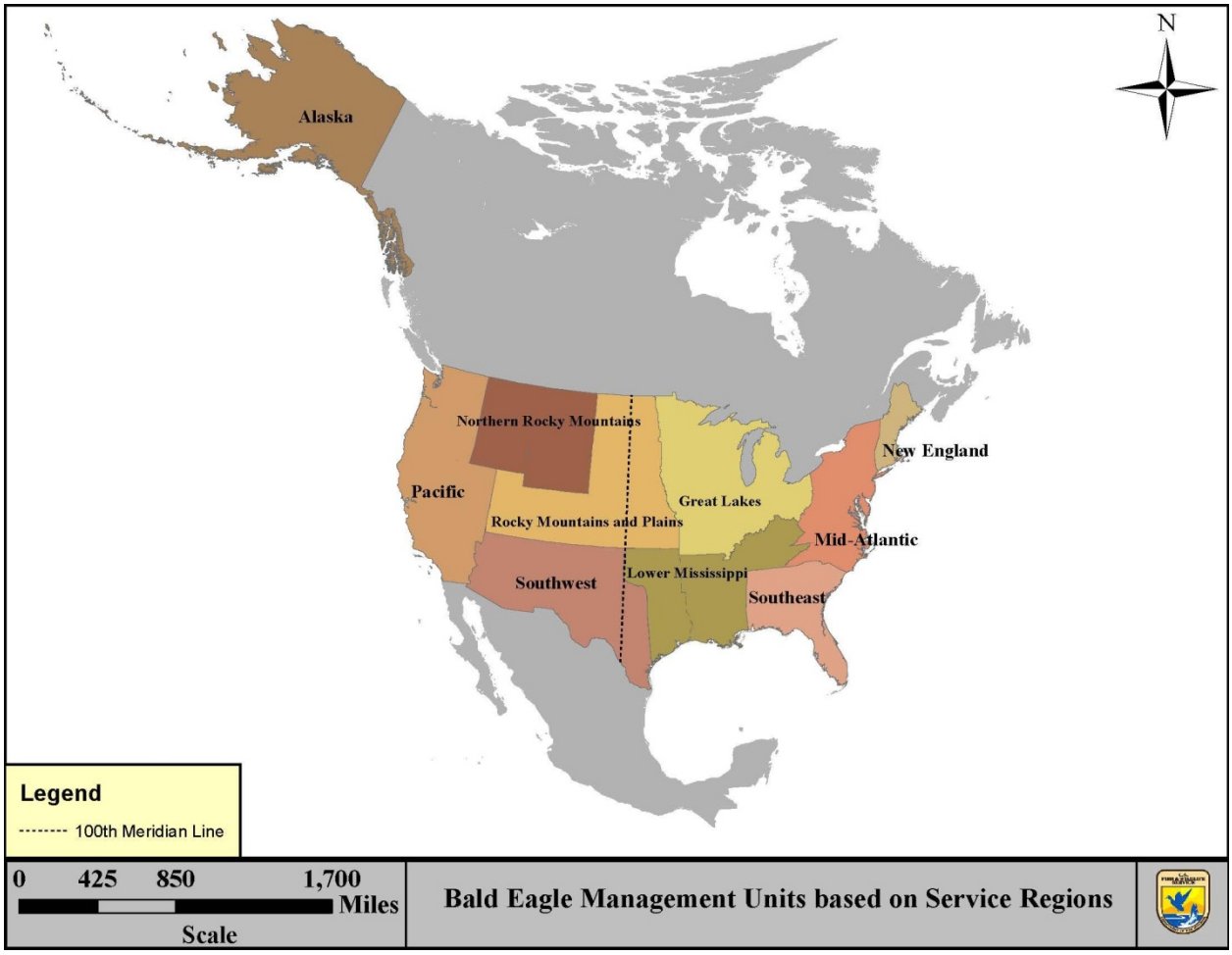


Figure 2-2. EMUs for bald eagles based roughly on Service regions.

2.2.2 Take Levels for Bald and Golden Eagles

Under the current management approach, permitted take of bald eagles is capped at 5% of estimated annual productivity. Because the Service lacked data to show that golden eagle populations could sustain any additional unmitigated mortality in 2009, take limits were set for that species at zero for all EMUs. This means that any new authorized "take" of golden eagles must be at least equally offset by compensatory mitigation (specific conservation actions to replace or offset project-induced losses). The Service has referred to this type of compensatory mitigation in the context of golden eagles as "offsetting mitigation" to distinguish it from other types of compensatory mitigation consisting of conservation measures designed to improve conditions for eagles.

The Service also developed and applied guidance, the Eagle Conservation Plan Guidance module 1—land-based wind energy version 2 (USFWS, 2013a), on upper limits of take at more

local scales to manage cumulative impacts to local populations. Under the guidance, the Service must assess take rates, both for individual projects and for the cumulative effects of other human-caused take of eagles, at the scale of the local-area eagle population (LAP). The LAP analysis involves compiling information on permitted anthropogenic mortality of eagles within a specified distance (derived from each eagle species' natal dispersal distance) of the permitted activities' boundary. If permitted eagle take exceeds 1% of the estimated population size of either species within the LAP area, additional take is of concern. If take exceeds 5% of the estimated population size within the LAP area, additional take is considered inadvisable unless the permitted activity will actually result in a lowering of take levels (e.g., permitting a repowered wind project that, in its repowered form, will take fewer eagles than before repowering). The number of eagles in the LAP is derived by applying the estimated eagle density at the EMU scale to the LAP area. It is not practical to conduct a formal quantitative analysis of unpermitted take as part of the LAP analysis due to the lack of specific data about background levels of anthropogenic mortality in most local areas. Current estimates of golden eagle survival rates suggest that on average about 18 to 20% of golden eagles die each year, and about 56% of these mortalities are from anthropogenic causes. Thus, background levels of golden eagle anthropogenic mortality within an average LAP appear to be roughly 10%. However, knowledge of the actual magnitude of eagle fatalities at a specific LAP scale is lacking, and areas where many eagle deaths are known may just be better studied and not actually reflect higher-than-normal fatality rates. Due to this uncertainty, the quantitative step of the LAP analysis considers only Service-permitted take. Nonetheless, other information available on unpermitted anthropogenic take is also qualitatively considered in making a permit decision. If there are data for a particular area that suggest cumulative anthropogenic take is higher than average (i.e., $> \approx 10\%$ of the LAP population for golden eagles), and that with additional permitted take might exceed average background levels of the LAP population, that would be strong evidence against authorizing additional take.

Ideally, the Service would be able to identify the proportion of eagle mortality at a permitted facility that is composed of eagles from the LAP versus migrants or dispersers from elsewhere. The Service could then limit take in such a way so as to not compromise the ability of the LAP to provide a rescue effect to the area around a project where take is occurring and to ensure particular source populations of migrants or wintering/summering eagles are not disproportionately affected. The Service and partners are making progress towards developing genetic and isotopic methods that will allow for this level of assignment, but those tools are not yet available.

2.2.3 Permits

2.2.3.1 Nonpurposeful Take Permits (50 CFR 22.26)

Current regulations provide for both standard permits, which authorize individual instances of take that cannot practicably be avoided, and programmatic permits, which authorize recurring take that is unavoidable even after implementation of Advanced Conservation Practices (ACPs).

The Service has issued standard permits for commercial and residential construction, transportation projects, maintenance of utility lines and dams, and in a variety of other circumstances where take is expected to occur in a limited timeframe and specific location. For instance, take that does not reoccur, such as temporary abandonment of a nest, or is caused solely by indirect effects, does not require a programmatic permit, but may require a standard permit.

"Programmatic take" of eagles is defined at 50 CFR 22.3 as "take that is recurring, is not caused solely by indirect effects, and that occurs over the long term or in a location or locations that cannot be specifically identified." The Service may issue programmatic permits for up to five years for disturbance and for take resulting in mortalities, based on implementation of ACPs developed in coordination with the Service. ACPs are "scientifically supportable measures approved by the Service that represent the best available techniques to reduce eagle disturbance and ongoing mortalities to a level where remaining take is unavoidable" (50 CFR 22.3). In an informal review in 2014 of programmatic permit requests across the U.S., the Service found that 16 of 23 permit requests were from wind facility developers; the remainder were from electric utilities (three for transmission lines) or Department of Defense (three for training activities), with one for other construction activities (USFWS, 2014a). Most take authorized under §22.26 has been in the form of disturbance. However, permits may authorize lethal take that is incidental to an otherwise lawful activity, such as mortalities caused by collisions with wind turbines, power line electrocutions, and other potential sources of incidental take.

Programmatic permittees must conduct rigorous monitoring of the permitted activity designed to yield valuable information about the actual take level and the conditions under which the take occurred. In this way, programmatic permits present opportunities for research and development of conservation measures to avoid and reduce eagle take.

Because take limits for golden eagles have been set at zero throughout the U.S., in order to meet eagle preservation goals, all permits for golden eagle take must incorporate offsetting compensatory mitigation after all appropriate and practicable avoidance and minimization measures are employed. The same applies to bald eagles in the Southwest EMU. For take that would exceed EMU take limits, offsetting compensatory mitigation must consist of actions that at least equally replace or offset project-induced losses. For take that exceeds EMU take limits, offsetting compensatory mitigation designed to replace bald and golden eagles at a 1:1 ratio would be required. Protection of existing eagle habitat in its current state is not a viable offsetting compensatory mitigation measure for take that would exceed take thresholds, because it is not additive. However, habitat enhancement and restoration along with protection can be used if they can be demonstrated to increase carrying capacity in the EMU, thus effectively offsetting an increase in mortality. Offsetting compensatory mitigation must be within the same EMU as the take.

For take that does not exceed EMU take limits, the 2009 regulations did not incorporate specific compensatory mitigation provisions beyond those described above. The Service may require

compensatory mitigation on a case-by-case basis. The current regulations provide that "mitigation measures determined by the Director as reasonable and specified in the terms of your permit to compensate for the detrimental effects, including indirect effects, of the permitted activity."

The maximum permit duration for both standard and programmatic permits is five years.

2.2.3.2 Eagle Nest Take Permits (50 CFR 22.27)

These permits authorize removal of eagle nests where (1) necessary to alleviate a safety emergency to people or eagles, (2) necessary to ensure public health and safety, (3) the nest prevents the use of a human-engineered structure, or (4) the activity or mitigation for the activity will provide a net benefit to eagles. Only inactive nests may be taken except in the case of safety emergencies.

2.3 MANAGEMENT COMMON TO ALL ACTION ALTERNATIVES

This section addresses the elements that are common to all four Action Alternatives. The baseline population size for both species is the number of estimated eagles in 2009 populations. The amount of authorized take that would be considered part of the baseline, and therefore would not be subject to an offsetting mitigation requirement in populations where the take limit is zero, would be unchanged from the 2009 numbers.

The Service would establish an EMU for golden eagles east of the 100th meridian and would allow issuance of permits for golden eagles in the eastern U.S. Under all the Action Alternatives, take levels in the eastern U.S. would be set at zero unless the take is offset, because additional take would likely not be consistent with the preservation standard. Therefore, any take of golden eagles east of the 100th meridian would need to be compensated for with offsetting mitigation.

The Service proposed a number of revisions to its eagle permit regulations that are included in all the Action Alternatives.

2.3.1 Definitions (50 CFR 22.3)

- Advanced Conservation Practices (removed from CFR).
- Alternate nest (new): "One of potentially several nests within a nesting territory that is not an in-use nest at the current time. When there is no in-use nest, all nests in the territory are alternate nests."
- Area nesting population (removed from CFR).
- Eagle Management Unit (new): "The geographic scale over which permitted take is regulated to meet the management objective." *(This definition was modified in this final PEIS for Alternative 5 (Preferred Alternative) based on public comment. See discussion of Alternative 5 below.)*
- Eagle nest: (revised): "Any assemblage of materials built, maintained, or used by bald eagles or golden eagles for the purpose of reproduction."

- Inactive nest: (removed from CFR).
- In-use nest (new): “A bald or golden eagle nest characterized by the presence of one of more eggs, dependent young, or adult eagles on the nest in the past ten days during the breeding season.”
- Maximum degree achievable (removed from CFR).
- Nesting territory (new): “The area containing one or more eagle nests within the home range of a mated pair of eagles, regardless of whether such nests were built by the current resident pair.”
- Practicable (revised): “Capable of being done after taking into consideration, relative to the magnitude of the impacts to eagles, the following three things: the cost of remedy compared to the scope and scale of the project; existing technology; and logistics in light of overall project purposes.”
- Programmatic take (removed from CFR).
- Programmatic take permit (removed from CFR).
- Territory (removed from CFR).

2.3.2 Scope of Eagle Regulations (50 CFR 22.11)

The Service would revise § 22.11(c) to replace “[Y]ou must obtain a permit under part 21 of this subchapter for any activity that also involves migratory birds other than bald and golden eagles, and a permit under part 17 of this subchapter for any activity that also involves threatened or endangered species other than the bald eagle” with “[A] permit under this part authorizes take, possession, and/or transport only under the Bald and Golden Eagle Protection Act and does not provide authorization under the Migratory Bird Treaty Act or the Endangered Species Act for the take, possession, and/or transport of migratory birds or endangered or threatened species other than bald or golden eagles.” The original language was promulgated prior to the bald eagle being removed from the ESA List of Endangered and Threatened Wildlife as part of a final rule authorizing transport of eagle parts. The original intent of § 22.11(c), as explained in the Federal Register notice accompanying its publication, was that a permit holder transporting items that contained not only eagle parts, but also parts of other species protected by the Endangered Species Act or the Migratory Bird Treaty Act, into or out of the country would need to ensure he or she possessed the applicable permits for those protected, non-eagle species in order to legally transport the item. (See 64 FR 50467.) However, this provision could be read to limit the Service’s discretion to decide the appropriate manner of authorization for activities that affect other protected species outside the context of transportation of items containing eagle parts. For example, § 22.11(c) could be read to preclude the Service from using intra-Service Section 7 consultation to analyze and exempt non-jeopardizing ESA take that may result from the Service’s issuance of an Eagle Act permit to a project proponent. Thus, we are proposing to amend § 22.11(c) to ensure it does not limit our discretion to apply the appropriate authorization under the ESA or the MBTA for activities that involve other species protected by those statutes.

2.3.2.1 Golden Eagle Nest Take Permits for Resource Development and Recovery (50 CFR 22.25)

The requirement for the Service to evaluate whether there is suitable nesting habitat available within the area nesting population would be revised to require evaluation of whether another nest site is available within the territory from which the nest is being removed.

- Minor revisions would be made for purposes of consistency with the § 22.27 nest take permit regulations.

2.3.2.2 Incidental Take Permits (50 CFR 22.26)

- Change name from "nonpurposeful take" to "incidental take."
- Compensatory mitigation requirements would be clarified.
- There would be one permit type only, rather than separate standard permits and programmatic permits.
- All permits would contain the standard that take must be avoided and minimized to the maximum degree practicable.
- The requirement to implement ACPs to reduce take to the point where any remaining take is unavoidable, which currently applies to programmatic permittees, would be eliminated.
- Service-approved protocols for pre-application surveys and risk modeling would be required.
- The permit application processing fee for permits up to five years in duration would increase from $500 to $2,500 for commercial entities.

2.3.2.3 Nest Take Permits (50 CFR 22.27)

- There would be one permit type only, rather than separate standard permits and programmatic permits.
- The requirement to implement ACPs to reduce take to the point where any remaining take is unavoidable, which currently applies to programmatic permittees, would be eliminated.
- Revisions would allow removal of in-use nests to prevent a rapidly developing safety emergency that is likely to occur while the nest is still in use for breeding purposes.
- Revisions would allow removal of in-use nests prior to egg laying to prevent the creation of a functional hazard that renders a human-made structure inoperable.
- The requirement that suitable nesting habitat be available to displaced eagles for non-emergency nest take would be removed. This provision has been problematic because in many healthy populations of bald eagles, suitable nest sites are all occupied. The regulations would retain the requirement that the Service consider the availability of alternative suitable nesting habitat, but a finding that there is suitable alternative habitat would not be a prerequisite for issuing a permit.

- There would be a provision for the Service to waive the requirement that nestlings and viable eggs be transported to a foster nest or permitted rehabilitator. In some geographic locations, transport of nestlings to rehabilitators is not possible. Nests with viable eggs or nestlings can be removed only in safety emergencies, so the requirement sometimes means that the Service cannot issue a permit necessary to alleviate the safety emergency.
- The permit application processing fee would increase from $500 to $2,500 for commercial entities. The permit application processing fee for permits to take multiple nests would increase from $1,000 to $5,000 for commercial entities.

2.4 Alternative 2: Current EMUs, Liberal Take Levels

2.4.1 Eagle Management Units

The scale the Service would use to evaluate eagle populations under this alternative would be the same as under Alternative 1. EMUs for the golden eagle would be at the BCR level (Figure 2-1). Management populations for bald eagles would correspond to the Service's regional organizational structure based on populations within the eight Service regions, with some shared populations (Figure 2-2).

2.4.2 Take Levels of Bald and Golden Eagles—Liberal

Take limits (for take that is not required to be offset) would be set at 0% for golden eagles and 8% of populations for bald eagles in most EMUs, with lower rates proposed in the Southwest (4.5%) and Alaska (0.7%).

2.4.3 Permit Regulations

The Service would make the revisions described in *Management Common to All Action Alternatives*, plus:

- Offsetting compensatory mitigation would be limited to permits that would exceed EMU take limits.
- For take that exceeds EMU take limits, compensatory mitigation designed to replace bald and golden eagles at a 1:1 ratio would be required.

2.5 Alternative 3: Current EMUs, Conservative Take Levels, Permit Duration Increase

2.5.1 Eagle Management Units

The scale the Service would use to evaluate eagle populations under this alternative would be the same as under Alternatives 1 and 2. EMUs for the golden eagle would be at the BCR level (Figure 2-1). Management populations for bald eagles would correspond to the Service's Regional organizational structure based on populations within the eight Service regions, with some shared populations (Figure 2-2).

2.5.2 Take Levels of Bald and Golden Eagles—Conservative

Take limits (for take not required to be offset) would be set at 0% for golden eagles and 6% of populations for bald eagles in most EMUs, with lower rates proposed in the Southwest (3.8%) and Alaska (0.8%).

2.5.3 Permit Regulations

This alternative would include the revisions described in *Management Common to All Action Alternatives*, plus:

- Maximum duration of permits would be extended to 30 years. The Service would evaluate each permit at no more than five-year intervals. These evaluations would reassess fatality rates, effectiveness of measures to reduce take, the appropriate level of compensatory mitigation, and eagle population status. Additional commitments with regard to conservation measures may be required of long-term permittees at the five-year permit evaluations. In 2013, when the maximum term of programmatic take permits was extended from five to 30 years (a change subsequently vacated by court order in 2015), language was included in the regulations limiting additional conservation measures that could be required of the permittee to those contemplated at the time the permit was issued. However, that language was based on the requirement that all permittees would be required to implement ACPs that reduce take to the point where it is unavoidable. As part of *Management Common to All Action Alternatives*, all permittees would be required to undertake all practicable measures to reduce take. The requirement to implement ACPs to reduce take to the point where any remaining take is unavoidable would be eliminated. Under this Alternative 3, to ensure eagles are adequately protected, based on the results of the five-year evaluations, the Service may, after negotiation with permittees, require that long-term permittees undertake additional conservation measures that are practicable and reasonably likely to reduce risk to eagles based on the best scientific information available. Circumstances where additional conservation measures may be appropriate include, but are not limited to, a higher-than-anticipated take rate, take resulting from an unexpected source within the permittee's purview, or an unanticipated significant detrimental change in the status of the local area or EMU eagle population.
- Compensatory mitigation designed to replace bald and golden eagles at a 1:1 ratio would be required for take that exceeds EMU take limits. Protection of existing eagle habitat in its current state would not be accepted as compensatory mitigation for take that would exceed take thresholds, because it is not additive, but habitat enhancement and restoration along with protection could be used if they can be demonstrated to increase carrying capacity in the EMU.
- Separate and distinct from compensatory mitigation to offset take above the EMU take limit, a minimum level of compensatory mitigation, preferably in the form of contribution to a third-party mitigation provider (and which could be used for habitat

protection) would be required for each take permit. As such, this additional mitigation would not be expected to directly offset the effects of the added mortality authorized by the permit, but would lead to improved overall environmental conditions for eagles (e.g., protecting habitat, conducting research that would inform future management).

- Incidental take permit application processing fees for permits less than five years would be $500. For permits five years or more, the fee would be $36,000.
- Permit administration fees for permits with a duration that exceeds five years would be assessed at $15,000 every five years to support the Service's ability to conduct the five-year evaluations.

2.6 Alternative 4: Flyway EMUs, Liberal Take Levels

2.6.1 Eagle Management Units

The Service and its partner agencies manage for migratory birds based on specific migratory route paths within North America (Atlantic, Mississippi, Central, and Pacific). Based on those route paths, state and federal agencies developed the four administrative flyways that are used to manage migratory bird resources (Figure 2-3). Under this alternative, the Service would use the flyways as the EMUs for both species. For bald eagles, the Pacific Flyway would be divided into three EMUs: southwest (south of 40 degrees N latitude), mid-latitude (north of 40 degrees to the Canadian border), and Alaska. For golden eagles, the Mississippi and Atlantic flyways would be combined as one EMU.

Both bald and golden eagles move over great distances seasonally and across years. There is a well-described seasonal migration of both species of eagles from northern regions southward in winter, a well-described migration of bald eagles from southern regions north in summer, and a recently discovered migration of golden eagles from southwestern regions northward in summer. The adoption of the administrative flyways as EMUs would better address geographic patterns of risk given the aforementioned seasonal movement patterns.

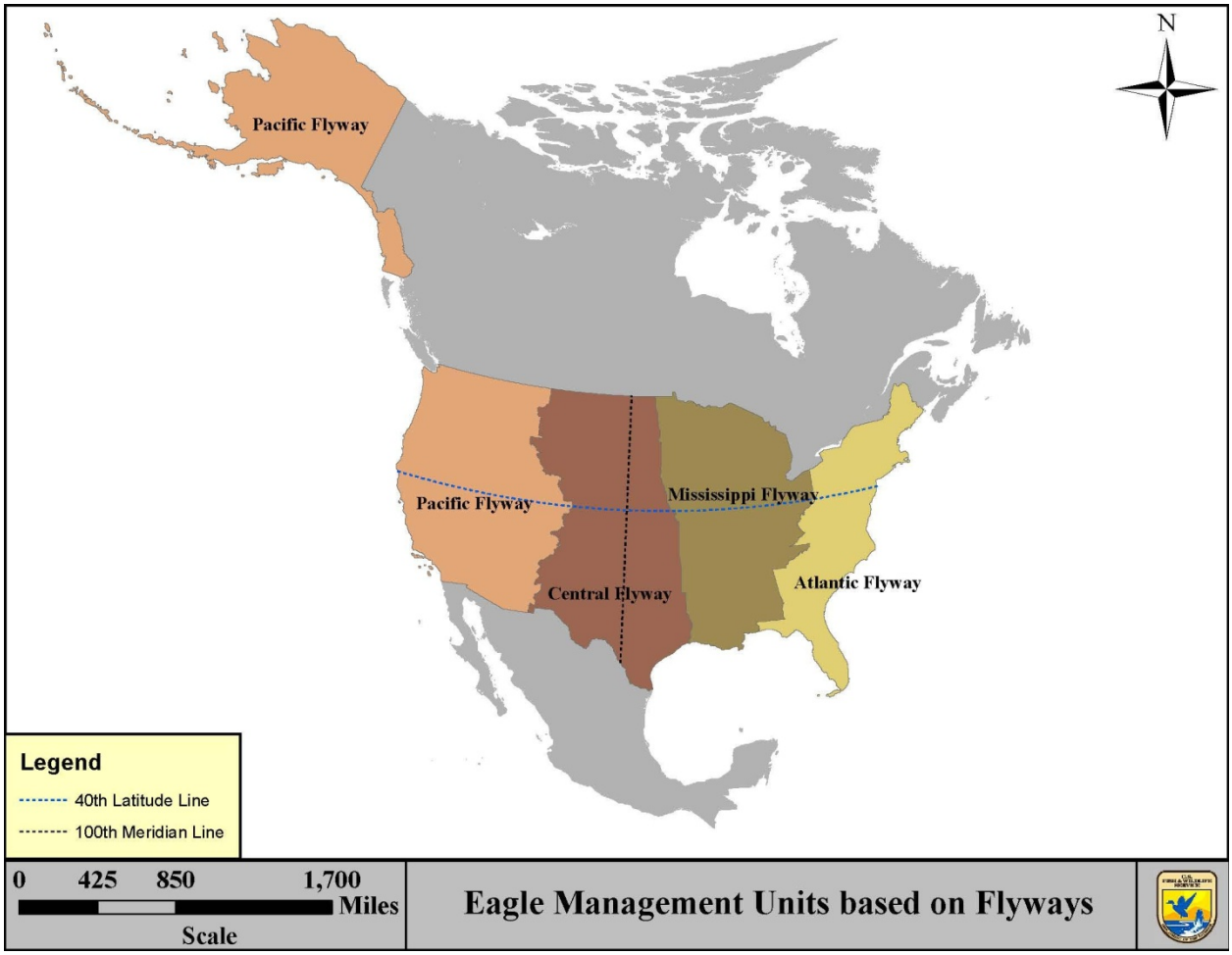


Figure 2-3. Flyways as EMUs for both bald and golden eagles.

2.6.2 Take Levels of Bald and Golden Eagles—Liberal

Take limits (for take that is not required to be offset) would be set at 0% for golden eagles and 8% of populations for bald eagles in most EMUs, with lower rates proposed in the Southwest (4.5%) and Alaska (0.7%).

2.6.3 Permit Regulations

The Service would make the revisions described in *Management Common to All Action Alternatives* and Alternative 2, plus:

- The Eagle Act's Preservation Standard—"compatible with the preservation of the bald eagle or the golden eagle"—would be defined in the regulations to mean "consistent with the goal of maintaining stable or increasing breeding populations in all eagle management units, and the persistence of local populations throughout the geographic

range of each species." The preservation standard requires the Service to manage populations over a period of time to ensure that the requirements for maintaining stable or increasing breeding populations and the persistence of local populations are met. The period for modeling effects to ensure the standard is met would be 100 years (at least eight generations of eagles). The baseline population size for both species is the number of estimated eagles in 2009 populations.

- The LAP cumulative effects analysis would be incorporated into the regulations to provide protection to populations at a more local scale. Because the flyway management scale of Alternative 4 is larger than the EMUs currently in use, EMU take limits would also increase, with the result that adoption of the flyways as EMUs could be less protective of eagle populations at more local scales if most take available with a flyway was used over a small portion of the flyway. To address that possibility, and to ensure persistence of local populations, analysis of Service-authorized take within the LAP would be required. If permitting a project would result in the total amount of authorized take exceeding 5% of the estimated total local area population size, the Service would not authorize that take unless additional analysis demonstrates that permitting take over 5% of that LAP is compatible with the preservation of eagles.
- Compensatory mitigation would be required for permits that would exceed EMU take limits, some permits that exceed LAP take limits, or if otherwise necessary to maintain the persistence of local eagle populations throughout their geographic range.
- For take that exceeds EMU take limits, compensatory mitigation designed to replace bald and golden eagles at a 1:1 ratio would be required.

2.7 Alternative 5: Flyway EMUs, Conservative Take Levels, Permit Duration Increase (Preferred Alternative)

2.7.1 Eagle Management Units

This alternative uses the same EMUs as Alternative 4; flyways are used as the EMU for both species. For bald eagles, the Pacific flyway would be divided into three EMUs: southwest (south of 40 degrees N latitude), mid-latitude (north of 40 degrees to the Canadian border), and Alaska. For golden eagles, the Mississippi and Atlantic flyways would be combined as one EMU.

As with Alternative 4, this alternative would also include a requirement that cumulative effects of permits be analyzed at the LAP scale because the flyway management scale is larger than the current EMUs and less protective of eagle populations at more local scales.

2.7.2 Take Levels of Bald and Golden Eagles—Conservative

Proposed in Draft PEIS: Take limits (for take that is not required to be offset) would be set at 0% for golden eagles and 6% of populations for bald eagles in most EMUs, with lower rates proposed in the Southwest (3.8%) and Alaska (0.8%).

Final PEIS: Take limits (for take that is not required to be offset) would be set at 0% for golden eagles and 6% of populations for bald eagles in most EMUs, including the Alaska portion of the Pacific Flyway, with lower rates proposed in the Southwest (3.8%).

2.7.3 Permit Regulations

This alternative includes the revisions described in *Management Common to All Action Alternatives*, plus the following revisions from Alternatives 3 and 4:

- Maximum duration of permits is extended to 30 years. The Service will evaluate each permit at no more than five-year intervals, as described in more detail under Alternative 3.
- Incidental take permit application processing fees for permits less than five years is $500. For permits five years or more, the fee is $36,000.
- Permit administration fees for permits with a duration that exceeds five years are $8,000 every five years to support the Service's ability to conduct the five-year evaluations.
- The LAP cumulative effects analysis is incorporated into the regulations (see discussion under Alternative 4).
- The Eagle Act's Preservation Standard— "compatible with the preservation of the bald eagle or the golden eagle"—would be defined in the regulations to mean "consistent with the goal of maintaining stable or increasing breeding populations in all eagle management units, and the persistence of local populations throughout the geographic range of each species." The period for modeling effects to ensure the standard is met would remain 100 years (at least eight generations of eagles). The baseline population size for both species is the number of estimated eagles in 2009 populations.
- Compensatory mitigation would be required for permits that would exceed EMU take limits, some permits that exceed LAP take limits, or if otherwise necessary to maintain the persistence of local eagle populations throughout their geographic range.

Alternative 5 also includes the following revision to the regulations:

- For take that would exceed EMU take limits, compensatory mitigation for bald eagles would be designed to offset take at a 1:1 ratio and compensatory mitigation for golden eagles would be required at a 1.2:1 ratio.

Based on public comments received on the Draft PEIS and proposed rule, the following changes were made to Alternative 5 (from the Draft PEIS to this Final PEIS):

- The sustainable take limit for bald eagles in Alaska is the same as in the other EMUs (6%) except the Southwest. *Section 3.2 Bald Eagle* contains further discussion of this change.
- Permit monitoring for long-term permits will be conducted by qualified, independent third parties, approved by the Service and reporting directly to the Service.
- The compensatory mitigation ratio for golden eagle take permits is specified: 1.2:1.

- The proposed definition of "eagle management unit" is revised to read: "a geographically bounded region within which permitted take is regulated to meet the management goal of maintaining stable or increasing breeding populations of bald or golden eagles."
- The permit administration fee is $8,000, rather than the $15,000 proposed administration fee.
- Provisions were added to the regulations to allow applicants for eagle incidental take permits nearing the end of the permit issuance process to elect to be authorized under the provisions of the 2009 regulations for a period of 6 months after publication of the final rule.

These changes along with further explanation for why the Service selected the components in Alternative 5 are discussed in *Appendix B. Comments Received on the Draft Programmatic Environmental Impact Statement and Responses*. Further explanation will be provided in the preamble to the final regulations.

2.8 Alternatives Considered but Dismissed from Detailed Analysis

2.8.1 Qualitative Management Objective

The Service considered but did not fully analyze as part of this PEIS the adoption of a qualitative rather than quantitative approach to managing eagle populations. A qualitative approach would not involve adoption of numerical population targets; nor would it rely on limits for allowable take. An example of a qualitative management objective is the approach used in implementation of the ESA, which allows the Service to issue incidental take permits upon a finding that the taking "will not appreciably reduce the likelihood of the survival and recovery of the species in the wild" (ESA Section 10(a)(2)(B), 16 U.S. C. § 1539(a)(2)(B)).

For purposes of eagle permits, a qualitative approach could allow the Service to issue permits as long as the activity to be permitted "does not meaningfully impair the long-term stability of the breeding population." The qualitative management objective would be implemented similar to the ESA approach, with each situation evaluated in a case-by-case risk analysis. The qualitative approach could be viewed as more flexible because it does not include take limits and would allow for the possibility of unmitigated take in any population. Additional flexibility would be provided by leaving any or all of the terms "meaningfully," "impair," and "existence" undefined.

The Service considered but dismissed this approach because it concluded that a quantitative approach would be more consistent with the language of the Eagle Act than a qualitative approach; specifically, the Eagle Act's requirement that the Service not authorize take without first making a determination that the taking would meet the preservation standard. The qualitative approach would require complete, independent population assessments for each permit in order for the Service to clearly demonstrate that it had made the required affirmative determination that the take met the preservation standard; thus, it could actually increase

workload for each permit and would not be conducive to tiering the individual permit decisions from this PEIS. Also, the qualitative approach alone contains no standards for assessment, which could lead to inconsistent implementation between Service regions. Inconsistent implementation across regions is a bigger concern with eagles than for most ESA-listed species, because the range of both bald and golden eagles extends throughout the continental U.S. Additional drawbacks to adopting a purely qualitative approach are that it is less compatible with formal adaptive management and does not provide a mechanism to assess cumulative impacts. Finally, considerable quantitative information is available on eagle populations, unlike many ESA-listed species, and to ignore these data or to independently re-assess them for each permit is inconsistent with the Service's commitment to use the best available information and practice the best science.

2.8.2 Establishment of Specific Population Goals for Each EMU

The Service considered developing specific eagle population objectives for each EMU and then using these objectives to inform permit decisions within the EMUs. The Service dismissed this alternative as infeasible at this time given the technical and logistical complexities of working with state agencies and tribes to set population objectives at this scale within the timeframe of this action, and the lack of fine-scale information on eagle populations that would be necessary.

2.8.3 Managing for Stable but Smaller Golden Eagle Populations

The Service considered allowing some take of golden eagles that would not requiring offsetting mitigation. Models show that if unmitigated take were authorized and added to existing levels of ongoing take, populations would decline, but assuming an increase in per-nest attempt productivity at lower population levels, stabilize at a lower equilibrium. The amount of decline is proportional to the rate of take as shown in Table 2-1. The equilibrium population size is based on the size of the predicted population at 60–100 years out (and assumes that other factors affecting populations remain unchanged).

The Service eliminated this alternative from further analysis because it is not consistent with the management objective. This alternative is inconsistent with the Service's interpretation of the Eagle Act's statutory mandate that permitting be compatible with eagle preservation because it would not "maintain" the current population even if the resulting population was stable. Also, it would likely be culturally unacceptable, particularly to Native Americans. Additionally, due to the degree of uncertainty in population estimates and the possibility that the Service might underestimate the extent to which populations may decline under an increased take rate, populations could decline to a level where they could not withstand threats, such as stochastic environmental events, climate change, drought, or resilience to a new disease or pesticide that may affect the eagles directly or their prey base. Moreover, managing a reduction in the population that may cause the species to become listed under the ESA is not consistent with the intent of the Eagle Act.

Table 2-1. The golden eagle equilibrium population size and percent decline as a function of the additive take rate.

Take Rate	Equilibrium Population Size	Percent Decline
0%	26,139	15%
1%	22,728	26%
2%	19,011	39%
3%	14,582	53%
4%	10,108	67%
5%	5,963	81%
6%	3,251	89%
7%	1,598	95%
8%	721	98%
9%	316	99%
10%	135	100%

2.8.4 Other Permitted Take Rates

All take rates that are not part of the Action Alternatives were dismissed. This includes take limits that the Service does not want to exceed and take rates that would be lower and higher, either too restrictive or too risky. The take rates selected for analysis represent reasonable alternatives between the two extremes and are based on the best science available and taking into account the Service's management objectives for eagles.

2.9 MITIGATION

The Service defines "mitigation" to sequentially include: avoidance, minimization, rectification, reduction over time, and compensation for negative impacts.

The 2009 eagle regulations lack specificity with regard to when compensatory mitigation will be required, and the preamble discussion of compensatory mitigation was somewhat inconsistent. In reference to nonpurposeful take permits, the preamble to the 2009 regulations contained the following language: "Additional compensatory mitigation would be required only (1) for programmatic take and other multiple take authorizations; (2) for disturbance associated with the permanent loss of a breeding territory or important traditional communal roost site; or (3) as necessary to offset impacts to the LAP. Because permitted take limits are population-based, the Service has already determined before issuing each individual take permit that the population can withstand that level of take. Therefore, compensatory mitigation for one-time, individual take permits would not typically be necessary for the preservation of eagles" (74 FR 46844).

Compensatory mitigation was also addressed in the 2009 FEA, which contained the following language: "For most individual take permits resulting in short-term disturbance, the Service would not require compensatory mitigation. The population-based permitting the Service

would propose is based on the level of take that a population can withstand. Therefore, compensatory mitigation for individual permits is not necessary for the preservation of eagles. However, the Service would advocate compensatory mitigation in the cases of nest removal, disturbance or [take resulting in mortality] that would likely incur take over several seasons, result in permanent abandonment of more than a single breeding territory, have large-scale impacts, occur at multiple locations, or otherwise contribute to cumulative negative effects."

As the 2009 regulations did not incorporate specific compensatory mitigation provisions, the Service has required compensatory mitigation on a case-by-case basis somewhat inconsistently between Service regions, which has resulted in disparate treatment of, and uncertainty for, permit applicants. Accordingly, all Action Alternatives analyzed in this PEIS include standardized requirements for compensatory mitigation. The DOI defines the term "compensatory mitigation" to mean "to compensate for remaining unavoidable impacts after all appropriate and practicable avoidance and minimization measures have been applied, by replacing or providing substitute resources or environments (See 40 CFR § 1508.20) through the restoration, establishment, enhancement, or preservation of resources and their values, services, and functions." The Action Alternatives would all adopt this definition and approach to compensatory mitigation by incorporating by reference the Service's mitigation policy, the Presidential Memorandum on Mitigating Impacts on Natural Resources from Development and Encouraging Related Private Investment (November 3, 2015), the Secretary of the Interior's Order 3330 entitled "Improving Mitigation Policies and Practices of the Department of the Interior" (October 31, 2013), and the Departmental Manual Chapter (600 DM 6) on Implementing Mitigation at the Landscape-scale (October 23, 2015).

Since 2009, take limits for golden eagles have been set at 0% throughout the United States, unless offset. Accordingly, in order to meet eagle preservation goals and because all permits for golden eagle take would exceed the take limits, permits must incorporate offsetting compensatory mitigation after all appropriate and practicable avoidance and minimization measures are employed.

In every alternative analyzed in this PEIS, including the No-Action alternative, compensatory mitigation would continue to be required whenever take would otherwise exceed established take limits. For eagle permits authorizing take that would exceed EMU take limits, compensatory mitigation must consist of actions that either reduce another ongoing form of mortality to a level equal to or greater than the unavoidable mortality, or lead to an increase in the eagle population by an equal or greater amount. In these situations, new authorized "take" of golden eagles must be at least equally offset by specific conservation actions to replace or offset project-induced losses. For example, if, under an eagle incidental take permit, a project is expected to take an average of three eagles over a five-year period, the permittee must provide compensatory mitigation that prevents three eagles from being taken by another pre-existing source of mortality within the EMU. Take would have to be compensated for within the same EMU as the take, except in cases where it is biologically justifiable to do otherwise. Thus, because a substantial proportion of the mortality of golden eagles originating in Alaska occurs

on migration or during winter in the interior, western, coterminous U.S. and north-central Mexico, effective mitigation for take of Alaskan golden eagles could occur in these areas as well.

Under Alternative 2, compensatory mitigation would be limited to permits that would exceed EMU take limits, and would be designed to offset take at a one-to-one ratio. Under Alternative 3, Compensatory mitigation designed to replace bald and golden eagles at a 1:1 ratio would be required for take that exceeds EMU take limits. For take that exceeds EMU take limits, compensatory mitigation designed to replace bald and golden eagles at a 1:1 ratio would be required.

Under Alternative 3, separate and distinct from compensatory mitigation to offset take that would exceed EMU take limits, a minimum level of compensatory mitigation, designed to address the incremental effects of authorized take, and preferably in the form of contribution to a third-party mitigation provider (and which could be used for habitat protection) would be required for each take permit.

Under Alternative 2, compensatory mitigation would be limited to permits that would exceed EMU take limits. That level of compensatory mitigation would meet the requirement that permitted take be compatible with the preservation of eagles. Under Alternatives 4 and 5, compensatory mitigation may be required for permits that would authorize take above the 5% LAP limit, if necessary to maintain the persistence of local eagle populations throughout their geographic range.

The Service will encourage the use of in-lieu fee programs, mitigation and/or conservation banks, and other established mitigation programs and projects. The Service intends to facilitate the establishment of one or more in-lieu fee program(s) to allow permit applicants to contribute to a compensatory mitigation fund as an alternative to developing individual mitigation measures for each project.

All compensatory mitigation would be required to adhere to the same principles and equivalent and effective standards as outlined in Service, Departmental, and Presidential mitigation policies. Compensatory mitigation is to be used to offset remaining impacts after the application of all practicable avoidance and minimization measures. Compensatory mitigation must be sited within the same eagle management unit where the permitted take will occur unless the Service has reliable data showing that the population affected by the take includes individuals that are reasonably likely to use another EMU during part of their seasonal migration. Compensatory mitigation must be based on the best available science and must use rigorous compliance and effectiveness monitoring and evaluation to make certain that mitigation measures achieve their intended outcomes, or that necessary changes are implemented to achieve them.

Compensatory mitigation must provide benefits beyond those that would otherwise have occurred through routine or required practices or actions, or obligations required through other legal authorities or contractual agreements. A compensatory mitigation measure is “additional”

when the benefits of the measure improve upon the baseline conditions of the impacted eagle species in a manner that is demonstrably new and would not have occurred without the required compensatory mitigation measure.

Compensatory mitigation must be durable and, at a minimum, maintain its intended purpose for as long as impacts of the authorized take persist. The Service will require that implementation assurances, including legal, contractual, and financial assurances, be in place when necessary to assure the development, maintenance, and long-term viability of the mitigation measure. Compensatory mitigation must also include mechanisms to account for and address uncertainty and risk of failure of a compensatory mitigation measure. This could be in the form of greater mitigation ratios, the establishment of buffers or reserve accounts, or other mechanisms.

Compensatory mitigation may include conservation banking, in-lieu fee programs, and other third-party mitigation projects or arrangements. In approving compensatory mitigation mechanisms and actions, the Service will ensure the application of equivalent ecological, procedural, and administrative standards for all compensatory mitigation mechanisms. The Service prefers that compensatory mitigation is conducted prior to when the impacts of the action occur.

The best available information indicates that ongoing levels of human-caused mortality of golden eagles likely exceed sustainable take rates, potentially significantly. As the rule defines "compatible with the preservation" of eagles as "consistent with the goals of maintaining or improving" eagle populations, with golden eagles possibly in decline, permits would be required to achieve a net benefit to golden eagles in order to be compatible with their preservation. This would be achieved by requiring a base mitigation ratio of 1.2 to 1 for each eagle authorized to be taken. The Service believes this mitigation ratio appropriately balances what is reasonable and practicable for permittees with the biological needs of the species, consistent with the Eagle Act. Based on the uncertainty in the effectiveness of a particular compensatory mitigation practice, the Service is likely to require further adjustments to mitigation ratios to provide a buffer in the event that the planned mitigation is less effective than anticipated.

2.10 Comparison of Alternatives

Four reasonable alternatives, in addition to the No-Action alternative, were developed. Table 2-1 compares and contrasts the alternatives, including how each alternative accomplishes the purpose or fulfills the project objectives identified in *1.3 Purpose and Need*. Alternative 5 is the Preferred Alternative.

Table 2-2. Comparison of alternatives.

Component	Alternative 1: No Action	Alternative 2: Current EMUs, Liberal Take	Alternative 3: Current EMUs, Conservative Take	Alternative 4: Flyway EMUs, Liberal Take	Alternative 5: Flyway EMUs, Conservative Take (Preferred Alternative)
Preservation Standard	Consistent with the goal of maintaining stable or increasing breeding populations.	Same as Alternative 1.	Same as Alternative 1.	Consistent with the goal of maintaining stable or increasing breeding populations in all eagle management units, and the persistence of local populations throughout the geographic range of each species.	Same as Alternative 4.
EMU	Bald eagle: based on Service regions Golden eagle: Bird Conservation Regions west of the 100th meridian.	Bald eagle: based on Service regions Golden eagle: Bird Conservation Regions west of the 100th meridian; east of 100th meridian combined into one EMU.	Same as Alternative 2.	Bald eagle: Flyways (Pacific Flyway divided into three EMUs: southwest, mid-latitude, and Alaska). Golden eagle: Flyways (Mississippi and Atlantic flyways combined as one EMU).	Same as Alternative 4.
EMU Take Level (Take limit without	Bald eagle: 5% of estimated annual	Bald eagle: 8% of population; 4.5%	Bald eagle: 6% of population; 3.8%	Same as Alternative 2.	Same as Alternative 3, except take limit

mandatory, offsetting, compensatory mitigation)	productivity. Golden eagle: 0%.	Southwest; 0.7% Alaska. Golden eagle: 0% unless offset.	Southwest; 0.8% Alaska. Golden eagle: 0% unless offset.		for bald eagles in Alaska is 6%.
LAP Analysis	Remains guidance.	Same as Alternative 1.	Same as Alternative 1.	LAP cumulative effects analysis is incorporated into the regulations. Analysis of Service-authorized take within the LAP required and not authorized if it would exceed 5% of the estimated total local area population size unless additional analysis is conducted and demonstrates that permitting take over 5% of that LAP is compatible with the preservation of eagles.	Same as Alternative 4.
Permit Types	Two types: Standard and Programmatic.	No distinction between different types of incidental take permits.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Permit Duration—§22.26	Up to five years.	Same as Alternative 1.	Up to 30 years with mandatory re-assessments at ≤ five-	Same as Alternative 1.	Same as Alternative 3.

			year checkpoints.		
Mitigation (Applies to both §22.26 and §22.27 unless noted)	Avoidance and minimization: for standard permits, must be practicable. For programmatic permits, must reduce take to unavoidable. Offsetting mitigation required to replace bald and golden eagles at a 1:1 ratio whenever take would exceed the current EMU take limits. Compensatory mitigation is not standardized and could be required for take that is within EMU take limits. Removal of eagle nests other than for safety emergencies, health or safety, or to restore the use of a man-made structure, the activity, or the mitigation for the activity, must provide a net benefit to	Avoidance and minimization to the maximum degree practicable for all permits. All compensatory mitigation is offsetting mitigation, and limited to take that would exceed EMU take limits, and designed to offset take at a 1:1 ratio. Removal of eagle nests other than for safety or to restore the use of a man-made structure, requires that the activity, or the mitigation for the activity, provides a net benefit to eagles. Use of mitigation banks could allow for funds to be leveraged and targeted where most needed.	Avoidance and minimization to the maximum degree practicable for all permits. Compensatory mitigation designed to offset impacts at a 1:1 ratio for any permitted take that exceeds EMU take limits. In addition to mitigation to offset take above the EMU take limit, Alternative 3 would require a minimum level of compensatory mitigation, which could be used for habitat protection, for each take permit. Additional reasonable and practicable avoidance and minimization may be required for long-term permits at five-year evaluations. Compensatory	Same as Alternative 2, plus: Compensatory mitigation would be required if needed to ensure the long-term persistence of local populations throughout the species' range, including if necessary to issue permits that would exceed the LAP take limit. Compensatory mitigation other than for take that exceeds EMU take limits could consist of habitat protection.	Same as Alternatives 3 and 4, except: Compensatory mitigation to be assessed at a 1.2:1 ratio for golden eagles.

	eagles.		mitigation for long-term permits would be adjusted up or down based on updated fatality predictions and applied going forward at five-year evaluations. Removal of eagle nests other than for safety or to restore the use of a man-made structure, requires that the activity, or the mitigation for the activity, must provide a net benefit to eagles.		
Service-approved Survey Protocols—§22.26	Not required by regulations.	Service-approved survey protocols required by regulations.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2, except that monitoring for long-term permits must be by independent third parties reporting directly to the Service.
Administration Fee—§22.26	N/A	N/A	Administration fee of $15,000 every five years.	N/A	Administration fee of $8,000 every five years.

Application Processing Fee—§22.26	Standard: $500 Programmatic five-year: $36,000	Less than five years—Homeowner: $500 Less than five years—Commercial: $2,500 Five years or more: $36,000	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Eagle Nest Take Permits	Removal of eagle nests where (1) necessary to alleviate a safety emergency to people or eagles, (2) necessary to ensure public health and safety, (3) the nest prevents the use of a human-engineered structure, or (4) the activity, or mitigation for the activity, will provide a net benefit to eagles. Only inactive nests may be taken except in the case of safety emergencies.	Requirement removed that suitable habitat be available for non-emergency nest take. Waiver for the transport of nestlings and viable eggs to a foster nest or rehabilitator requirement. Allows for removal of in-use nests to prevent an advancing safety emergency that is likely to fully develop while the nest is still in use. Allow removal of an alternate nest or an in-use nest prior to egg-laying that would lead to a structure becoming inoperable. Application	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.

		Processing Fee for commercial entities would increase to $2,500, and for multiple nests, $5,000			
Definitions	Definitions for *ACP*, *Area Nest Population*, *Eagle Nest*, *Inactive nest*, *Maximum Degree Achievable*, *Programmatic Take*, *Programmatic Take Permit*, and *Territory* remain the same. No new definitions for *Alternate Nest*, *Nesting Territory*, and *In-use Nest*.	Definitions revised for *Eagle Nest* and *Practicable*. New definitions: *Alternate Nest, Eagle Management Unit, In-use Nest, and Nesting Territory.* Definitions of *Inactive Nest, Advanced Conservation Practices, Area Nesting Population, Maximum Degree Achievable, Territory, Programmatic Take, and Programmatic Take Permit* removed.	Same as Alternative 2.	Same as Alternative 2 plus: New definition: *Compatible with the Preservation of the bald eagle or the golden eagle*.	Same as Alternative 4, except that Eagle Management Unit is defined as: *a geographically-bounded region within which permitted take is regulated to meet the management goal of maintaining stable or increasing breeding populations of bald or golden eagles*.

Chapter 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the affected environment and potential environmental effects associated with the No-Action alternative and the actions considered as part of the four Action Alternatives. Following the description of the affected environment, this section presents analysis of the direct and indirect effects to the environment that may occur as a result of implementing the alternatives.

3.1 METHODOLOGY

For each resource topic, the effects of the actions in each alternative are analyzed. The effects to the resources are analyzed on the basis of type, duration, extent, and magnitude of the impacts. The following general definitions were used to evaluate impacts associated with project alternatives.

3.1.1 Types of Impact

- Beneficial – A positive change in the condition of the resource or a change that moves the resource toward a desired condition. An impact could also be beneficial if it contributes towards meeting the objectives of bald and golden eagle management.
- Adverse – A change that moves the resource away from a desired condition or detracts from its condition. An impact could also be adverse if it detracts from meeting the objectives of bald and golden eagle management.
- Direct – An effect that is caused by an action and occurs in the same time and place.
- Indirect – An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable.

3.1.2 Duration of Impact

NEPA analyses usually express impacts in terms of duration, such as long-term, short-term, and temporary. Long-term impacts would last for the duration of the eagle rule revision or until that time when the rule is revised again. Short-term impacts would extend beyond the time of project activities, but would not last more than a few years.

3.1.3 Extent of Impact

Context is the setting within which an impact is analyzed. For this eagle rule revision, most impacts are analyzed in the context of a nationwide setting. However, local impacts may occur in an LAP area or in those instances that affect the resource only on the project site or its immediate surroundings.

3.1.4 Magnitude of Impact

Impact intensity is the degree to which a resource would be beneficially or adversely affected by the action.

- Negligible – Minimal impact on the resource would occur; any change that might occur would be barely perceptible and not easily measurable.
- Minor – Change in a resource would occur, but no substantial resource impact would result; the change in the resource would be detectable but would not alter the condition of the resource.
- Moderate – Noticeable change in a resource would occur and this change would alter the condition of the resource, but the integrity of the resource would remain intact.
- Major – Substantial impact or change in a resource would occur that is easily defined and highly noticeable and that measurably alters the condition of the resource; the integrity of the resource may not remain intact.

3.2 BALD EAGLE

3.2.1 Affected Environment

3.2.1.1 General Conditions

The bald eagle (*Haliaeetus leucocephalus*) is a member of the sea eagle genus that is endemic to North America, breeding from Canada to northern Mexico (Buehler, 2000; Figure 3-1). Bald eagles exhibit delayed reproduction, and go through a series of plumages before attaining the white head and tail of the definitive plumage at five years of age (Clark and Wheeler, 1983; Figure 3-2). Bald eagles are large birds, weighing up to 11.5 lbs.; females are larger than males and overall size decreases from north to south across the species' range (Buehler, 2000).

Bald eagles may travel great distances during dispersal and migration (Buehler, 2000; Mojica et al., 2008) but usually return to within 45 miles of their natal area to breed (Millsap et al., 2015). Breeding bald eagles occupy territories, which are typically occupied continuously for many years (Buehler, 2000; Figure 3-3). Bald eagle nesting territories usually contain many alternative nest sites, only a single one of which is normally used in any given year (Buehler, 2000; Watts, 2015). Breeding begins in Florida as early as October, and as late as April or May in northern parts of the country (USFWS, 2009a).

Bald eagles typically lay one to three eggs once per nesting season, and productivity averages about 1.12 young per occupied nesting territory, except in the southwestern U.S., where productivity averages 0.73 young fledged per occupied nesting territory (USFWS, 2016). The eggs hatch after about 35 days of incubation, and young leave the nest at 10 to 12 weeks after hatching (Buehler, 2000). Young birds usually remain in the vicinity of the nest for about six weeks, over which time they are almost completely dependent upon their parents for food (Wood and Collopy, 1998; Millsap et al., 2004).

Figure 3-1. Range of the bald eagle in North America, from Buehler (2002).

Outside the breeding season bald eagles often gather in large, communal roosts near good foraging areas (Platt, 1976; Mojica et al., 2008; Figure 3 4). There is a high degree of fidelity to migratory routes, stopover sites, and roosts (Mojica et al., 2008). Recent studies show that bald eagles use networks of communal roosts located strategically in association with foraging areas, and that individuals may move daily between regional roosts (Watts and Mojica, 2015).

Figure 3-2. Adult bald eagle (*Haliaeetus leucocepha*lus)

Figure 3-3. Pair of bald eagles on their nest.

Figure 3-4. Thousands of bald eagles congregate annually on the Chilcat River in Alaska.

Bald eagles are opportunistic feeders, focusing on fish and aquatic prey primarily, but also feeding heavily on waterfowl, wading birds, small mammals, turtles, and carrion, including refuse at landfills (Buehler, 2002; Mojica et al., 2008). For a discussion of bald eagle habitat and effects of the alternatives on habitat, see *3.4 Eagle Habitat*.

3.2.1.2 Population

Introduction

Bald eagles are thought to have declined with the loss of habitat and persecution associated with early European settlement in North America, but there is little data to support that conjecture. However, in 1940, recognizing the accumulating threats to bald eagles, Congress enacted the Bald Eagle Protection Act, which was amended in 1962 to become the Bald and

Golden Eagle Protection Act with the addition of protection for the golden eagle (Millsap et al., 2007).

A class of organochlorine insecticide compounds including DDT (dichloro-diphenyl-trichloroethane), dieldrin, endrin, aldrin, and heptachlor, were introduced in the 1940s. DDT and relatives were used extensively and in large quantities to control mosquitoes and other insect pests (Newton, 1998). DDT and its breakdown products are persistent organic chemicals that are not easily or quickly broken down or decomposed into non-toxic substances by natural processes (Newton, 1998). These persistent pesticides bioaccumulated in aquatic and avian food chains, reaching their highest levels in predators at the tops of these food chains like bald eagles, ospreys (*Pandion haliaetus*), and peregrine falcons (*Falco peregrinus*) (Nisbit, 1989; Kauffman et al., 2004; Bretagnolle et al., 2008). The main effect these pesticides and their metabolites had on raptors was to inhibit the eggshell formation process, which led to eggs with abnormally thin shells that failed to hatch, together with increased mortality (Nisbit, 1989; Bowerman et al., 1995; Grier, 1982). Together, these factors led to a substantial decline in bald eagle populations throughout the coterminous U.S. in the mid-1900s, with lowest populations observed in the 1960s (Buehler, 2000).

This decline resulted in the bald eagle being listed under the Endangered Species Conservation Act in 1967 and later under the Endangered Species Act as threatened or endangered everywhere in the U.S. except Alaska (Millsap et al., 2007; 43 FR 6230, Feb. 14, 1978). In the four decades since registration of DDT was cancelled by EPA in 1972, bald eagle numbers have rebounded (Buehler, 2000). By 1999, the Service proposed to remove the bald eagle from the list of threatened and endangered species, and in July 2007, the Service completed that action (FR 72:37346-37372). Delisting in the Sonoran Desert region was enjoined by the Federal District Court for the District of Arizona in response to *Ctr. for Biological Diversity v. Kempthorne*, No. 07-0038-PHX-MHM (D. Ariz. Mar. 6, 2008). However, in September 2011, the Service published a final rule delisting the bald eagle in the Sonoran Desert region (76 FR 54711, Sept. 2, 2011).

Bald eagles are listed as a Bird of Conservation Concern (BCC) by the Service because of their recent Endangered-Species-Act-delisted status (USFWS, 2008a). They were included on 29 out of 35 BCRs (not including other U.S. Pacific Islands and U.S. Caribbean Islands, where they do not regularly occur); BCRs 5, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, and 37. Bald eagles are considered a BCC in Service regions 1, 2, 3, 4, 5, 6, and 8. Bald eagles are also included on the U.S. National BCC list.

To help inform the decisions contemplated in this PEIS, the Service assembled a team of biologists and biometricians in February 2015 to compile relevant scientific data and to conduct appropriate scientific analyses. Much of this work focused on gathering data to estimate sustainable take rates and take limits. The team compiled recent data on population size and trends for the bald and golden eagle, generated estimates of contemporary survival and fecundity rates, and used these data in models to predict future population trends and the

ability of bald and golden eagles to withstand additional mortality in the form of permitted take. This information is summarized in the Service document titled "*Bald and Golden Eagles—Population Demographics and Estimation of Sustainable Take Rates in the United States, 2016 Update*" (USFWS, 2016; available with this PEIS). The subsequent information summarized here comes from this document, and interested readers should consult that reference for details on methods and analysis procedures.

Demographic Rates and Characteristics

Survival

USFWS (2016) estimated bald eagle survival rates over the period 1996–2014 from band recoveries. Analyses suggested juvenile bald eagles had lower survival rates than older age classes, but survival among the older age classes was similar. Additionally, bald eagles in the Southwestern U.S. had different survival rates than elsewhere (Table 3-1).

Table 3-1. Bald eagle annual survival rate estimates, 1996–2014, from USFWS (2016).

	Estimate	Lower 95% Credible Interval	Upper 95% Credible Interval
Annual Survival			
HY, not Southwest	0.86	0.80	0.90
AHY, not Southwest	0.91	0.86	0.94
HY, Southwest	0.66	0.31	0.87
AHY, Southwest	0.93	0.73	0.99
Band Recovery Probability[a]	0.03	0.03	0.04

Note: Abbreviations are: HY = hatching-year; AHY = after hatching-year; Southwest = west of the 100th meridian and south of 40° north latitude. [a]Band recovery probability is the probability a band placed on an eagle will be re-encountered and reported subsequently.

Causes of Mortality

Trauma and poisoning have been the leading causes of death for bald eagles submitted to the National Wildlife Health Center since 1975 (Russell and Franson, 2014), so anthropogenic factors account for most discovered bald eagle deaths. However, inferences from opportunistically found dead raptors can be misleading indicators of the overall importance of different mortality agents, because deaths from some causes are more apt to be discovered (Kenward et al., 1993). A study of satellite-tagged bald eagles from Florida, which usually provides less-biased information on the relative importance of different mortality factors,

indicated starvation and disease, vehicle collisions, electrocution, and poisoning, in that order, were leading causes of death (Millsap et al., 2004).

Productivity

USFWS (2016) compiled data on bald eagle productivity from 17 study areas in the U.S. over the period 1995–2014. Productivity differed between the Southwestern U.S. and elsewhere, with lower productivity in the Southwest (median = 0.73, 95% credible interval = 0.40–1.36) than the rest of the U.S. (median = 1.12, 95% credible interval = 0.73–1.72).

Population Size

USFWS (2016) estimated the number of occupied bald eagle nesting territories in the coterminous United States from a dual-frame survey coordinated by the Service in 2009 (see Appendix A3, Table A3-5 in USFWS, 2016). Combined with an existing estimate for Alaska from 2009, the total number of occupied bald eagle nesting territories in the United States in 2009 was estimated at 30,600 (95% confidence interval = 24,500–36,600; Figure 4, USFWS, 2016). USFWS (2016) used these data and conservative estimates of the proportion of the population that consisted of breeding adults to estimate a median bald eagle population size of 143,000 nationally (20^{th} quantile = 126,000) in 2009; estimates for each prospective bald eagle EMU are provided in Table 3-2. Increases in the number of occupied nesting territories and inferred population size between the time of delisting under the ESA (using pre-2007 data; USFWS, 2009a) and 2009 were observed in all current bald eagle EMUs except the Northern Rockies (Table 3-3 and Figure 3-5). Differences in methods for the two time periods likely account for some of the apparent population trends (USFWS, 2016).

The total nationwide bald eagle population estimate of 143,000 individuals here is lower than the Service estimated in the 2009 FEA (155,473 individuals) (Table C3, USFWS, 2009a), even though bald eagle populations have continued to grow. The reason for that discrepancy is the Service used updated estimates of survival rates and productivity to estimate population size and sustainable take rates in 2016. Our updated estimates for survival were similar to those used in 2009, but our productivity estimates were substantially lower than the values used in 2009. This is because we conducted a more thorough literature review to support the 2016 productivity estimate, thus the updated values are likely more representative of the full geographic range of the bald eagle in the U.S. Despite the lower productivity estimate, the Service's estimate of total population size for bald eagles in the coterminous U.S. increased from 2009 to 2016 (68,923 in 2009 to 72,434 in 2016) due to the substantial increase in the estimated number of occupied nesting territories in the lower 48 states over that period. However, the Service did not have any data with which to update the estimated number of occupied nesting territories for Alaska in 2016, so we used the same number as in 2009 (15,000). When we model population size in Alaska using the same number of occupied nesting territories as in 2009, but with lower productivity, our updated population estimates for Alaska are lower (70,544 in 2016 versus 86,550 in 2009). The numbers are not an indication that bald

eagles are doing poorly in Alaska, they merely reflect that we updated our technical information, yielding a lower estimated total population size. Even the amount of increase in the lower 48 is affected by the lower productivity value: if we used the 2009 productivity values in our 2016 models, the new estimate for the lower 48 would be around 80,000–85,000 rather than 72,000. However, the primary reason the total U.S. population size estimate for the bald eagle is lower in 2016 than in 2009 is because we have refined our estimate of population size for Alaska downward slightly based on the updated estimate of productivity.

Table 3-2. Estimated total U.S. bald eagle population size in 2009, from USFWS (2016).

Management Unit	N	N_{20th}	h	h_{20th}	H	H_{20th}	Source
Alaska [a]	70,544	62,935	0.080	0.060	5,643	3,776	USFWS (2009)
Great Lakes	27,440	24,065	0.080	0.060	2,195	1,444	Post-Delisting Survey
Lower Mississippi	5,640	4,622	0.080	0.060	451	277	Post-Delisting Survey
Mid-Atlantic	8,244	7,201	0.080	0.060	660	432	Post-Delisting Survey
New England	3,017	2,729	0.080	0.060	241	164	Post-Delisting Survey
Northern Rocky Mountains	1,569	720	0.080	0.060	126	43	Post-Delisting Survey
Pacific	12,102	10,504	0.080	0.060	968	630	Post-Delisting Survey
Rocky Mountains and Plains	1,583	1,411	0.080	0.060	127	85	Post-Delisting Survey
Southeast	12,190	10,788	0.080	0.060	975	647	Post-Delisting Survey
Southwest	648	533	0.045	0.038	29	20	Post-Delisting Survey
Alaska Flyway [a]	70,544	62,935	0.080	0.060	5,643	3,776	USFWS (2009)
Atlantic Flyway	22,279	20,387	0.080	0.060	1,782	1,223	Post-Delisting Survey
Central Flyway	3,209	1,163	0.080	0.060	257	70	Post-Delisting Survey
Mississippi Flyway	31,706	27,334	0.080	0.060	2,537	1,640	Post-Delisting Survey
Pacific Flyway, South	447	391	0.045	0.038	20	15	Post-Delisting Survey
Pacific Flyway, North	14,792	13,296	0.080	0.060	1,183	798	Post-Delisting Survey
Total U.S.	142,977	125,508			11,423	7,522	
Total U.S. (excl. AK)	72,434	62,572			5,772	3,742	

Note: Population size is presented at the median (N) and 20th quantile (N_{20th}) by potential eagle management unit (EMU). Estimated sustainable take rates (h) and take limits (H) are also presented with the median and 20th quantile for each EMU. Take rates and limits are constrained so as to maintain an equilibrium size as least as large as N (or N_{20th}). [a] Population size estimates for Alaska are approximations based on limited survey information. Values of h and h_{20th} in this table are the biologically indicated sustainable take rates, which (for h_{20th}) were used for the preferred Alternative 5 in the final PEIS. For PEIS Alternatives 2 and 4, the Service used h = 0.007 for Alaska; for Alternative 3, the Service used h = 0.008 for Alaska (see text for more details).

Table 3-3. Apparent change in estimated occupied bald eagle nesting territories in the coterminous U.S. by EMU between the time of delisting (pre-2007 data) and 2009, from USFWS (2016).

Management Unit	Occupied Nests		
	2007	2009	2009 95% Credible Interval
Alaska	15,000	15,000	12,471 – 17,529
Great Lakes	3,452	5,879	4,769 – 6,989
Lower Mississippi	447	1,207	753 – 1,661
Mid-Atlantic	952	1,766	1,373 – 2,159
New England	603	645	577 – 713
Northern Rocky Mountains	564	339	0 – 751
Pacific	1,039	2,587	2,073 – 3,101
Rocky Mountains and Plains	200	338	281 – 395
Southeast	1,210	2,611	2,180 – 3,042
Southwest	51	176	119 – 233

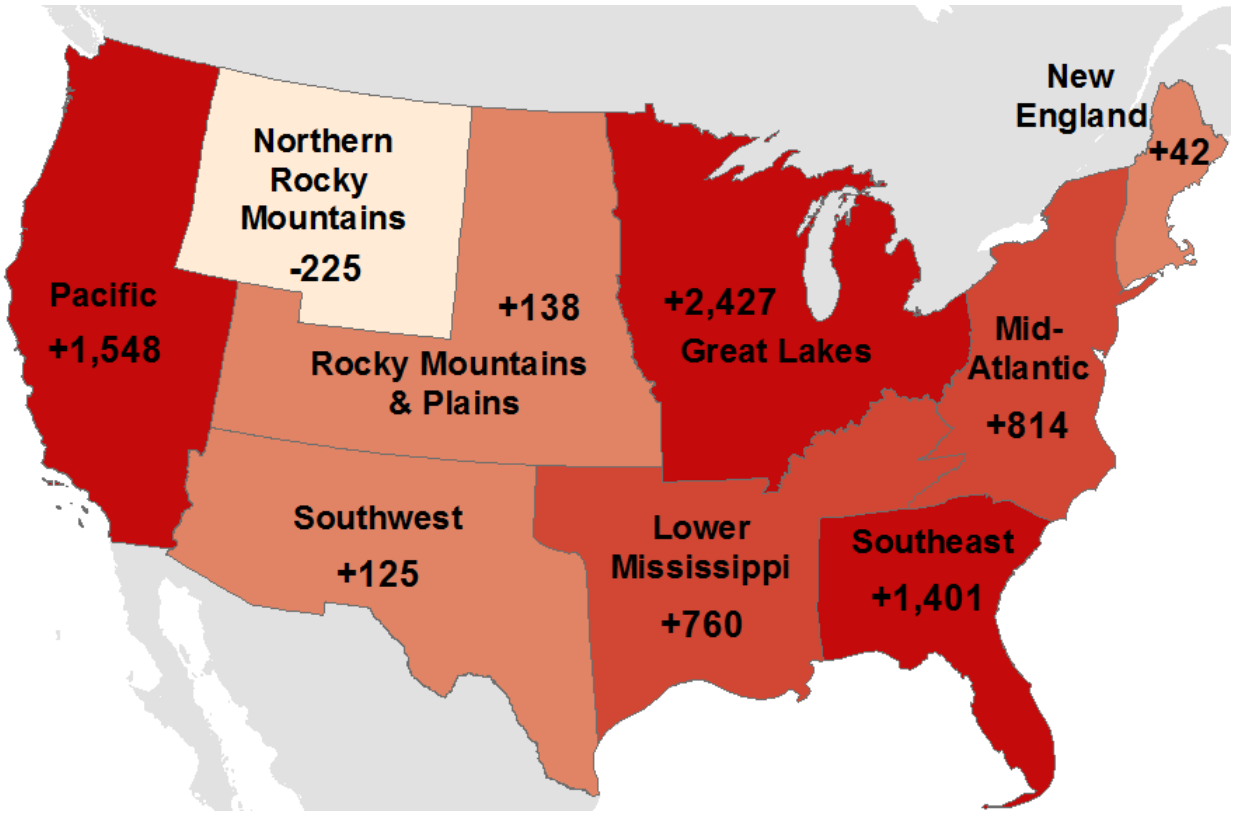


Figure 3-5. Map of apparent change in estimated occupied bald eagle nesting territories in the coterminous U.S. by EMU between the time of delisting (pre-2007 data) and 2009, from USFWS (2016).

Population Trajectory

The U.S. Geological Survey Breeding Bird Survey (BBS) index trend estimate for the bald eagle over the entire BBS coverage area for the period 1966–2012 is 5.3% (95% credible interval = 4.1%–6.6%), though trends for the area that include Alaska have been closer to stable (0.08%, 95% credible interval = -8.41%–5.44%) (Sauer et al., 2014). Of note, the decline indicated for the Northern Rockies EMU in the number of occupied nesting territories is not reflected in the BBS data, which shows a population change of 8.7% (95% confidence interval = 5.1%–13.1%) from 2003–2013 (Sauer et al., 2014).

USFWS (2016) used a demographic model to predict that the number of bald eagles in the U.S. outside the Southwest (including Alaska) will continue to increase until populations reach an equilibrium at about 228,000 (20^{th} quantile = 197,000) individuals (Figure 3-6). The model predicted that bald eagles in the Southwest will also continue to increase until reaching an equilibrium at about 1,800 (20^{th} quantile = 1,400) individuals (Figure 3-7). USFWS (2016) cautioned that these predictions are only valid and relevant to the extent that environmental

and biological conditions remain as they were over the time when the vital rates were measured. This critical assumption is likely to be less true the further into the future the projections go, due to the cumulative impacts discussed in *Chapter 4, Cumulative Impacts* of this PEIS and perhaps other unforeseen factors. These projections also assume that food availability and other factors do not become limiting.

Management Unit Comparison

USFWS (2016) used band recovery data to assess whether the EMU configurations under consideration differed in terms of capturing bald eagle movements across seasons and life stages. Ninety-four percent (range = 67%–96%) of bald eagles were banded and recovered in the same Flyway EMU compared to 84% (range = 43%–100%) within the same 2009 EMU.

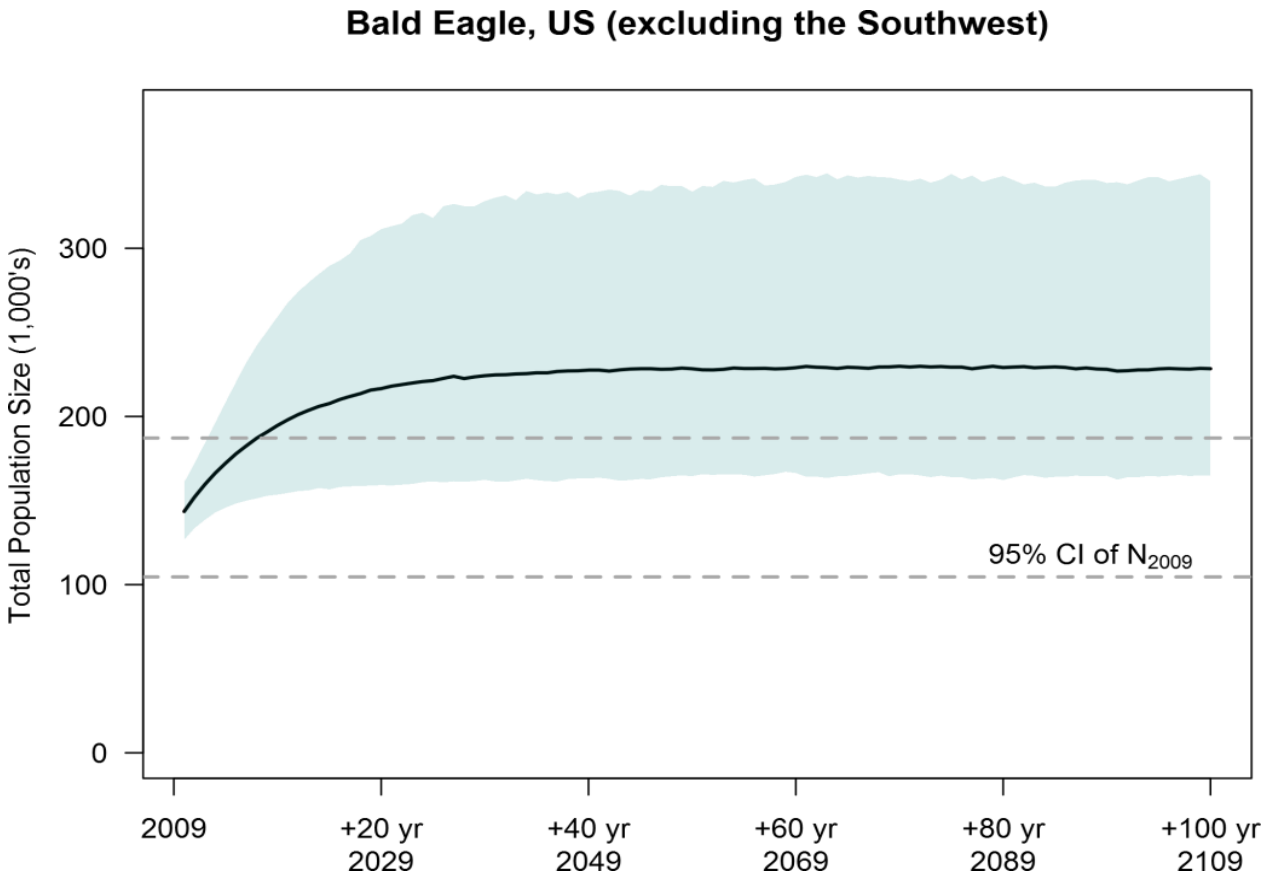


Figure 3-6. Projected bald eagle population in the U.S. excluding the Southwest, from USFWS (2016).

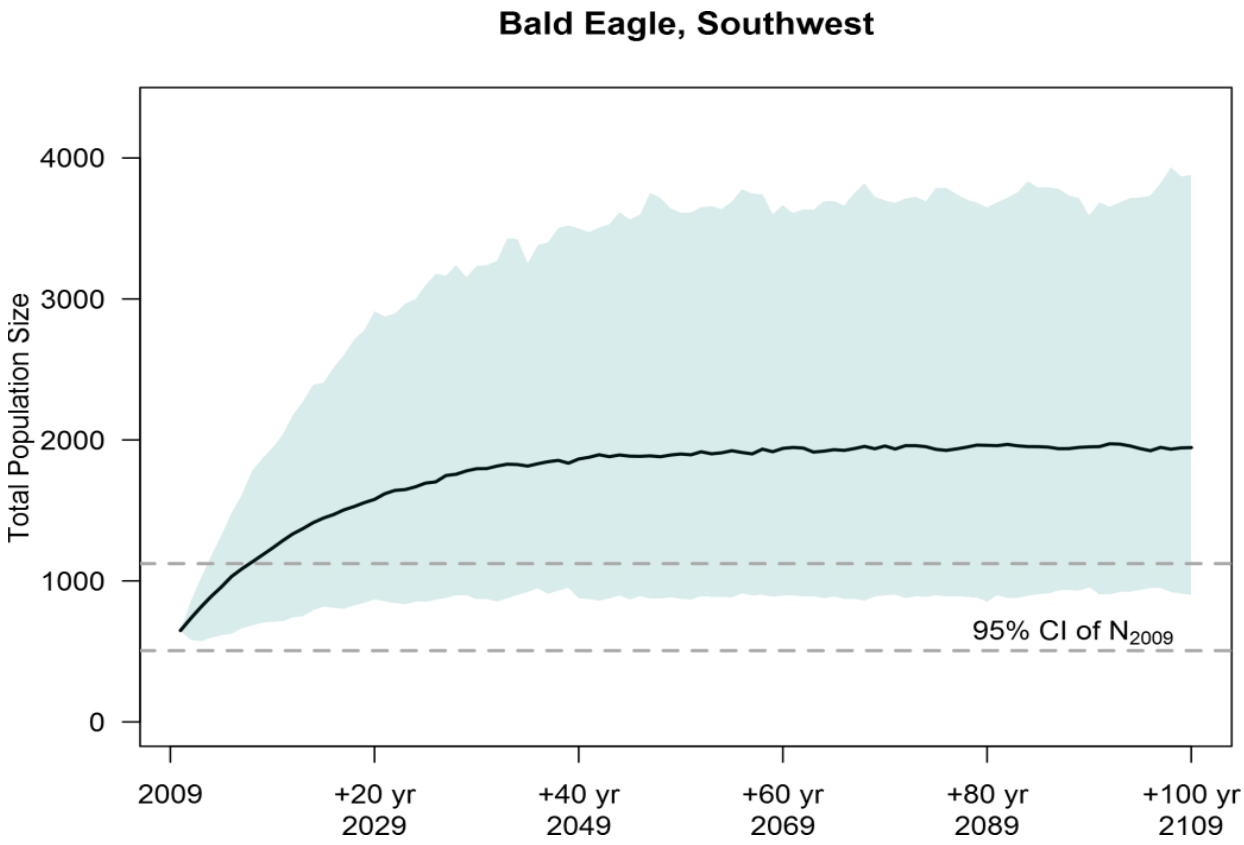


Figure 3-7. Projected bald eagle population in the American Southwest, 2009–2109, from USFWS (2016).

3.2.1.3 Disturbance

Where a human activity agitates or bothers bald eagles to the degree that causes injury or substantially interferes with breeding, feeding, or sheltering behavior and causes, or is likely to cause, a loss of productivity or nest abandonment, the conduct of the activity constitutes a violation of the Eagle Act's prohibition against disturbing eagles (see 50 CFR 22.3). The circumstances that might result in such an outcome are difficult to predict without detailed site-specific information (USFWS, 2007a).

Many studies have evaluated the sensitivity of bald eagles to different human activities (Mathisen, 1968; Stalmaster and Newman, 1979; Skagen, 1980; Gerrard et al., 1984; Fraser et al., 1985; Russell and Lewis, 1993; Brown and Stevens, 1997; Grubb et al., 2002). Overall, these studies show that individual bald eagles react differently to disturbance; what could cause nest abandonment to one pair of bald eagles may be readily tolerated by another. This variability comes from differences in the degree to which eagles are exposed to the disturbance (e.g., whether or not they are visually buffered from it by vegetation), and prior experiences of individuals to human activity. Increasingly, bald eagles appear to be adapting to human activity,

as evidenced by an increasing number of successful nests in urban and suburban areas (Millsap et al., 2004).

The Service has developed a document entitled "National Bald Eagle Management Guidelines" (NBEMG; USFWS, 2007a) that provides an overview of legal and biological factors that should be considered when assessing the potential for disturbance of bald eagles. Major considerations are repeated below, but we refer readers to the NBEMG for additional details; unless otherwise noted, the material presented in this section is based on the NBEMG.

Human activities that cause prolonged absences of breeding adult bald eagles from their nests can jeopardize both eggs and nestlings (Figure 3-8). Depending on prevailing weather, this may cause the eggs either to overheat or to cool off excessively, and then fail to hatch. Unattended eggs and nestlings are also vulnerable to predation. Irregular feeding of nestlings by adults due to human disruption can harm nestlings. Adults startled when incubating or brooding nestlings may damage eggs or injure their nestlings as they abruptly leave the nest. Older nestlings may also be startled by loud noises or intrusive human activities and then prematurely jump from the nest before they are able to fly properly, and be injured or killed in the fall. In general, susceptibility to nesting failure as a result of disturbance-induced abandonment is greatest early in the nesting season, while risks of exposure and startling are greatest towards the end of the nesting season (Table 3-4).

Human activities near or within foraging areas and communal roost sites may prevent eagles from feeding or taking shelter, especially if no other adequate feeding or roosting sites are available (Figure 3-9). Human disturbances may represent a threat to wintering bald eagle populations by causing displacement to areas of lower human activity, if those areas are of lower quality (e.g., offered less food) or are energetically costly (e.g., lay at a greater distance from food resources) (Stalmaster, 1976; Stalmaster and Newman, 1978; Brown and Stevens, 1997). Human disturbances may also interfere with foraging behavior of eagles (Mathisen, 1968; Stalmaster, 1976). Recent studies suggest that at least in some areas, winter bald eagle roosts may actually constitute a complex of interrelated locations that individuals move regularly among, presumably taking advantage of local foraging opportunities around whichever roost is being used at a particular time (Watts and Mojica, 2012). This greatly complicates assessing when loss of a particular roost might result in impacts severe enough to be considered take under the Eagle Act.

Figure 3-8. Nesting bald eagles.

Figure 3-9. Perching bald eagles in Alaska.

Table 3-4. Nesting bald eagle sensitivity to human activities, from USFWS (2007a).

Phase	Activity	Sensitivity to Human Activity	Comments
I	Courtship and Nest Building	Most sensitive period; likely to respond negatively	Most critical time period. Disturbance is manifested in nest abandonment. Bald eagles in newly established territories are more prone to abandon nest sites.
II	Egg laying	Very sensitive period	Human activity of even limited duration may cause nest desertion and abandonment of territory for the breeding season.
III	Incubation and early nestling period (up to four weeks)	Very sensitive period	Adults are less likely to abandon the nest near and after hatching. However, flushed adults leave eggs and young unattended; eggs are susceptible to cooling, loss of moisture, overheating, and predation; young are vulnerable to elements.
IV	Nestling period, four to eight weeks	Moderately sensitive period	Likelihood of nest abandonment and vulnerability of the nestlings to elements somewhat decreases. However, nestlings may miss feedings, affecting their survival.
V	Nestlings eight weeks through fledging	Very sensitive period	Gaining flight capability, nestlings eight weeks and older may flush from the nest prematurely due to disruption and die.

Avoiding Disturbance

The NBEMG contains a series of recommendations for avoiding or minimizing the risk of disturbance to bald eagles. The NBEMG were developed drawing from existing state and regional bald eagle guidelines, scientific literature on bald eagle disturbance, and recommendations of state and federal biologists who monitor the impacts of human activity on eagles. Uncertainties still remain concerning the effects of many activities on eagles, and how eagles in different situations may or may not respond to certain human activities. The Service recognizes this uncertainty and views the ongoing collection of better biological data on the response of eagles to disturbance as a high priority.

Very generally, the NBEMG recommends: (1) keeping a distance between the activity and the nest, roost, or foraging area (distance buffers); (2) maintaining preferably forested (or natural) areas between the activity and the area of eagle use (landscape buffers); and (3) avoiding certain activities during the season of eagle use (temporal buffers). The spatial and visual buffers serve to minimize visual and auditory impacts associated with human activities. Ideally,

buffers would be large enough to protect existing nest, roost, and foraging trees and provide for alternatives or replacements, but there are a number of site-specific factors that should be taken into consideration when designing buffers.

3.2.2 Environmental Consequences

3.2.2.1 General Considerations

The Service manages eagle take at two geographic scales, regional EMUs and the LAP (USFWS, 2009a; 2013a). As noted previously in *Chapter 2, Alternatives*, the Service is considering two alternative EMU configurations—the EMUs established in 2009 and the four administrative flyways, which may better represent geographic use across seasons. Unlike EMUs, the LAP is unique to each prospective permit, and is the eagle population in the area of the permitted activity bounded by, in the case of the bald eagle, the median natal dispersal distance of females, 86 miles. This value has been adopted as Service policy; see USFWS (2016, Appendix A5), for more details.

Eagle take at the EMU scale is governed by a take rate that is compatible with maintaining an equilibrium population size equal to or greater than the population objective–the estimated population size in 2009. Take limits at the LAP scale, on the other hand, apply only to take permitted or authorized by the Service, and while they allow for local population declines under some situations, they are intended to prevent local extirpation of eagles—both breeding and non-breeding. The Service recognizes that some, perhaps even most, eagles taken at a permitted project will derive from natal areas outside the LAP. Despite this, given fidelity to migration corridors and wintering areas by both bald and golden eagles, conservation benefits of limiting take at the LAP scale are likely accrue to more than just eagles breeding within the LAP (USFWS, 2016).

Across an EMU, there may be landscapes with some areas in proximity to permitted projects with comparatively high levels of authorized anthropogenic mortality, but offset by other areas where authorized anthropogenic take is low, averaging to a maximum across the EMU equal to or less than the EMU take limit. In cases where take exceeds the EMU take limit, all excessive take must be offset by mitigation that would commensurately reduce ongoing mortality from other sources, such that there is no authorized increase in net mortality (USFWS, 2009a; USFWS, 2013a).

Take Limits at the Scale of EMUs

USFWS (2016) used a potential biological removal (PBR) model to estimate sustainable lethal take rates (*h*) and take limits (*H*) for both species of eagle following the approach described in Runge et al. (2009); see USFWS (2016) for specific details. USFWS (2016) used methods that incorporated uncertainty in measures of survival, fecundity, and population size in such a way that the uncertainty could be quantified and incorporated into the take rate estimates and take limits themselves. The medians of demographic parameter distributions were used for the

liberal-alternative estimates of *h* and *H*. For the conservative estimates of *h* and *H*, uncertainty in the input parameters was accounted for by using the 20th quantiles of relevant parameter distributions (denoted h_{20th} and H_{20th}). The use of median values for relevant parameters in calculating take rates under the liberal alternatives amounts to equally (approximately in a 50:50 ratio) sharing the risk posed by uncertainty in the estimated take rates between over-protecting and over-harvesting eagles. The use of the 20th quantiles under the conservative alternatives amounts to distributing risk in roughly an 80:20 ratio in favor of being more protective of bald eagles than may be necessary to foster stable or growing populations. In all cases, expressions regarding how risk is distributed relate strictly to the risk posed by additive take, and are based on the assumption that environmental and biological conditions remain as they were over the time period over which demographic rates were measured.

Outside the Southwest region, USFWS (2016) estimated that $h = 0.103$ (or 10.3%) and that $h_{20th} = 0.092$ (or 9.2%) for the bald eagle. To remain consistent with management objectives, USFWS (2016) adjusted *h* to a level compatible with maintaining an equilibrium population greater than or equal to the 2009 population estimate, which resulted in $h = 0.08$ and $h_{20th} = 0.06$ outside the Southwest (Table 3-2). In the Southwest, USFWS (2016) noted that the 2009 population was less than one-half of the projected demographic carrying capacity of that region. To allow for greater additional bald eagle population growth in this region, the Service proposes to set *h* to one-half the take rate at maximum sustainable yield (4.5%), and h_{20th} to the 20th quantile of one-half the take rate at maximum sustainable yield (3.75%), rather than the higher take rates associated with the 2009 population estimate (Table 3-2). Again, the methods and approach behind these analyses are explained in some detail in USFWS (2016). In Alaska, because of uncertainties in the population size estimate, Service managers initially opted to maintain *H* and H_{20th} at approximately 500, as was recommended in 2009 (USFWS, 2009a). However, in response to comments on the Draft PEIS, particularly those from the Alaska Department of Fish and Game and the Pacific Flyway Council, the Service elected to use the biologically indicated take rate of 6% for bald eagles in Alaska under the preferred Alternative in the final PEIS. Collectively, across all EMUs, the estimated bald eagle take limits are 11,423 and 7,522 under the liberal and conservative alternatives, respectively (Table 3-2).

In summary, $h = 0.080$ (or 8%) for the bald eagle outside the Southwest region, and this is the proposed take rate for the liberal take alternatives (Alternatives 2 and 4) for bald eagles except for the Southwest and Alaska, where it is lower (4.5% and 0.7%, respectively). For the conservative take alternatives, $h_{20th} = 0.060$ (or 6%), which is the proposed take rate in the U.S. except for the Southwest, and, for Alternative 3, Alaska. The proposed take rate for bald eagles in the Southwest in Alternatives 3 and 5 is 3.8%. The proposed take rate for Alaska is 0.8% for Alternative 3 and 6% for Alternative 5 (see Table 3-2 in this PEIS).

Take as a Result of Disturbance at the Nest

For disturbance to have a potential population-level effect, it has to result in a loss of potential productivity. In 2009, the Service used the EMU-specific productivity (mean number of young

fledged per occupied nesting territory) for each species per year as the expected loss for each instance of authorized nest disturbance (USFWS, 2009a). The Service proposes to use the same approach in the new regulations, but with updated productivity values from USFWS (2016). The median values of the productivity distributions were used for liberal alternatives and the 80th quantiles for the conservative alternatives to maintain a protective 20% probability of underestimating the productivity potentially lost as a result of disturbance (USFWS, 2016).

Following this approach, for each instance of bald eagle nest disturbance predicted to result in loss of productivity outside the Southwest Region, the Service proposes to debit take limits by 1.12 or 1.33 eagles, under the liberal and conservative alternatives, respectively, per year that the disturbance occurs. For bald eagles in the Southwest region, the Service proposes to debit take limits by 0.73 or 0.95 under the liberal and conservative alternatives, respectively.

Take as a Result of Territory Loss

Loss of an occupied nesting territory results in the recurring loss of annual production from that territory. However, this loss of future production is difficult to estimate and account for in debiting take limits. In 2009, the Service quantified future production lost from loss of an occupied territory by comparing equilibrium population size with *N* and *N-1* nesting territories, then debiting EMU take limits by the difference (USFWS, 2009a). This approach assesses the effects of loss indirectly and relates it to a future equilibrium population size rather than the population objective. USFWS (2016) recommended a different approach, where for each instance of occupied territory loss the mean annual per-nesting-territory productivity is subtracted from the EMU take limit annually for the generation time of the eagle species. Generation time is defined as the average age of breeders in the population (Caswell, 2001; Bienvenu and Legendre, 2015). Using this as the temporal scale is biologically relevant and sufficiently long to assure that potential longer-term effects can be accounted for by future adjustments to the EMU take limits based on reassessments of eagle populations (USFWS, 2016).

Some nesting territories hold more value than others (Millsap et al., 2015). Moreover, it is often difficult to predict in advance whether an activity would result in loss of a nesting territory or simply the loss of a nest structure and cause a shift in use to an existing or new alternative nest. The latter would have little or no consequence to the eagle population (Watts, 2015). For these reasons, each instance where loss of a nesting territory is a possible outcome requires careful consideration and review on the part of Service biologists. Permitting the loss of high-value nesting territories with a long history of occupancy and production could have greater population-level consequences and should be carefully considered.

USFWS (2016) used the mean of the fertility rate schedule from the matrix demographic models (effectively the mean age of breeders in the population) as the generation time. For the Southwest bald eagle population, generation time is 12 years; it is 10 years for bald eagles in the rest of the U.S. outside of the Southwest. The corresponding debits to take limits by EMU

are given in Table 13 of USFWS (2016). The Service proposes to adopt the approach recommended in USFWS (2016) to account for take as a result of nesting territory loss as a technical improvement under all alternatives in this PEIS.

Take Limits at the Scale of the Local Eagle Population

The objective of the LAP take limit is to regulate take so that local populations are protected from significant reduction or extirpation due to Service-authorized activities. Although the primary aim is to prevent extirpation of local nesting populations, there is increasing evidence of strong philopatry (the tendency of an organism to return to familiar places) to non-breeding areas in bald eagles (Mojica et al., 2008), and the LAP take limits also provide protection from over-take of wintering and migrating eagles. As noted above, LAP take limits pertain only to take permitted or authorized by the Service, and they are cumulative, taking into consideration all Service-authorized activities affecting the LAP.

In the ECPG (USFWS, 2013a), the Service identified LAP take-rates above 1% as being of concern, and rates of 5% being at the maximum of what should be considered (and under Alternatives 4 and 5, the maximum allowed unless further analysis shows higher take to be compatible with the preservation of bald or golden eagles). The take authorized (within the LAP take limits) is in addition to the average background rate of natural mortality and any ongoing illegal take. The Service collects information on bald eagle mortalities, but that information comes opportunistically and therefore cannot be relied on to provide a quantitative measure of background mortality rates within an LAP. However, Service biologists do consider and take into account available information on unpermitted take within the LAP area; evidence of excessive unpermitted take warrants careful evaluation and would be taken into consideration during the permitting process.

The population size of the LAP is estimated by applying the density estimates for EMUs to the LAP area (USFWS, 2013a). The Service acknowledges this approach is simplistic for at least two reasons: (1) given the eagle density estimates come from nesting or late-summer population surveys, they do not account for seasonal influxes of eagles that occur through migration and dispersal; (2) this approach assumes eagle density is uniform across the EMU, which is inaccurate. USFWS (2016) reports that in most cases the first simplification leads to an underestimate of true density, particularly in core wintering areas during the non-breeding months. As such, this serves as an added buffer against over-take of local-nesting eagles. The second assumption of uniform density leads to greater relative protection of areas with higher-than-average eagle density within an EMU, and less relative protection in areas of lower density. Improving the ability to estimate true LAP-eagle densities is an area of active investigation by the Service and partners.

To understand the potential consequence to a LAP of bald eagles of authorizing take up to the LAP take limits, USFWS (2016) conducted a series of simulations using demographic models to add a 5% take rate to background take levels in hypothetical large and small project footprints

in high- and low-density EMUs. Models showed adding a 5% take to background mortality levels for bald eagles would not cause declines from current populations in projected LAPs, but would reduce the size of the eventual equilibrium LAP by 38% from the equilibrium without the added mortality (see Figure 12 in USFWS, 2016).

The way the LAP is treated varies among the five alternatives. In the No-Action alternative and Alternatives 2 and 3, use of the LAP remains guidance. In Alternatives 4 and 5, it is codified into the proposed regulations such that Service-authorized take within a LAP would be limited to no more than 5% of the estimated total local area population size, unless additional analysis is conducted and demonstrates that permitting take over 5% of that LAP is compatible with the preservation of eagles. It is important to keep in mind that this 5% authorized take within an LAP would be in addition to existing natural mortality and any unpermitted take that is occurring in the LAP.

The Role of Offsetting Compensatory Mitigation

Authorized take above the take limits for each EMU has to be offset by compensatory mitigation that would produce a commensurate decrease in a pre-existing mortality factor, or an increase in carrying capacity, that offsets the permitted mortality (USFWS, 2009b and 2013a). The effect of this mitigation must be that no net increase in mortality occurs within the EMU where the take is authorized (USFWS, 2009a, 2013a).

Currently, the Service requires that offsetting mitigation be undertaken in the same EMU where the take is authorized (USFWS, 2013a), and this spatial scale is believed to still be the most reasonable, taking into account that migrating or wintering eagles originating from other EMUs might also be benefitted by mitigation outside their natal EMU.

There are subtle but important distinctions between the roles of offsetting compensatory mitigation among the five alternatives, as summarized in Table 2-2.

Population Monitoring

As noted previously, the take limits are time sensitive and require regularly updated estimates of population size. More generally, the Service has also implemented the eagle take permit process under a formal adaptive management framework, and monitoring eagle populations and updating population estimates and take limits are critical parts of the adaptive management feedback loop (USFWS, 2013a). For these reasons, the Service proposes to formalize its eagle population monitoring commitments as part of this PEIS process. Specifically, the Service proposes to re-assess population size and trend for both eagle species every six years, and to base that re-assessment on the recurring population surveys described in USFWS (2016) and summarized below.

Under each of the alternatives, the Service would conduct a modified version of the dual-frame bald eagle nesting territory survey in years three and six of each six-year period. As part of that survey effort, the Service would investigate the potential for combining the dual-frame survey

estimates of occupied nesting territories with BBS indices to better link the dual-frame results to changes in total population size.

As budgets allow, the Service would continue to conduct and fund additional research and monitoring to improve understanding of bald and golden eagle distribution and habitat use at finer spatial scales. Funding for eagle population monitoring is a high priority of the Service, but as budgets continue to tighten, the certainty of funding for large-scale survey efforts diminishes. Service biologists would continue to look for ways to implement these surveys as efficiently and effectively as possible, including periodic reassessments of statistical power and reliability. The Service would also continue investigating how to integrate other sources of information (e.g., Christmas Bird Counts) with the surveys to improve power and representativeness, and to expand the scale of inference (USFWS, 2016).

3.2.2.2 Effects of All the Alternatives

All the alternatives would have both direct and indirect effects. Direct impacts are those caused by issuing a particular permit, such as any changes to the applicant's proposed project stemming from the permit application process, including negotiating the permit's terms and conditions and ensuring compliance with the regulations, and the application of the actual permit terms and conditions, such as any required eagle conservation measures and compensatory mitigation that would offset predicted take in excess of EMU limits. Indirect impacts would result from implementing a given project, including any indirect effects resulting from compensatory mitigation. The duration of the impacts, whether beneficial or adverse, would be both short term and long term. Short-term impacts would extend beyond the time of a given project's activities, but would not last more than a few years. Long-term impacts would last until such time as the management approach and regulations undergo further review and changes.

The extent of the impacts from all the Action Alternatives would range from local through regional to nationwide; that is, it would affect bald eagle populations at all levels, from that of LAPs, to EMUs, to the overall bald eagle population of the U.S.

3.2.2.3 Alternative 1: No Action

Under the No-Action alternative, described fully in *2.2 Alternative 1: No Action*, the current management objective would be continued; that is, to manage bald eagle numbers consistent with the goal of stable or increasing breeding populations. The baseline population size is the estimated number of bald eagles in 2009 (70,544 for Alaska; 72,434 for the U.S. outside of Alaska, including 648 in the Southwest region; and 142,977 for the entire United States). Duration of incidental take permits would be up to five years, and permitted take of bald eagles would be capped at 5% of estimated annual productivity in each EMU; EMUs would not change, but would continue to be configured roughly similarly to the eight Service regions. Under the No-Action alternative, permitted take of bald eagles would be capped at 5% of estimated annual productivity, the most restrictive of all the alternatives (see USFWS, 2009a, Table C.3 for

current take limits). Service biologists reviewing incidental take permit applications would be encouraged but not required to incorporate the LAP analysis. By not requiring application of the LAP analysis, this alternative could potentially allow large, high-take projects to result in mortality that exceeds 5% of a LAP, though still not exceeding the 5%-of-estimated-annual productivity limit of an entire EMU.

By restricting the duration of incidental take permits to five years, the No-Action Alternative (as well as Alternatives 2 and 4) might slightly increase the potential for public scrutiny at the time of permit renewal, because a few permits for which substantial changes in operation or new information is available might require additional NEPA analysis at the time of renewal. However, most renewals would not require incorporation of substantial new information, and thus not trigger the need for additional NEPA. Therefore, the actual potential for increased public input under the No-Action Alternative (and Alternatives 2 and 4) is minor. Retaining the five-year maximum permit duration would not encourage additional applications for take coverage, and therefore not ameliorate the high levels of unauthorized take now occurring.

Retaining the five-year duration limit could also result in greater environmental and/or socioeconomic impacts at the permit renewal stage after the 5-year initial permit term lapses than at the equivalent 5-year review stage of a long-term permit under Alternatives 3 and 5. A long–term permit would incorporate adaptive management conditions designed to reduce the long-term effects of the project, whereas a 5-year permit would not require such conditions. Therefore, if conditions change significantly after the first 5 years of a permitted long-term project's operation, the probability that significant unforeseen changes to the project or permit conditions would be required to maintain compliance with the incidental take permit regulations is higher under the No Action Alternative (and Alternatives 2 and 4) than at the equivalent 5-year review stage of a long-term permit under Alternatives 3 and 5.

Overall, because of its restrictive take rate—5% of annual productivity, which is well below the take rates (*h*) shown in Table 3-2—and with its requirements for offsetting mitigation, the No-Action alternative would likely attain the management objective for bald eagles in all EMUs. That is, it would be consistent with the goal of maintaining the potential for stable or increasing breeding populations. This would constitute a beneficial effect on bald eagle populations, defined as "a positive change in the condition of the resource or a change that moves the resource toward a desired condition."

The magnitude of the beneficial impacts on bald eagle populations from the No-Action alternative would be moderate throughout the U.S.; that is, a "noticeable change in a resource would occur, and this change would alter the condition of the resource." The noticeable change in question is that bald eagle populations in all of the EMUs would continue to recover and rebound toward their theoretical carrying capacity. However, the ultimate equilibrium population after 100 years would likely fall somewhat short of the theoretical demographic nationwide carrying capacity of 227,800 bald eagles.

3.2.2.4 Alternative 2: Current EMUs, Liberal Take Levels

Alternative 2, described fully in *2.4 Alternative 2: Current EMUs, Liberal Take Levels*, would also aim to manage bald eagle numbers consistent with the goal of stable or increasing breeding populations over 100 years. Permitted take of bald eagles would be capped at levels at or beneath the estimated sustainable take rate within each EMU; EMUs would not change, but would continue to have configurations that approximate the eight Service regions. Service biologists reviewing incidental take permit applications would be encouraged but not required to incorporate the LAP analysis. By not requiring application of the LAP analysis, this alternative could potentially allow large, high-take projects to result in mortality that exceeds 5% of a LAP, though still not exceeding the take limit of an entire EMU.

The permitted levels of take in Alternatives 2 and 4 are the estimated sustainable bald eagle take rates for the Southwest (4.5%) and the rest of the United States (8%) shown in column *h* of Table 3-2 for the median (*N*) population estimates, and a conservative take rate (0.7%) in Alaska. If permits were issued allowing aggregate take up to this level in any given EMU, or in all EMUs combined, and if these take levels were actually reached, then based on the current understanding of bald eagle population dynamics and assuming underlying demographic factors remain unchanged, the risk posed by uncertainty in the demographic rates used to estimate sustainable take would be shared equally between the possibility of authorized take being higher than the level required to maintain stable bald eagle populations and the possibility of over-regulating take.

The maximum duration of incidental take permits would remain five years, which would not encourage additional applications for take coverage, and therefore not ameliorate the high levels of unauthorized take now occurring.

Overall, the added unmitigated take allowed by Alternative 2 would result in populations not reaching levels they would otherwise attain, so at equilibrium, there would be downward pressure holding populations back from reaching the estimated theoretical nationwide carrying capacity of 227,800 bald eagles. However, it is likely some or all of that take would occur regardless of whether a permit was available or not, as has proven to be the case since 2009.

The current EMUs maintained under Alternatives 1, 2, and 3 would not account as thoroughly for the full annual movement and migratory cycle of the bald eagle. The current EMU configuration means a higher percentage of eagles taken would be of individuals that actually derive from a different EMU, and are therefore not directly accounted for in that EMU's take limit.

Alternative 2 essentially shares the risk of being under protective of eagles and the risk of imposing unnecessarily burdensome regulations equally. The main difference between liberal (2 and 4) and conservative (3 and 5) alternatives is the certainty with which allowable take would be sustainable. In the liberal alternatives, given uncertainty, the risk of the take rate

being too high or too low relative to the population objective is essentially equal in all EMUs over the coming century.

The magnitude of Alternative 2's impacts could range from potentially negligible to potentially moderately adverse.

3.2.2.5 Alternative 3: Current EMUs, Conservative Take Levels

Alternative 3, described fully in *2.5 Alternative 3: Current EMUs, Conservative Take Levels, Permit Duration Increase*, would also strive to manage bald eagle numbers consistent with the goal of stable or increasing breeding populations over 100 years. Alternative 3 would maintain the same current EMUs for bald eagles; however, take limits are lower than Alternative 2 and higher than the No-Action alternative. Allowable take per EMU, unless offset, would be 3.8% of estimated population size in the Southwest and 6% in the rest of the country.

The EMU take limits in Alternative 3 are the conservative estimated sustainable bald eagle take rates (h_{20th}) times the conservative population estimates (N_{20th}), as shown in column h_{20th} of Table 3-2, except the take rate in Alaska would be set at 0.8%. If permits were issued allowing aggregate take up to this level in any given EMU, or in all EMUs combined, and if these take levels were actually reached, and assuming the underlying demographic factors were to remain unchanged, then based on the current understanding of bald eagle population dynamics, the risk posed by uncertainty in demographic estimates is weighted 80:20 in favor of protecting bald eagles from over-harvest in all EMUs over the coming century.

In addition to incorporating the same limits for when permitted take would require offsetting compensatory mitigation, Alternative 3 would allow for additional mitigation over and above what is strictly required to offset take. The additional mitigation could address any bald eagle conservation need. Also, additional reasonable and practicable avoidance and minimization may be required for long-term permits at five-year evaluations, and compensatory mitigation would be adjusted up or down and applied going forward at five-year evaluations.

Under Alternative 3, the maximum permit duration for incidental take permits would be extended to 30 years. The intended and expected result would be that more project proponents are likely to seek permit coverage than under Alternatives 1 and 2 because the availability of longer-duration incidental take permits provides greater certainty that longer-term projects would remain authorized over the lifetime of the project. If permitted, those projects would incorporate avoidance and minimization measures that otherwise would not have been implemented.

Service biologists reviewing incidental take permit applications would be encouraged but not required to incorporate LAP analysis under Alternative 3. By not requiring application of the LAP analysis, this alternative could potentially allow large, high-take projects to result in mortality that exceeds 5% of a LAP, though still not exceeding the take limit of the EMU, depending on location.

Given the 80:20 weighting of risk posed by uncertainty, the effects of Alternatives 3 and 5 are expected to be beneficial, but there is some possibility they could be adverse. As stated above, the main difference between liberal (2 and 4) and conservative (3 and 5) alternatives is the certainty with which allowable take would be sustainable. In a conservative alternative such as this one, given uncertainty, the risk of overly restricting take is higher than the risk that take rates are excessive relative to the population objective.

The magnitude of Alternative 3's impacts is likely to be minor to moderately beneficial compared to Alternative 2, and comparable to Alternative 1, although for different reasons. Under Alternative 3, bald eagle populations in all of the EMUs and the nation as a whole would continue to recover and rebound toward their theoretical carrying capacity, including at the LAP scale. While the ultimate equilibrium population after 100 years would not reach the estimated theoretical nationwide carrying capacity of 227,800 bald eagles because of the additional authorized take, it is likely some or even most of that take would occur regardless of whether a permit was available or not, as has proven to be the case since 2009—and with no accompanying implementation of eagle conservation measures.

3.2.2.6 Alternative 4: Flyway EMUs, Liberal Take Levels

Alternative 4, described fully in *2.6 Alternative 4: Flyway EMUs, Liberal Take Levels*, would also aim to manage bald eagle numbers consistent with the goal of stable or increasing breeding populations over 100 years. Alternative 4 would replace the current EMUs for bald eagles that roughly approximate Service regions with EMUs based on flyways. Permitted take per EMU would be the same as Alternative 2: 4.5% of estimated population size in the Southwest, 0.7% in Alaska, and 8% for the rest of the U.S. Duration of incidental take permits would be up to five years (same as the No-Action alternative and Alternative 2) and permitted take of bald eagles would be capped at levels at or beneath the estimated sustainable take rate within in each EMU.

The Eagle Act's Preservation Standard (the Service's management objective) would be defined in the regulations to mean "consistent with the goal of maintaining stable or increasing regional breeding populations, and the persistence of local populations, throughout the geographic range of each species." In some cases compensatory mitigation could be required to meet the preservation standard. By requiring application of the LAP analysis, this alternative would better conserve bald eagle numbers at the local as well as regional scales.

Overall, the added unmitigated take allowed by Alternative 4 would result in populations not reaching levels they would otherwise attain, so at equilibrium there would be downward pressure holding populations back from reaching the estimated theoretical nationwide carrying capacity of 227,800 bald eagles. However, it is likely some or even most of that take would occur regardless of whether a permit was available or not, as has proven to be the case since 2009.

The flyway-based EMUs that would be implemented under Alternative 4 would likely more accurately correspond to the full annual movement and migratory cycle of the bald eagle. This EMU configuration would have the result that a higher percentage of eagles taken would be individuals that originated from that EMU and are thus appropriately accounted for in that EMU's take limit.

Compensatory mitigation could be required if permits are issued that exceed the LAP take limit, if additional environmental analysis shows that such mitigation would make the permitted take compatible with the preservation of eagles.

Given the equal sharing of risk of uncertainty, the effects of Alternative 4 are expected to be beneficial but have nearly an equal chance of being adverse. The main difference between liberal (2 and 4) and conservative (3 and 5) alternatives is the certainty with which allowable take would be sustainable. In a liberal alternative such as this one, given uncertainty, the risk of the take rate being too high or low relative to the population objective is balanced.

The magnitude of Alternative 4's impacts could range from potentially negligible to minor adverse to potentially minor to moderately beneficial.

3.2.2.7 Alternative 5: Flyway EMUs, Conservative Take Levels (Preferred Alternative)

Alternative 5, described fully in *2.7 Alternative 5: Flyway EMUs, Conservative Take Levels, Permit Duration Increase (Preferred Alternative),* would also strive to manage bald eagle numbers consistent with the goal of stable or increasing breeding populations over 100 years, but would manage populations at the regional (EMU) level and at the local population level. Like Alternative 4, Alternative 5 would replace the current EMUs for bald eagles that roughly approximate Service regions with EMUs based on flyways.

The permitted take rate in Alternative 5 is the same as in Alternative 3, except that the take rate for Alaska would be set at 6%, as shown in column h_{20th} of Table 3-2. If permits were issued allowing aggregate take up to this level in any given EMU, or in all EMUs combined, and if these take levels were actually reached, then based on the current understanding of bald eagle population dynamics and assuming no change in the underlying demographic factors, the risk posed by uncertainty in demographic estimates is weighted 80:20 in favor of protecting bald eagles from over-take in all EMUs over the coming century. Alternative 5, like Alternative 3, extends the maximum permit duration for incidental take permits to 30 years, providing the same benefits described under Alternative 3.

The Eagle Act's Preservation Standard—"compatible with the preservation of the bald eagle or the golden eagle"—would be defined in the regulations to mean "consistent with the goal of maintaining stable or increasing breeding populations in all eagle management units, and the persistence of local populations throughout the geographic range of each species." In some cases compensatory mitigation could be required to meet the preservation standard. By

requiring application of the LAP analysis, this alternative would better conserve bald eagle numbers at the local as well as regional scales.

The flyway-based EMUs proposed under Alternative 5 (and Alternative 4) would likely more accurately correspond to the full annual movement and migratory cycle of the bald eagle. This flyway-based EMU configuration means a higher percentage of eagles taken within a given EMU would be of individuals that originate from that EMU, and are thus appropriately accounted for in that EMU's take limit.

Alternative 5's impacts are likely to be moderately beneficial to bald eagles. Alternative 5 is likely to assist the Service in achieving its long-term management goal for the bald eagle; that is, managing bald eagle numbers consistent with the goal of stable or increasing breeding populations and persistence at the LAP scale over 100 years. Under Alternative 5, bald eagle populations in all of the EMUs and the nation as a whole would continue to grow toward their theoretical carrying capacity, though once stabilized, would likely fall short of the levels that would be attained in the absence of human-caused impacts.

3.3 GOLDEN EAGLE

3.3.1 Affected Environment

3.3.1.1 General Conditions

The golden eagle (*Aquila chrysaetos*) has a worldwide distribution in the Northern Hemisphere, mainly in North America and Eurasia, but including parts of northern Africa (Ferguson-Lees and Christie, 2001; Kochert et al., 2002). As with bald eagles, golden eagles exhibit delayed reproduction, and do not attain the definitive plumage (Figure 3-10) until their fifth year (Clark and Wheeler, 1983). Golden eagles exhibit the same pattern as with bald eagles of females being larger than males, and size increasing with increasing latitude; the largest northern golden eagles can weigh over 13.5 lbs. (Kochert et al., 2002).

Golden eagles may travel great distances during dispersal and migration but usually return to within 30 miles of their natal area to breed (Millsap et al., 2015). Breeding golden eagles occupy discrete territories, which are typically used continuously for many years (Kochert et al., 2002; Kochert and Steenhof, 2012; Figure 3-11). Golden eagle pairs establish and defend breeding territories that, as with bald eagles, may contain multiple alternative nests, and nesting territories are often occupied for many decades (Millsap et al., 2015). Re-use of individual nests within a territory is frequent, but some individual nests can go for decades between use (Kochert and Steenhof, 2012). Breeding begins earlier at southern latitudes, but in general occurs with the start of courtship in many areas in January and extends through fledging of young, mostly in June and July in temperate latitudes but into August at the northern extent of the range (Kochert et al., 2002).

Figure 3-10. Adult golden eagle (*Aquila chrysaetos*).

Golden eagles typically lay one to three eggs (rarely four) once per year (Kochert et al., 2002), and productivity averages 0.54 young fledged per occupied nesting territory (USFWS, 2016). Incubation lasts around 42 days; young leave the nest between 45 and 60 days of age, and they become independent 45 to 80 days (perhaps longer in some cases) after fledging (Kochert et al., 2002).

Some northern populations of golden eagles migrate southward in winter (McIntyre et al., 2008, 2012), and some nonbreeding golden eagles from southern latitudes migrate northward in summer (R. Murphy, USFWS, personal communication). (See Figure 3-12. Note that recent work has documented that golden eagles occur regularly in winter in the eastern United States; these individuals are from the breeding areas in eastern Canada.) As with bald eagles, there is increasing evidence for repeated use of migratory routes, stopover sites, and nonbreeding use areas across years by individuals (McIntyre, 2012; R. Murphy, USFWS, personal communication). Golden eagles are not as social as bald eagles outside the breeding season, but they do gather in communal roosts near plentiful food or in extreme weather in some cases (Kochert et al., 2002).

Golden eagles feed primarily on small to mid-sized mammals, most commonly rabbits (*Sylvilagus* spp.), hares (*Lepus* spp.), ground squirrels (*Spermophilus* spp.), marmots (*Marmota* spp.), and prairie dogs (*Cynomys* spp.) (Kochert et al., 2002). In some areas carrion is an

important part of the diet, as are waterfowl, particularly in winter (Millsap and Vana, 1984; Kochert et al., 2002).

For a discussion of golden eagle habitat, and effects of the alternatives on habitat, please see *3.4 Eagle Habitat*.

Figure 3-11. Golden eagle and nestlings in nest on cliff.

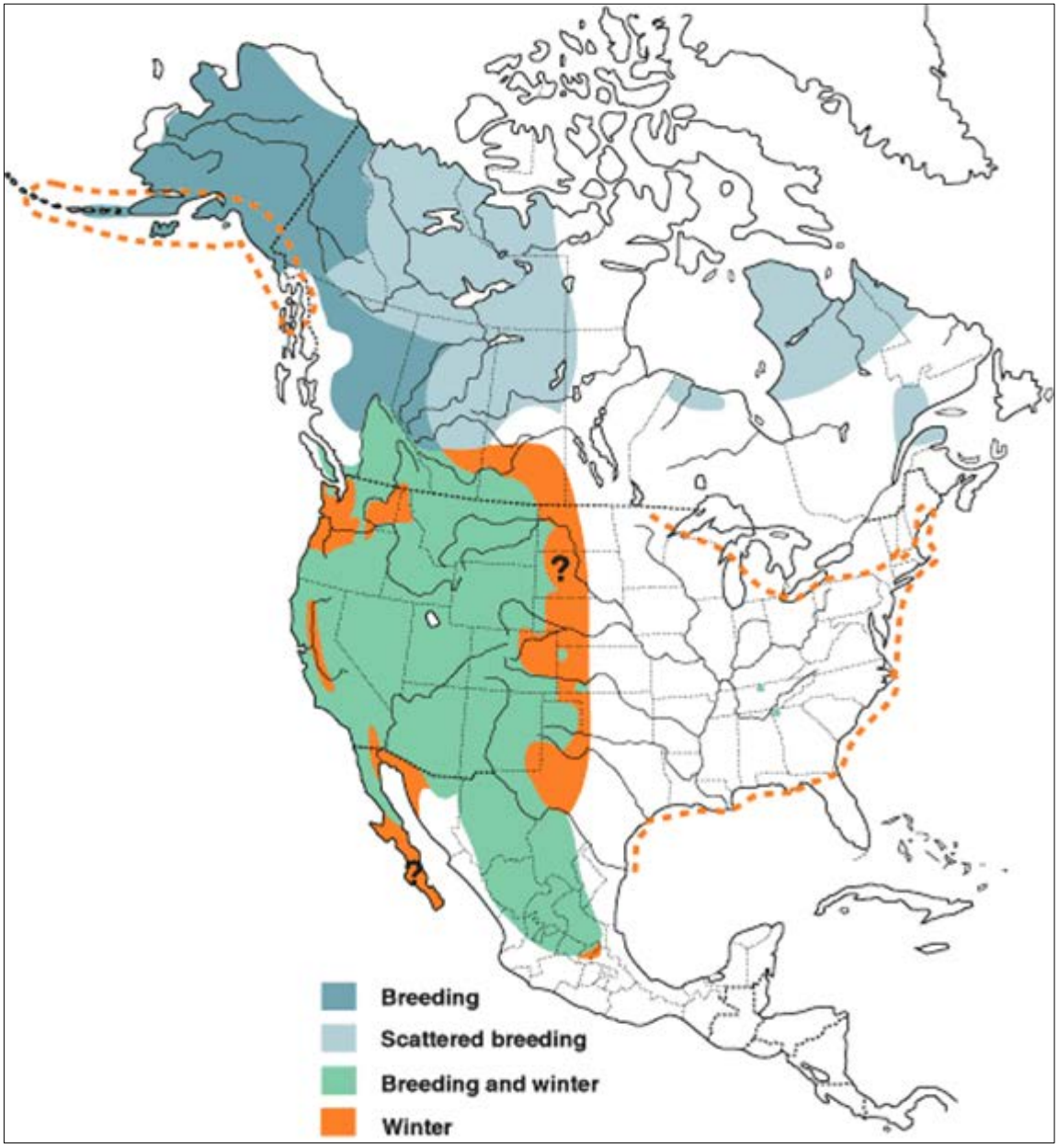


Figure 3-12. North American range map of the golden eagle, from Kochert et al. (2002). The distribution is better understood now than in 2002, when this figure was drafted. For example, golden eagles are now known to winter in greater numbers in the eastern United States than implied here.

3.3.1.2 Population

Golden eagles are listed as a BCC because of their assessment score, which is based on "population trend, threats, distribution, abundance and the importance of an area to a species" (USFWS, 2008a). Golden eagles are included in five out of 35 BCRs (not including other U.S. Pacific Islands, and U.S. Caribbean Islands where they do not regularly occur): BCR 9, 16, 17, 18, and 35. Golden eagles are considered BCC in Service regions 2 and 6.

As described above for the bald eagle, a team of Service biologists began working in February 2015 to assemble relevant scientific data and conduct analyses in support of the PEIS. This information is summarized in the Service document titled "Bald and Golden Eagles: Population demographics and estimation of sustainable take in the United States, 2016 update" (USFWS, 2016). In the following sections we summarize some of the key relevant findings from that document for the golden eagle, but we refer the reader to that document and to the previous discussion for the bald eagle for additional details not repeated here.

Demographic Rates and Characteristics

Survival

USFWS (2016) reported that annual survival varied by age class for the golden eagle. Estimated annual survival rates by age class are reported in Table 3-5.

Table 3-5. Golden eagle annual survival rate estimates, 1968–2014, from USFWS (2016).

	Estimate	Lower 95% Credible Interval	Upper 95% Credible Interval
Annual Survival			
HY	0.70	0.66	0.74
SY	0.77	0.73	0.81
TY	0.84	0.79	0.88
ATY	0.87	0.84	0.89
Recovery Probability	0.06	0.06	0.07

Note: Abbreviations are HY = hatching-year; SY = second-year; TY = third-year; ATY = after-third-year.

Causes of Mortality

USFWS (2016) reported data from 386 satellite-tagged golden eagles provided by collaborators over the period 1997–2013. This data set was used to estimate the relative importance of various mortality factors for golden eagles. Radio- and satellite-tagged raptors are an important source of less biased information on causes of mortality than leg bands, for which recovery probability varies by the type of death (e.g., raptors struck by vehicles are more likely to be re-encountered than raptors that die of starvation; Kenward et al., 1993). Anthropogenic factors accounted for 56% of all golden eagle mortality, and resulted in an overall increase in the

annual mortality rate of about 10% (Table 3-6). Importantly, the proportion of golden eagle mortality caused by humans increased with age.

Table 3-6. Estimated annual golden eagle survival rates with/without anthropogenic mortality, from USFWS (2016).

	Age Class		
	First Year	**Subadult**	**Adult**
Cause-of Death			
Anthropogenic	0.34 (0.23–0.46)	0.57 (0.32–0.81)	0.63 (0.44–0.80)
Natural	0.66 (0.54–0.77)	0.43 (0.19–0.68)	0.37 (0.20–0.56)
Survival Rate			
With only natural mortality	0.80 (0.76–0.85)	0.92 (0.86–0.96)	0.93 (0.89–0.96)
With all mortality	0.70 (0.66–0.74)	0.80 (0.77–0.83)	0.87 (0.84–0.89)

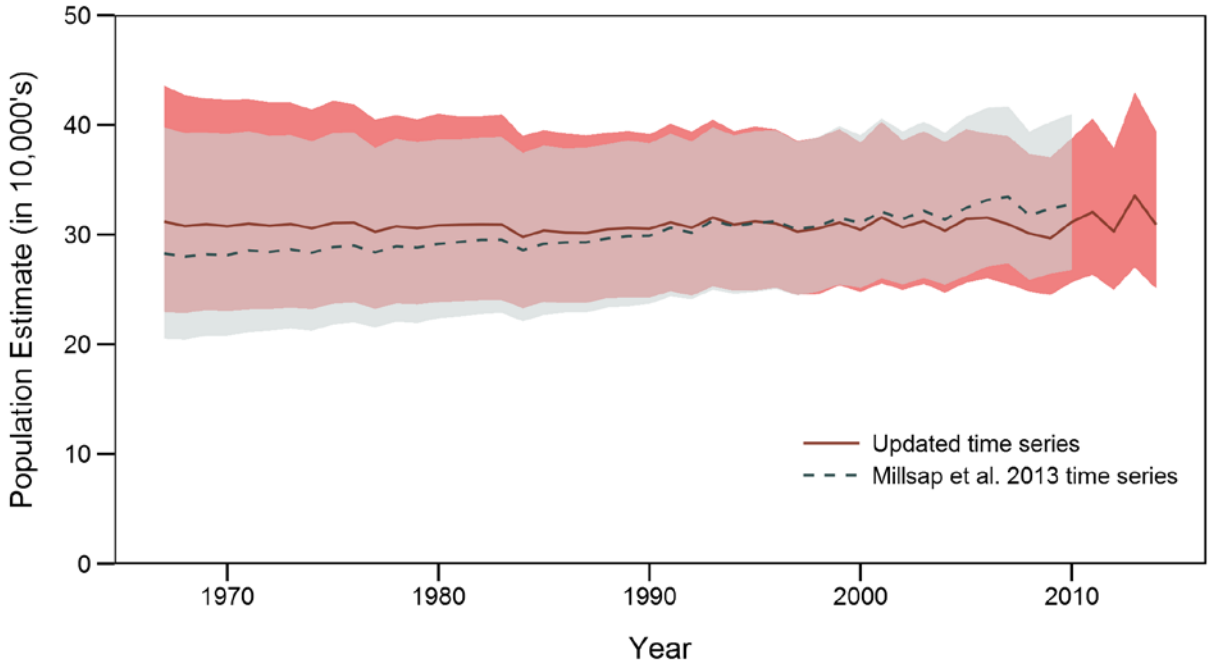
Major causes of golden eagle deaths were (1) starvation, which was largely restricted to eagles in their first year; (2) illegal poisoning; (3) illegal shooting; (4) intra-specific fighting; (5) collisions with power distribution lines, vehicles, and wind turbines; and (6) electrocution (USFWS, 2016, Table 8). This differs from the importance of different mortality factors in a sample of 1,427 golden eagles necropsied at the USGS National Wildlife Health Center (NWHC) from 1975–2013; in that sample trauma (likely from collisions) accounted for most deaths, followed by electrocutions (Russell and Franson, 2014). However, golden eagles analyzed at the NWHC were opportunistically found individuals, thus that sample was probably biased in favor of causes of death most likely to be detected.

Productivity

USFWS (2016) summarized estimates of golden eagle productivity from 12 study areas in the U.S. over the period 1995–2014. That analysis did not suggest any strong regional differences in productivity, and yielded an estimated mean productivity for the entire U.S. of 0.55 (95% credible intervals 0.40–0.75) young fledged per breeding season per occupied nesting territory.

Population Size

USFWS (2016) updated estimates of golden eagle population size and trend for the western United States for the period 1967–2014, using a model that integrated data from a late summer aerial transect survey of golden eagles conducted annually since 2006 (Nielson et al., 2014) with BBS counts; see Millsap et al. (2013) for more details on this approach. The updated analysis indicated a late summer population averaging 31,000 (20^{th} quantile = 29,000) over the most recent decade (Figure 3-13 in this PEIS and Figure 7 in USFWS, 2016), and total coterminous western U.S. population of 30,000 (20^{th} quantile = 27,000) for 2009.



Note: Gray shading is the 95% credible interval for estimates from Millsap et al., 2013. Red shading is the 95% credible interval for the updated time series.

Figure 3-13. Comparison of time series for golden eagle population estimates in the western U.S., from USFWS (2016).

For Alaska, in 2014 and 2015 the Service funded aerial transect surveys over the same four-BCR area of the interior west in January to estimate midwinter population size (Nielson and McManus, 2014; Nielson et al., 2015). Golden eagles from natal areas above 60 degrees N latitude are usually migratory, as are many individuals from the subarctic regions of Canada and Alaska (Kochert et al., 2002; McIntyre et al., 2008, 2012). Thus, the mid-winter population in the survey area includes resident birds that remain in the coterminous U.S. year-round and migrants that occur at more northern latitudes in the summer, but migrate into the coterminous U.S. for the winter. USFWS (2016) used the increases in counts from late-summer to mid-winter to provide a lower bound on the size of the northern migratory population of western golden eagles. That difference was 4,000 (95% confidence interval = 3,800–4,100) in 2013–2014, and 17,000 (95% confidence interval = 14,900–20,200) in 2014–2015. USFWS (2016) noted that this mid-winter survey has not been conducted frequently enough to evaluate the meaning and significance of the annual variability in the change in numbers of eagles between late summer and winter, but these are the first data that allow approximation of the size of the high-latitude migratory golden eagle population in western North America.

USFWS (2016) assumed the presumed northern migrant golden eagles are originating from natal areas in Canada (west of the 100th meridian) and Alaska in proportion to the relative area of those regions (76% Canada, 24% Alaska). Based on this, USFWS (2016) concluded that in 2013–2014 and 2014–2015, around 1,000–4,000 mid-winter migrant golden eagles originated from Alaska. Additionally, based on comments received on the Draft PEIS from the Alaska Department of Fish and Game, we increased these estimates by 25% to account for Alaskan golden eagles that do not winter in the coterminous U.S. The Service used the larger estimate (5,114) as the population size for Alaska for the liberal PEIS alternatives, and the midpoint (3,180) as the population estimate for the conservative PEIS alternatives. In comparison, in 2009, the Service coarsely estimated the size of the Alaskan golden eagle population at 2,400 individuals (USFWS, 2009a).

Golden eagles occur frequently in the eastern United States, primarily as winter migrants from breeding and natal areas in northeastern and northcentral Canada (Morneau et al., 2015). Recently, the size of this population has been estimated at 5,000 (20th quantile = 4,000) (Dennhardt et al., 2015).

USFWS (2016) pooled estimates for the western United States, Alaska, and eastern U.S. populations to obtain an estimate of the total U.S. golden eagle population size in 2014 for the purpose of computing contemporary take limits, as reported in Table 3-7. USFWS (2016) used this same approach, but with the 2009 population size estimate for the coterminous western U.S., to set the population objective for the golden eagle at 39,000 (20th quantile = 34,000).

Population Trajectory

The updated summer golden eagle population trend for the coterminous western U.S. from USFWS (2016) did not differ substantially from the trend reported by Millsap et al. (2013), with an annual rate of change of 1.0 (95% credible interval = 0.99–1.01) over the most recent decade (Figure 3-13 and Figure 7 in USFWS, 2016). USFWS (2016) projected golden eagle populations forward using a population projection model and demographic rates reported above; that annual rate of change averaged 0.998 (95% confidence interval 0.997–0.999), and suggested that golden eagle numbers in the U.S. might be gradually decreasing toward a new, lower equilibrium population size of around 26,000 individuals (Figure 3-14 and Figure 8 in USFWS, 2016). USFWS (2016) pointed out that 95% confidence limits for the demographic model projection broadly overlap the 95% credible intervals for the composite model projection, so the results are generally consistent despite their differing ramifications. However, USFWS (2016) noted that the demographic projections were consistent with the expected effect of the high rate of anthropogenic mortality observed, and that together these support the interpretation that golden eagle populations are either declining slightly or in the early stages of a decline. As noted previously, with respect to interpretation of projection model trends, the validity of future predictions is dependent among other things on continuation of the biological and ecological conditions under which the vital rates were estimated. The predictions reported

here do not take into account conditions that might develop in North America as a result of factors described in *Chapter 4, Cumulative Impacts*.

Table 3-7. Estimated total golden eagle population size in 2014 at the median (*N*) and 20th quantile (N_{20th}) by potential EMU, from USFWS (2016).

Management Unit	*N*	N_{20th}	*h*	h_{20th}	*H*	H_{20th}	Source
Alaska	5,144	3,180	≈0	≈0	0	0	Nielson et al. 2014, 2015; Alaska Department of Fish and Game
Eastern	5,122	4,002	≈0	≈0	0	0	Dennhardt et al., 2015
BCR 5	189	114	≈0	≈0	0	0	USFWS, 2016
BCR 9	6,596	5,682	≈0	≈0	0	0	USFWS, 2016
BCR10	5,675	4,851	≈0	≈0	0	0	USFWS, 2016
BCR11	836	519	≈0	≈0	0	0	USFWS, 2016
BCR 15	72	38	≈0	≈0	0	0	USFWS, 2016
BCR 16	4,258	3,585	≈0	≈0	0	0	USFWS, 2016
BCR 17	9,837	8,091	≈0	≈0	0	0	USFWS, 2016
BCR 18	1,459	1,091	≈0	≈0	0	0	USFWS, 2016
BCR 32	718	549	≈0	≈0	0	0	USFWS, 2016
BCR 33	418	247	≈0	≈0	0	0	USFWS, 2016
BCR 34	411	229	≈0	≈0	0	0	USFWS, 2016
BCR 35	786	528	≈0	≈0	0	0	USFWS, 2016
Atlantic/Mississippi	5,122	4,002	≈0	≈0	0	0	Dennhardt et al., 2015
Central Flyway	15,327	13,210	≈0	≈0	0	0	USFWS, 2016
Pacific Flyway	15,927	14,437	≈0	≈0	0	0	USFWS, 2016
Total (U.S. west)	36,368	30,827			0	0	
Total (contiguous U.S. and Alaska)	41,490	34,829			0	0	

Note: Population size is presented at the median (N) and 20th quantile (N_{20th}) by potential eagle management unit (EMU). Estimated sustainable take rates (h) and take limits (H) are also presented with the median and 20th

quantile for each EMU. Take rates and limits are constrained so as to maintain an equilibrium size as least as large as N (or N_{20th}).

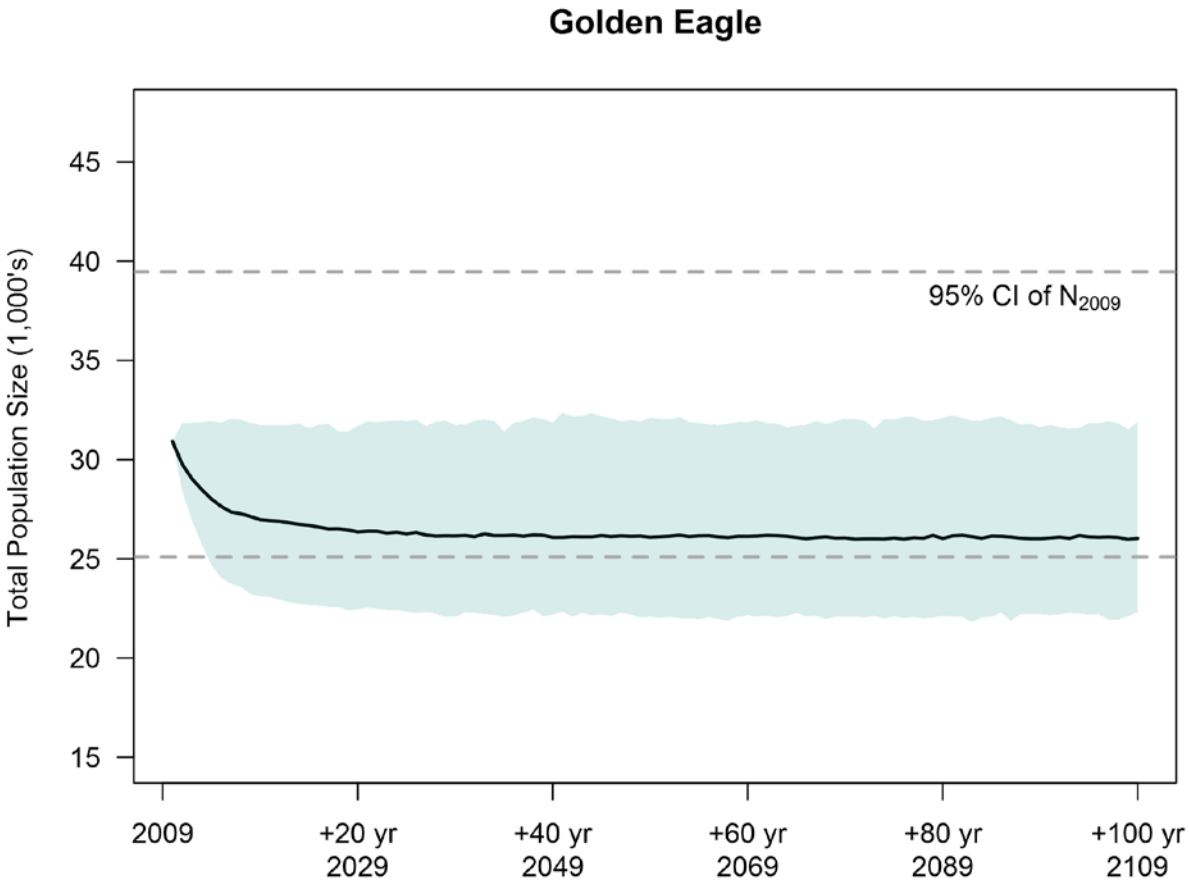


Figure 3-14. Golden eagle population projection from 2009 to 2109 for the western contiguous United States.

Management Unit Comparison

USFWS (2016) used band recovery data to assess whether the EMU configurations under consideration differed in terms of capturing golden eagle movements across seasons and life stages. USFWS (2016) reported that 73% (range = 0%–86%) of golden eagles were banded and recovered in the same 2009 EMU compared to 84% (range = 50%–87%) within the same flyway EMU.

3.3.1.3 Disturbance

As with bald eagles, where a human activity agitates or bothers golden eagles to the degree that causes injury or substantially interferes with breeding, feeding, or sheltering behavior and causes, or is likely to cause, a loss of productivity or nest abandonment, the conduct of the

activity constitutes a violation of the Eagle Act's prohibition against disturbing eagles (see 50 CFR 22.3). The Service has not developed specific guidelines for management of disturbance of golden eagles, but many of the concepts and management considerations in the NBEMG apply generally to golden eagles as well. One notable difference is that golden eagles have not demonstrated the same level of adaptation to human disturbance and land-use conversion that bald eagles have, and as a consequence the effects of habitat loss and disturbance may be having more substantial population-level effects on golden eagles (Kochert and Steenhof, 2002). There is documentation in the literature of relatively minor human activities in the vicinity of golden eagle nests causing nest abandonment or death of young (Boeker and Ray, 1971; Suter and Jones, 1981; Stedl et al., 1993; Colorado Division of Wildlife, 2008).

3.3.2 Environmental Consequences

3.3.2.1 General Considerations

The methods and approach used for golden eagles are the same as for bald eagles, so this section will just present the results and conclusions particular to the golden eagle.

Take Limits at the Scale of EMUs

USFWS (2016) used the same PBR model as described earlier for the bald eagle to estimate sustainable take rates for golden eagles. That analysis showed that while golden eagles could likely sustain take rates of around 10%, existing levels of unpermitted take were essentially at that level, thus there was no capacity for additional unmitigated take given the objective of maintaining stable populations at 2009 levels (USFWS, 2016). Consequently, the Service has concluded that the appropriate take rate for golden eagles is zero (Table 3-7 in this PEIS and Table 11 in USFWS, 2016), as was the case in 2009.

This analysis suggested the comparatively high observed mortality rate, particularly for adult golden eagles, is likely constraining population size to an equilibrium level well below what might otherwise be the case. Adding further unmitigated mortality would likely cause golden eagles to decrease to a lower population size, and would thus be incompatible with the Service's population objective for this species.

Take as a Result of Nest Disturbance

As noted above, for disturbance to have a population-level effect, it has to result in a loss of potential productivity. Following the approach described for the bald eagle, USFWS (2016) concluded that for each instance of nest disturbance predicted to result in loss of productivity, take limits for golden eagles should be reduced by 0.54 (50^{th} quantile) or 0.59 (80^{th} quantile), respectively.

Take as a Result of Territory Loss

Loss of an occupied nesting territory results in the recurring loss of annual production from that territory. As with the bald eagle, USFWS (2016) used the mean of the fertility rate schedule

from the matrix demographic models (effectively the mean age of breeders in the population) as the generation time. Golden eagle generation time is 11 years. The corresponding debits to take limits by EMU are given in Table 14 of USFWS (2016).

Take Limits at the Scale of the Local Eagle Population

As noted earlier, the Service (USFWS, 2013a) identified LAP take rates above 1% as being of concern, and rates of 5% being at the maximum of what should be considered (and under Alternatives 4 and 5, the maximum allowed unless further analysis shows higher take to be compatible with the preservation of bald or golden eagles). The take authorized (within the LAP take limits) is in addition to the average background rate of anthropogenic mortality—for golden eagles, this is about 10%. Thus, total anthropogenic mortality for a golden eagle LAP experiencing the maximum permitted take rate of 5% is likely about 15%. As part of the LAP analysis for golden eagles, Service biologists also consider available information on unpermitted take occurring within the LAP area; evidence of excessive unpermitted take warrants careful evaluation and will be taken into consideration during the permitting process.

To understand the potential consequence to the LAP of authorizing take up to the levels of the LAP take limits, USFWS (2016) conducted a series of simulations using its demographic models to add a 5% take-rate to background take levels for a hypothetical LAP of the golden eagle. Researchers looked at hypothetical large and small project footprints in high- and low-density EMUs. For the golden eagle, adding 5% take results in a decline in the LAP and eventually lowers the equilibrium as much as 80% (Figure 3-15 in this PEIS and Figure 10 in USFWS, 2016). However, the LAP was not extirpated in the scenarios considered.

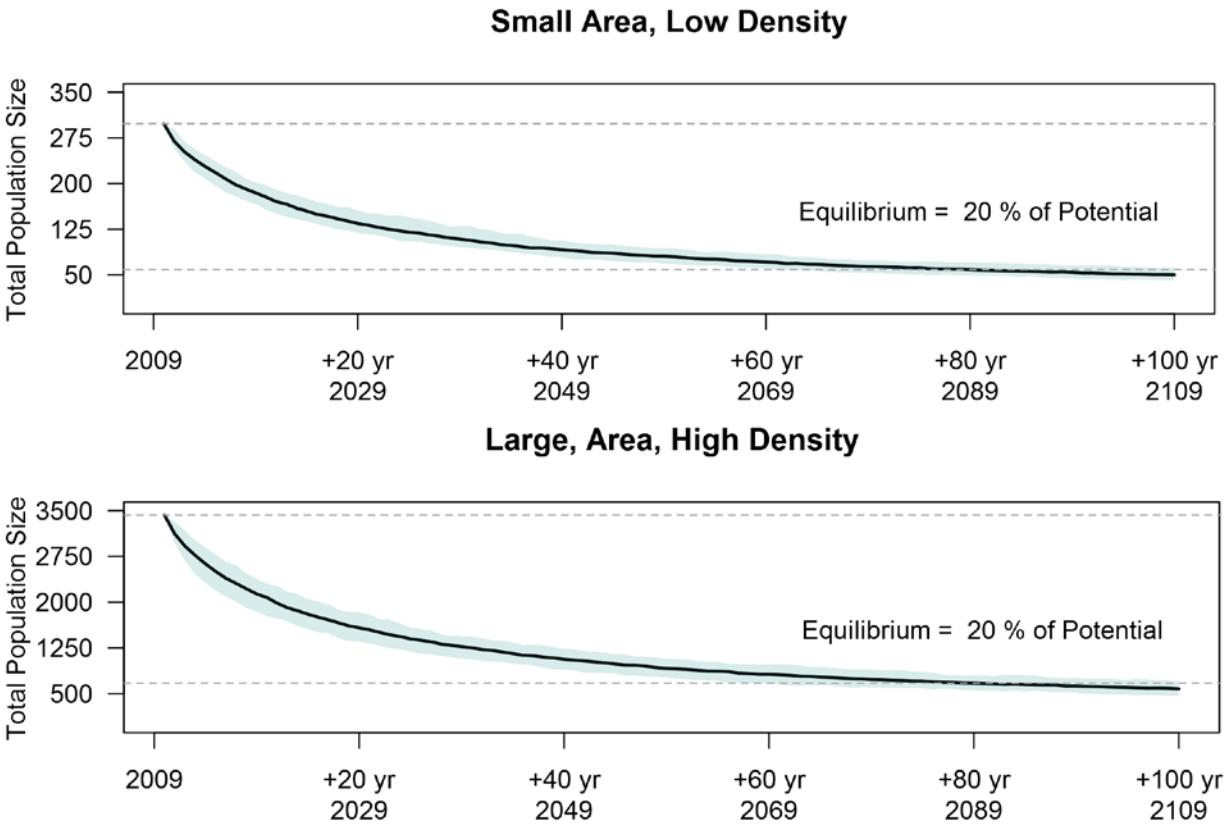


Figure 3-15. Effect on golden eagle LAPs of a 5% increase in the take rate, from USFWS (2016).

The Role of Offsetting Compensatory Mitigation

In the case of the golden eagle, under any of the PEIS alternatives, essentially all permitted take must be offset, most of all under Alternative 5, which requires compensatory mitigation to be assessed at a greater than 1:1 ratio. Thus, the factor that most limits how much golden eagle take can be permitted is the amount of ongoing unpermitted take or natural mortality that can reasonably be expected to be offset. This has proven a demanding objective to actually accomplish, partly because of the difficulty in quantifying the real effects of conservation actions in reducing mortality. The best understood existing mortality source is electric distribution power line retrofitting to reduce electrocutions (APLIC, 2006 and 2012; USFWS, 2013b). Although the Service considers and is working with partners to test other offsetting compensatory mitigation methods, power line retrofits remain the approach that has the most promise and least risk (USFWS, 2016).

Based on the available data on cause-specific mortality rates, USFWS (2016) estimated that about 500 (20th quantile = 280) golden eagles are electrocuted annually in the U.S. (Table 3-7 in this PEIS and Table 9 in USFWS, 2016). Power line retrofitting is not 100% effective and may not

be possible everywhere take authorization is needed for golden eagles, so the actual number of permitted golden eagle fatalities that could be offset annually by reducing electrocutions is likely somewhat less than 500. This highlights the need to develop quantifiable measures for reducing other forms of golden eagle mortality (e.g., lead bullet replacement, removal of carrion from highways), an activity that several non-governmental organizations are pursuing currently (e.g., Cochrane et al., 2015)

As with bald eagles, the Service continues to believe that compensatory mitigation for golden eagles should be undertaken in the same EMU where the take is authorized (USFWS, 2013a), with exceptions taking into account that migrating or wintering eagles originating from other EMUs might also benefit from mitigation outside their natal EMU.

Population Monitoring

As noted previously, the take limits are time sensitive and require regularly updated estimates of population size. The population monitoring schedule described previously in this PEIS and in detail in USFWS (2016) would result in updated estimates of golden eagle population size and status every six years.

3.3.2.2 Effects of All the Alternatives

All the alternatives would have both direct and indirect effects. Direct impacts are those caused by issuing a particular permit, such as any changes to the applicant's proposed project stemming from the permit application process, including negotiating the permit's terms and conditions and ensuring compliance with the regulations, and the application of the actual permit terms and conditions, such as any required eagle conservation measures and compensatory mitigation that would offset predicted take in excess of EMU limits. Indirect impacts could result from implementing a given project, including any indirect effects of compensatory mitigation.

The duration of impacts would be long term, likely lasting a decade or more, until such time as revised population estimates are available and the management approach and regulations are subsequently revised and take effect. The extent of the effects would extend throughout all EMUs; that is, they would be nationwide.

3.3.2.3 Alternative 1: No Action

Under the No-Action alternative, described fully in *2.2 Alternative 1: No Action*, the current management objective would be continued: that is to manage golden eagle numbers consistent with the goal of stable or increasing breeding populations. No new permitted take of golden eagles, without offsetting compensation, would be allowed anywhere in the country under the No-Action alternative. Under the No-Action alternative, no incidental take permits could be issued east of the 100th meridian—in other words, in the eastern United States no take of golden eagles could be permitted. The LAP analysis would be encouraged but not required.

The current BCR-based EMUs maintained under the No-Action alternative and Alternatives 2 and 3 would not account as thoroughly for the full annual movement and migratory cycle of the golden eagle, and thus would not provide Service managers and incidental take permit application analysts with the most accurate information on actual eagle population distribution. The current EMU configuration means a higher percentage of eagles taken would be of individuals that actually derive from a different EMU, and are therefore not directly accounted for in that EMU's take limit. The inability, under the No-Action alternative, to issue incidental take permits for golden eagles east of the 100th meridian, does not prevent most potentially harmful projects from proceeding, but rather precludes the Service from interacting with permit applicants/permittees and imposing compensatory mitigation requirements that could benefit the golden eagle by reducing overall mortality within an EMU and nationally.

By not requiring application of the LAP analysis, this alternative could potentially allow large, high-take projects to result in mortality that exceeds 5% of a LAP.

By restricting the duration of incidental take permits to five years, the No-Action Alternative (as well as Alternatives 2 and 4) might slightly increase the potential for public scrutiny at the time of permit renewal because a few permits for which substantial changes in operation or new information is available might require additional NEPA analysis at the time of renewal. However, most renewals would not require incorporation of substantial new information, and thus not trigger the need for additional NEPA. Therefore, the actual potential for increased public input under the No-Action Alternative (and Alternatives 2 and 4) is minor.

Retaining the five-year duration limit could also result in greater environmental and /or socioeconomic impacts at the permit renewal stage after the 5-year initial permit term elapses than at the equivalent 5-year review stage of a long-term permit under Alternatives 3 and 5. A long–term permit would incorporate adaptive management conditions designed to reduce the long-term effects of the project, whereas a 5-year permit would not require such conditions. Therefore, if conditions change significantly after the first 5 years of a permitted long-term project's operation, the probability that major unforeseen changes to the project or permit conditions would be required to maintain compliance with the incidental take permit regulations is much higher under the No Action Alternative (and Alternatives 2 and 4) than at the equivalent 5-year review stage of a long-term permit under Alternatives 3 and 5.

The No-Action alternative would not resolve the problem of unpermitted, unauthorized take and relatively high overall levels of anthropogenic mortality that may be causing golden eagle populations to decline. Under the No-Action alternative, future golden eagle populations would likely approximate the projection shown in Figure 3-14—that is, trending downward toward an equilibrium population size not only well below the estimated theoretical carrying capacity for the U.S., but also potentially below the population objective.

Overall, the effects of the No-Action alternative on golden eagle populations according to the definitions shown in *3.1 Methodology* would be moderately adverse. This is because the

management approach and rule revisions associated with the No-Action alternative would be insufficiently aggressive to arrest or reverse the possible decline in the nationwide golden eagle population shown in Figure 3-14.

3.3.2.4 Alternative 2: Current EMUs, Liberal Take Levels

Alternative 2, described fully in *2.4 Alternative 2: Current EMUs, Liberal Take Levels*, would also aim to manage golden eagle numbers consistent with the goal of stable or increasing breeding populations over 100 years. As to EMUs, Alternative 2 would use BCRs west of the 100th meridian; the BCRs east of the 100th meridian would be combined into one EMU. Permitted take per EMU would be zero, unless offset with mitigation measures. The BCR-based EMUs retained under Alternative 2 likely would not account for the full annual movement and migratory cycle of the golden eagle, with the result that compensatory mitigation is less likely to affect eagles in the same EMU as Alternatives 4 and 5. LAP analysis would be encouraged but not required, with the same effects as under Alternative 1.

Like the No-Action alternative, Alternative 2 would likely be unable to meet the management objective of providing for stable or increasing golden eagle populations in any of the EMUs, or at the national scale, over the coming century. The amount of permitted take (which would always require compensatory mitigation) would be small compared to aggregate, unpermitted anthropogenic mortality, which appears to be driving the golden eagle population downward. With regard to mitigation, as with the No-Action alternative, compensatory mitigation under Alternative 2 is designed to offset take for golden eagles at a 1:1 ratio. Unlike the No-Action alternative, compensatory mitigation would not be limited to actions that have been fully analyzed and metrics to adjust for risk would be applied. Compensatory mitigation could consist of a variety of experimental measures under this alternative, so long as they are expected to offset permitted mortality and are calibrated to account for relative risk posed by the uncertainty. Establishment and promotion of mitigation banks could potentially allow for greater benefits than the No-Action alternative, dollar for dollar, because funds would be leveraged and targeted where most needed.

Overall, the effects of Alternative 2 on golden eagle populations according to the definitions shown in *3.1 Methodology* would be moderately adverse. Like the No-Action alternative, Alternative 2 would be unlikely to resolve the problem of unpermitted take and relatively high overall levels of ongoing anthropogenic mortality. Thus, Alternative 2 would not allow for attainment of the management objective of stable or increasing golden eagle populations over the coming century.

The magnitude of the adverse impacts on golden eagle populations from Alternative 2 would be similar to Alternative 1, but slightly smaller due to the expected conversion of some existing and potential unauthorized take to authorized take and the resulting implementation of conservation measures. That effect is expected because of regulatory revisions that would make permit coverage possible in the eastern United States and more attractive throughout the

country, including the elimination of the "unavoidable" standard that currently applies to programmatic permits and application of the standard that impacts must be avoided and minimized to the full extent practicable.

3.3.2.5 Alternative 3: Current EMUs, Conservative Take Levels

Alternative 3, described fully in *2.5 Alternative 3: Current EMUs, Conservative Take Levels, Permit Duration Increase*, like Alternative 2, would retain the use of BCRs west of the 100th meridian, and BCRs east of the 100th meridian would be combined into one EMU. Permitted take per EMU would be zero, unless offset with mitigation measures. The LAP analysis would be encouraged but not required under Alternative 3 with the same effects as under Alternatives 1 and 2.

Under Alternative 3, the maximum permit duration for incidental take permits would be extended to 30 years, with five-year evaluations of fatality rates, compensatory mitigation levels, and efficacy of measures to lower risk to eagles. The intended and expected result would be that more project proponents are likely to seek permit coverage than under Alternatives 1 and 2, because the availability of longer-duration incidental take permits provides greater certainty that longer-term projects would remain authorized over the lifetime of the project. If permitted, those projects would incorporate avoidance and minimization measures that otherwise would not have been implemented.

This alternative includes a requirement that every permit must be accompanied by a minimum level of compensatory mitigation separate and distinct from compensatory mitigation to offset take above the take EMU take limit. In spite of additional emphasis on mitigation, Alternative 3 is still not likely to resolve the problem of unpermitted take and the existing high levels of anthropogenic take because the wider range of mitigation options that could be implemented through the additional mitigation requirement of Alternative 3 is likely to result in mitigation through habitat preservation and other measures that do not address human-caused mortality. Without greater emphasis on compensatory mitigation directed at unpermitted take, and additional measures to protect golden eagles from cumulative effects at more local levels, the potential population declines are unlikely to be more than moderately abated.

Overall, the effects of Alternative 3 on golden eagle populations would be moderately beneficial compared to the No-Action Alternative, but still would not meet the Service's management objectives, and would be minor to moderately adverse in terms of achieving the management goal.

3.3.2.6 Alternative 4: Flyway EMUs, Liberal Take Levels

Alternative 4, described fully in *2.6 Alternative 4: Flyway EMUs, Liberal Take Levels*, would implement flyway EMUs for golden eagles; permitted take per EMU would be the same as under all Alternatives: zero unless offset. Duration of incidental take programmatic permits

would be five years, while LAP cumulative effects analysis would be incorporated into the regulations.

The flyway EMUs (with the Mississippi and Atlantic flyways combined as a single EMU) proposed under Alternatives 4 and 5 would more thoroughly account for the full annual movement and migratory cycle of the golden eagle.

The Eagle Act's Preservation Standard (the Service's management objective) would be defined in the regulations to mean "consistent with the goal of maintaining stable or increasing regional breeding populations, and the persistence of local populations, throughout the geographic range of each species." Analysis of Service-authorized take within the LAP would be required and the permit would not be issued if authorized take would exceed 5% of the estimated total LAP size, unless the Service can demonstrate through additional analysis that permitting take over 5% of that LAP is compatible with the preservation of eagles. By requiring application of the LAP analysis, this alternative would better conserve golden eagle populations on a local scale.

However, like the previous alternatives, Alternative 4 would not resolve the potential problem of ongoing, unpermitted take exceeding sustainable limits. Thus, Alternative 4 would not facilitate the attainment of the Service's management objective of stable or increasing golden eagle populations over the coming century.

Overall, the effects of Alternative 4 on golden eagle populations would be beneficial compared to Alternatives 1 and 2 and may be comparable to Alternative 3, though the impacts would stem from different factors. The proposed management approach and revisions to the regulations associated with Alternative 4 would, as under Alternatives 1 through 3, likely be insufficient to arrest the potential future decline in the nationwide golden eagle population projected in Figure 3-14.

3.3.2.7 Alternative 5: Flyway EMUs, Conservative Take Levels (Preferred Alternative)

Alternative 5, described fully in *2.7 Alternative 5: Flyway EMUs, Conservative Take Levels, Permit Duration Increase (Preferred Alternative)*, like Alternative 4, would adopt flyway EMUs for golden eagles (with the Mississippi and Atlantic flyways combined as a single EMU). As in the other Alternatives, all take would require offsetting compensatory mitigation. As with Alternative 4, the cumulative LAP analysis would be required when reviewing permit applications and the Preservation Standard would be modified to incorporate more protection at the local scale. The maximum length of a programmatic incidental take permit under this alternative would be extended to 30 years, with the same provisions that would be required under Alternative 3.

The beneficial impacts from Alternatives 3 and 4 would also result from Alternative 5, with the exception of the effects that would occur under Alternative 3 from the requirement for a minimum level compensatory mitigation for every eagle incidental take permit.

Alternative 5, however, would address in two ways the problems of unpermitted take and relatively high overall levels of anthropogenic mortality that preclude the Service from attaining its management objective for golden eagles under the other alternatives. First, longer permit duration is expected to have the effect of converting a greater amount of existing and future unauthorized take to authorized take than the other alternatives, and thereby result in more avoidance, minimization, and compensatory mitigation. Second, and more important, the offsetting mitigation ratio would be greater than 1:1; thus, some of the currently unsustainable, unpermitted take would be addressed through management actions undertaken as compensatory mitigation required by take permits.

Under Alternative 5, future golden eagle populations may stabilize or increase in contrast to the projection shown in Figure 3-14. That is, they may come closer to achieving an equilibrium population size that is close to the Service's management objective. This outcome would be achieved both by incentivizing greater participation by developers and project proponents to apply for permits, and by requiring a more aggressive mitigation ratio, greater than 1:1, thereby not only offsetting the authorized take, but at the same time reducing the factors that are currently limiting golden eagle population size.

Overall, these effects of Alternative 5 on golden eagle populations are expected to be minor to moderately beneficial.

3.4 EAGLE HABITAT

3.4.1 Affected Environment

Bald and golden eagles both range over large geographic areas and use a variety of habitats. Bald eagles are typically found near bodies of water such as the shorelines of lakes, rivers, and coastal areas, whereas golden eagles tend to occupy the more mountainous terrain and open, arid areas typical of the western U.S. (USFWS, 2009a). Both eagle species may adjust habitat use based on the time of year (e.g., breeding, migration, wintering), prey availability, nesting territory availability, and disturbance (Buehler, 2000; Kochert et al., 2002). When combined, the habitat used by bald and golden eagles includes most of the U.S. (USFWS, 2009a). A detailed description of eagle habitat of this large area is beyond the scope of this PEIS; however, general habitat characteristics are described for each species. Additionally, a summary of some factors of eagle habitat that may be related to population effects are discussed.

3.4.1.1 Bald Eagle Habitat

Bald eagles generally nest in mature trees or snags in forested areas near bodies of water that offer foraging opportunities (Buehler, 2000). They do nest on cliffs and on the ground in areas where there are no trees, but rarely. They also nest with increasing frequency on human-made structures such as power poles and communication towers (Millsap et al., 2004). Forest size and structure, quality of foraging areas (distance, prey diversity, and availability), and low human

disturbance are key habitat factors that influence the selection of nesting territories (Buehler, 2000; Livingston et al., 1990).

Migrating and wintering bald eagles can be highly social, frequently gathering in large numbers in areas near open water or other areas rich in food resources such as freshwater and saltwater fishes, waterfowl, turtles, rabbits, snakes, and other small animals and carrion (Buehler, 2000; Mojica et al., 2008; USFWS, 2009a). Recent studies show that bald eagles use networks of communal roosts strategically associated with foraging areas, and individuals may move daily between regional roosts (Watts and Mojica, 2015).

Habitat Factors

Habitat loss and human encroachment from development continue to be factors for bald eagles (USFWS, 2009a). For example, some of the states with the highest numbers of bald eagles (in particular Florida, Washington, and Virginia; Appendix A3 in USFWS, 2016) have also experienced high rates of housing unit development from 2010 to 2013 (USCB, 2014). Of the 25 geographical locations ranked highest in housing unit development, 10 states also have high numbers of bald eagles (Table 3-8).

However, many of the fastest-growing counties still have relatively low human population densities and low counts of bald eagles. Bald eagle numbers in most of the United States are increasing or stable (USFWS, 2016), so while there may be impacts to individuals in local areas due to development, the Service does not believe development has caused adverse impacts to overall bald eagle populations so far (USFWS, 2009a).

Table 3-8. States with high concentrations of bald eagles ranked by degree of housing unit development, from USCB (2014).

Rank	State
3	Florida
6	Colorado
7	Idaho
8	Virginia
10	North Carolina
14	Maryland
17	Georgia
18	Indiana
21	Washington
23	Louisiana

Although bald eagle populations are stable or growing throughout the United States (USFWS, 2016), the loss of high-quality, unprotected habitat could ultimately limit population size in many areas (Buehler, 2000; Fraser et al., 1996). Potential threats to bald eagle habitat include:

urban development (in particular waterfront development due to loss of shoreline nesting, perching, roosting, and foraging areas), energy development (wind generation facilities, oil and gas development), commercial timber harvest, and other development (USFWS, 2009a; see *4.1.6 Loss and Fragmentation of Eagle Habitat* for further discussion). Much of the impact to bald eagles from habitat loss and fragmentation comes in the form of additional disturbance, which was discussed previously in *3.2.1.3 Disturbance*.

3.4.1.2 Golden Eagle Habitat

Golden eagles in the western United States breed in open or semi-open areas in a wide variety of habitats (e.g., tundra, shrubland, grassland, desert rimrock), but generally avoid urban and heavily-forested areas (Kochert et al., 2002). Golden eagles usually nest on rock ledges and cliffs, but also in large trees, steep hillsides or rarely on the ground (Kochert, 2002). Nesting territories are often associated with rugged terrain in suitable vegetation types with limited human development and healthy prey populations (Baglien, 1975; Craig and Craig, 1984; Millsap and Vana, 1984; Bates and Moretti, 1994). Golden eagles no longer breed in the eastern United States (Palmer, 1988), but continue to breed in in Northeastern and Northcentral Canada and migrate from there to wintering areas in the forested Appalachian Mountains and coastal bays and estuaries in the eastern U.S. (Katzner et al., 2012).

When migrating, golden eagles are associated with geographic features such as cliff lines, ridges, and escarpments, where they take advantage of uplift from deflected winds. They often forage over open landscapes, using lift from heated air (thermals) to move efficiently (USFWS, 2011a). Golden eagles can be found throughout much of the U.S. in the winter in a variety of habitats (sagebrush, riparian, grassland, and cliff areas), including grazed areas (Kochert, 2002; Marzluff et al., 1997). In the eastern U.S. they frequent areas that support large concentrations of waterfowl (Millsap and Vana, 1984; Wingfield, 1991) as well as relatively densely forested mountainous areas (Katzner et al., 2012).

Habitat Factors

Habitat loss and degradation due to encroachment from urbanization (e.g., Bittner and Oakley, 1999) and conversion of habitat to agricultural uses (Kochert et al., 2002) have negatively impacted areas historically used by golden eagles (USFWS, 2009a). Though golden eagle populations appear to have been stable over the past 40 years, factors negatively affecting survival may be having an impact now (USFWS, 2016).

Potentially key factors for golden eagles are prey densities and the availability of nest sites near suitable prey populations. Declines in populations of prairie dogs, a major prey species for golden eagles, have been suggested as a habitat-related factor affecting golden eagle populations (Kochert and Steenhof, 2002). Most of the remaining prairie dogs in the southern grasslands are associated with playas (seasonally wet depressions or dry lake beds), which are small and dispersed. Declines in white-tailed and black-tailed prairie dogs have led to declines

in availability of prey, which can reduce reproductive performance and survival of young golden eagles (USFWS, 2009a).

Another factor affecting golden eagle habitat has been the increasing number, frequency, and intensity of fires, particularly in the Intermountain West (Kochert et al., 2002). Over approximately the last 35 years, for example, fires have caused large-scale losses of jackrabbit habitat, negatively affecting the golden eagle nesting population at the Snake River Birds of Prey National Conservation Area (Kochert et al., 1999). Nesting success at burned territories declined after major fires and researchers observed a decrease in the number of nesting pairs due to abandonment of burned territories. There is evidence that the widespread abundance of non-native annual grasses has led to the establishment of a more frequent fire cycle in areas that had relatively low fire frequency historically. This issue is discussed further as a cumulative effect in *Chapter 4, Cumulative Impacts*.

Due to a large home range and ability to regularly make large-scale movements (Kochert et al., 2002), golden eagles are vulnerable not only to changes in local habitat condition, but also habitat fragmentation and the compounding of multiple threats across the landscape (see *4.1.6 Loss and Fragmentation of Eagle Habitat*). Energy development also affects golden eagle habitat. Surface coal mines have affected nesting sites in Wyoming, and subsidence from underground coal mines negatively affects nests associated with cliffs in Utah (USFWS, 2009a). Increased oil and gas (conventional and coal bed methane) development in Colorado, Montana, Utah, and Wyoming continues in areas centered within the golden eagle range in the lower 48 states. The degree to which these activities result in impacts to habitat, either temporarily or permanently, can vary by location of project, method of extraction, or success of reclamation. However, the introduction of new or improved roads into previously poorly-accessible golden eagle habitat is a common factor in most oil and gas development (USFWS, 2009a). Even if roads and well-pads are eventually reclaimed, the life of some field developments can extend for decades. In addition, reclamation times for vegetation (supporting prey and providing line-of-sight screening for nests) in semi-arid to arid areas where many golden eagles occur can be lengthy. Smith et al. (2010) provide an example of negative impacts of oil and gas development on breeding golden eagles in Wyoming and Utah.

The western United States, because of its combination of wide expanses of inexpensive real estate and high winds, has been the focus of extensive wind energy development. Installations of new wind turbine facilities increased the national wind energy-generation capacity, and three of the top five states in terms of capacity are in the western United States. Wind turbines pose a mortality risk to golden eagles (Pagel et al., 2013), and may negatively affect habitat quality if situated in golden eagle breeding or foraging habitat.

3.4.2 Environmental Consequences

There would be no direct adverse impacts to bald and golden eagle habitat from the authorization of take of eagles. Issuance of eagle take permits can indirectly result in adverse

impacts to eagle habitat from potential loss, alteration, and fragmentation of habitat, and reduced habitat values and suitability during implementation of permitted projects. The amount of habitat that is disturbed is a function of the size of a project, the amount of associated infrastructure, and the degree of disturbance that is already present at a site. These indirect, adverse impacts on eagle habitat may be negligible to major depending on the type and duration of the project, as well as the type of habitat in which it is located, i.e., negligible impacts in habitat that is already disturbed versus major impacts in habitat that is sensitive and previously untouched. These effects are considered indirect because impacts to habitat are not generally the result of authorizing eagle permits (although they can be direct if the permit covers take of a nest, includes conservation measures that involve ground-disturbing activities, or the permit application process results in alteration of the applicant's proposed project configuration). The impacts to biological and physical resources that occur from implementing a project are not authorized by the Service, thus an eagle incidental take permit is not the direct cause of habitat degradation.

For eagle permits in which take would exceed EMU take limits, compensatory mitigation would seldom be habitat-based. For take that would exceed EMU take limits, compensatory mitigation must consist of actions that either reduce another ongoing form of mortality to a level equal to or greater than the unavoidable mortality, or lead to an increase in carrying capacity that allows the eagle population to grow by an equal or greater amount (see full description in *2.9 Mitigation*). This type of compensatory mitigation is offsetting and different than other types of compensatory mitigation consisting of conservation measures designed to improve conditions for eagles in the long-term by preventing future impacts to habitat. As such there is a meaningful difference between compensatory mitigation that truly offsets take and mitigation related to habitat protection. Under all the Action Alternatives, offsetting compensatory mitigation could include habitat restoration or enhancement as long as it is shown to offset take at the required rate.

Project proponents that obtain permits would be required to apply standardized compensatory mitigation measures when take limits are exceeded or take is otherwise not in accordance with management objectives. In such cases, measures for compensatory mitigation could include designs to avoid or minimize the risk of disturbance to eagle habitat (as long as it could be shown that take would be offset), possibly resulting in direct benefits to the biological and physical environment through habitat improvements and preservation. The range of beneficial effects on habitat could be minor to moderate: minor impacts would occur where project impacts and mitigation are small and no substantial benefits would result; moderate impacts would occur where project impacts and mitigation are larger and substantial benefits positively change the condition of the habitat. However, when mitigation is not required (such as when take is within EMU take limits), no potential benefits to eagle habitat would occur.

Indirect adverse impacts on eagle habitat could be minimized or altogether avoided by selection of sites outside of habitat, or areas that are of low habitat value because they are

already disturbed or fragmented, rather than placing new developments within large and intact habitats. Indirect adverse impacts of a project can also be reduced by compensatory mitigation, which consists of conservation measures that benefit or improve conditions for eagles.

3.4.2.1 Alternative 1: No Action

The No-Action alternative consists of current regulations that provide for both standard permits, which authorize individual instances of take that cannot practicably be avoided along with compensatory mitigation requirements that are not standardized, and five-year programmatic take permits, which authorize recurring take that is unavoidable even after implementation of Advanced Conservation Practices. Programmatic take permittees would continue to conduct rigorous monitoring of the permitted activity designed to yield valuable information about the actual take level and the conditions under which the take occurred. In this way, programmatic take permits would present opportunities for research and development of conservation measures.

Under the No-Action alternative, the Service could not issue permits for golden eagle take in the eastern United States. Rather than providing an increased level of protection for golden eagles, activities that take golden eagles in the East would continue to proliferate without implementation of avoidance and minimization measures as part of permits that would address impacts to golden eagle habitat. Unpermitted projects in the eastern U.S. would continue to damage or alter golden eagle habitat without implementing mitigation measures.

Also, many large projects have not applied for permits under the current incidental take regulations. The No-Action alternative would not address the disincentives that project proponents perceive in the current permit application process.

Alternative 1 does allow for requiring compensatory mitigation over and above what is necessary to comply with EMU take limits. Because the 2009 regulations did not incorporate standardized compensatory mitigation provisions, the Service has required compensatory mitigation on a case-by-case basis. A lack of specificity in the regulations as to when compensatory mitigation is required leaves the Service the option to ask for compensatory mitigation for any permit issued for either species. Thus, in this alternative, the Service can use habitat protection as mitigation for bald eagles.

Direct beneficial effects on habitat under the No-Action alternative would likely be moderately beneficial overall for bald and golden eagle habitat because of the No-Action alternative's compensatory mitigation options. Indirect minor to major impacts to habitat of both species could indirectly result from loss, degradation, and fragmentation of habitat as the result of the implementation of projects.

3.4.2.2 Alternative 2: Current EMUs, Liberal Take Levels

Under Alternative 2, there would be one permit type only, rather than standard permits and programmatic permits as in the No-Action alternative, that could be issued for up to five years.

All permits would contain the standard that take must be avoided and minimized to the maximum degree practicable and would include standardized requirements for compensatory mitigation. Compensatory mitigation would be limited to take that would exceed the EMU take limits. Establishment and promotion of mitigation banks could allow for greater benefits than the No-Action alternative because funds would be leveraged and targeted where most needed.

Under Alternative 2, the Service would be able to issue permits for golden eagle take in the eastern United States. Many ongoing and new activities in the East that were implemented in the past without compliance with the Eagle Act, would likely seek permits and apply the required minimization and avoidance measures, so there would likely be minor beneficial impacts to golden eagle habitat through compensatory mitigation. However, most offsetting mitigation would not be habitat-based, because protection of existing eagle habitat in its current state would not be accepted as compensatory mitigation for take exceeding EMU limits, because it is not additive. However, habitat enhancement and restoration along with protection could be used if they can be demonstrated to increase carrying capacity in the EMU. The result of allowing take permits for golden eagles in the eastern United States would be minor and beneficial to golden eagle habitat.

Implementation of the revised permit regulations would not have direct adverse impacts to eagle habitat. The indirect effects of issuance of eagle take permits would be similar to those discussed under *3.4.2 Environmental Consequences*.

Greater conversion of unauthorized take to authorized take than under Alternative 1 would moderately reduce adverse impacts on eagle habitat. Overall, limiting compensatory mitigation to take that is above EMU take limits would reduce the level of habitat protection for eagles compared to other alternatives that are less restrictive (Alternative 1 and Alternative 3).

3.4.2.3 Alternative 3: Current EMUs, Conservative Take Levels

As described for Alternative 2, under Alternative 3 the Service could issue permits for golden eagle take in the eastern U.S., with similar impacts.

Under this alternative, the conservative take levels for bald eagles would allow fewer individuals to be taken without offsetting compensatory mitigation than under the alternatives with liberal take levels, resulting in minor beneficial impacts to bald eagle habitat when habitat improvements can be demonstrated to offset impacts at the necessary rate and are applied as compensatory mitigation to offset the take above EMU take limits.

Under Alternative 3, permits could be issued for up to 30 years. Extension of the maximum permit duration is expected to increase demand for permits and the number of permits issued, with the result that existing projects without permits would gain permit coverage and implement conservation measures for eagles. The longer permit duration is also expected to encourage more future projects to seek permits with similar benefits gained through avoidance, minimization, and compensatory mitigation. Although compensatory mitigation to

offset take exceeding EMU limits would still not be habitat based, unless such habitat actions could be shown to offset mortality (e.g., reduce starvation rates of juvenile golden eagles) under Alternative 3 moderate to major beneficial impacts to habitat for both species of eagles are likely to result from the additional minimum level of compensatory mitigation that would be required for each take permit. The Service would encourage applicants to apply such mitigation as a contribution to a conservation bank or other third-party mitigation provider, which could apply the funding to protect and/or improve eagle habitat.

As discussed under Alternative 2 above, Alternative 3 would have similar effects on eagle habitat from converting existing and potential unauthorized take into authorized take of eagles.

3.4.2.4 Alternative 4: Flyway EMUs, Liberal Take Levels

Effects on eagle habitat from authorized take of golden eagles in the East, the liberal take levels, and converting unauthorized take to authorized take would be similar to those described in Alternative 2.

The more liberal levels of bald eagle take that does not need to be offset would result in adverse impacts to bald eagle habitat compared to Alternatives 1 and 3, because less offsetting mitigation would be secured. However, compensatory mitigation for take that exceeds take thresholds would typically not be habitat-based, since protection of existing eagle habitat is not additive. Habitat enhancement and restoration along with protection could be used if they can be demonstrated to increase carrying capacity in the EMU. Therefore, the adverse effects expected from the more liberal take limits in Alternative 4 would be only minor.

The modification of the eagle preservation standard and the incorporation of the LAP cumulative effects analysis would result in situations where the bald eagle LAP take thresholds are exceeded before EMU take limits are reached. Under these conditions a permit would not be issued unless the take over the LAP take threshold was determined to be compatible with the preservation of the bald eagle. One factor that might lead to such a determination would be application of compensatory mitigation within the LAP. Because LAP-based compensatory mitigation could be habitat-based (i.e., it is not required to be offsetting unless the EMU take limits are exceeded), Alternative 4 might provide greater benefits to eagle habitat than Alternative 2.

3.4.2.5 Alternative 5: Flyway EMUs, Conservative Take Levels (Preferred Alternative)

Impacts under Alternative 5 would include many from Alternatives 3 and 4. The most significant beneficial effects on golden eagle habitat would be the result of increasing the compensatory mitigation ratio to greater than 1.2:1. Take of golden eagles in the East would be authorized, resulting in a modest reduction of adverse impacts and introduction of a moderate increase in beneficial effects on golden eagle habitat from mitigation.

As with Alternative 3, longer-term permits available under the extended maximum permit duration would likely increase compliance and permit coverage, resulting in a modest increase

in habitat protection for both species that would be secured by requiring compensatory mitigation for a greater proportion of permits.

Adoption of the flyways as EMUs would allow compensatory mitigation to be applied where more likely to benefit eagle populations affected by the permitted activity, and some of this mitigation might be habitat-based. Combining the LAP analysis with conservative take levels in this alternative would reduce adverse impacts on eagle habitat more than when the LAP analysis is combined with liberal take levels as in Alternative 4.

For the above reasons, Alternative 5 is likely to have beneficial impacts to eagle habitat that are comparable to those of Alternative 3, and these two alternatives have greater potential beneficial impacts than Alternatives 1, 2, and 4.

3.5 MIGRATORY BIRDS

3.5.1 Affected Environment

The Service's Division of Migratory Bird Management has begun an effort to develop incidental take regulations under the Migratory Bird Treaty Act (MBTA) (16 USC 703–712). We have not yet officially proposed these regulations. However, we published a notice of intent to prepare a PEIS to evaluate the environmental impacts of three regulatory, incidental-take-authorization options (see 80 FR 30,032, May 26, 2015). The three potential authorization mechanisms are as follows: (1) a general conditional authorization for incidental take by industry sectors that adhere to appropriate standards for protection and mitigation of incidental take of migratory birds; (2) legal authority for issuing individual, incidental take permits for projects or activities not covered under a general, conditional, industry-sector authorization; and/or (3) a written agreement between the Service and another Federal agency that authorizes incidental take caused by the Federal agency's own actions (see 80 FR 30,035).

Currently, 1,026 species of birds are considered by the USFWS to be migratory birds under the provisions of the MBTA (see 50 CFR 10.13). The treaties define migratory birds by taxonomic family or species and not by exhibited migratory behavior. For purposes of MBTA protection, an avian species does not have to actually be a migrant. Instead, a migratory bird protected under the MBTA is a bird belonging to a family or species native to the U.S. that is specifically referenced in at least one of the migratory bird treaties between the U.S. and Canada, Japan, Mexico, or Russia. For a more detailed explanation of which species are protected by the MBTA and why, see the most recent FR notice updating the current list of protected migratory bird species at 78 FR 65,844 (Nov. 1, 2013).

The MBTA makes it illegal for anyone to (or attempt to) pursue, hunt, take, capture, kill, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit or otherwise authorized pursuant to federal regulations. (See 16 USC § 703.)

Migratory birds depend on all habitats in the U.S., and some species may use multiple habitat types in the U.S. and other Western Hemisphere countries during different life cycles and life stages. These habitats may include but are not limited to alpine, tundra, grassland, wetland, temperate forest, tropical forest, woodland, shrubland, savanna, desert, and marine environments.

Some migratory birds are permanent residents (sedentary populations) (Newton, 2008) and live in the same general habitat year-round, and do not technically "migrate." Other birds such as the common poorwill (*Phalaenoptilus nuttallii*) use hibernation or multi-day torpor to conserve energy (Jaeger, 1949). The majority of bird species, however, conduct annual migrations, dispersal movements, dispersive migration, or at least seasonal movements from breeding to wintering habitat during their annual life cycle, mostly revolving around an annual breeding season (Newton 2008). As such, bird species migrate from areas of low or decreasing food or thermal resources to areas of high or increasing resources—for example, birds migrating from colder, higher latitudes to more temperate or tropical environments during winter, or birds travelling between different altitudes in the same region or east-west during seasonal movements.

Many Neotropical migrant bird species (birds that migrate to wintering grounds in the Neotropics) are in decline, and have been so for at least four decades (Robbins et al., 1989). Anthropogenic activities which occur in breeding habitat, migration corridors, as well as wintering habitat (e.g., deforestation, habitat conversion, and habitat fragmentation/loss; illegal hunting, pesticide related poisoning, urbanization, energy production and transmission, communication towers, building windows, vehicle impact, wind generation facilities, and climate change) have caused or contributed to these declines (Rappole and McDonald, 1994; Donovan et. al., 1995; Friesen et al., 1995; Sherry and Holmes, 1996; Trombulak and Frissell, 2001; Manville, 2005; Drewitt and Langston, 2006; Drewitt and Langston, 2008; Smallwood and Karas, 2009; Kuvelsky et al., 2010; APLIC, 2012; Dobleer et al., 2013; Loss et al., 2013; Machtans et al., 2013; Smallwood, 2013; Kagan et al., 2014; Loss et al., 2014a,b; Marques et al., 2014; Manville, 2016).

3.5.2 Environmental Consequences

3.5.2.1 Effects under All Alternatives

No direct adverse impacts are expected on migratory birds from the implementation of revised authorized take of eagles. The exception would be where changes to a proposed project as a result of the application process or an eagle conservation measure implemented as the result of revised regulations would adversely affect migratory birds. For example, a conservation measure that may reduce the risk of eagles hitting wind turbines might be to mow the grass in turbine fields to reduce the rodent prey base and make the area less attractive to eagles for hunting. This measure would likely have positive effects on raptors and negative impacts on grassland-nesting migratory bird species. However, most avoidance, minimization, and

compensatory mitigation measures are likely to be beneficial to migratory birds than adverse because they will address mortality issues facing other species as well. Some may have negligible or no effect on other migratory birds.

Thus, compensatory mitigation conducted for eagles could have both adverse and beneficial effects on migratory birds, ranging from negligible to moderate: negligible impacts would occur if migratory birds and their habitats would be affected by changes so slight that they would not be of any measurable or perceptible consequence; moderate impacts would occur if effects to migratory birds are readily detectable, long-term, with consequences at the population level, but the continued existence of the species would not be threatened.

Compensatory mitigation under the eagle rule, which includes conservation measures designed to benefit or improve conditions for eagles, would likely improve conditions for many species of migratory birds under all the alternatives. Habitat-based eagle conservation measures will usually protect and/or improve habitat conditions for other migratory birds. Compensatory mitigation designed to reduce eagle mortality would also often provide benefits to migratory birds, particularly other raptors.

Under all the alternatives analyzed in this PEIS, bald eagle populations are likely to increase from current levels; this could have negative indirect effects on some migratory birds, such as colony-nesting waterbirds, which may be increasingly predated by increased numbers of eagles. Although this scenario would not affect many species, impacts could be significant for some species.

It is not possible to discuss in this PEIS all the circumstances where impacts of the revised rule on migratory birds would be significant and need additional NEPA analysis. Instead, an example of a hypothetical scenario is given under which the Service would consider impacts on migratory birds to be so severe or uncertain that the project could not tier off this PEIS and a separate NEPA analysis would need to be conducted prior to permit authorization:

> *For a wind project, the expected take of eagles is well within the EMU and LAP take limits, but the project is likely to kill hundreds of red knots because it is sited near the Delaware beach that red knots depend on to feed and rest during migration. Although it would be the project itself and not the eagle permit that is directly responsible for killing the red knots, the eagle permit does indirectly contribute to the authorization to operate the turbines that kill the red knots and adjustments to the proposed project to implement avoidance and minimization measures for eagles that may also have an effect on red knots could be negotiated during the application process. Also, issuance of the eagle permit is a federal action, which should be implemented in accordance with all federal laws.*

In addition to this example, listed here are significance criteria, which if met or exceeded, could trigger the potential need for additional NEPA analysis of impacts to migratory birds prior to permit authorization:

- Changes due to the project affect a large portion of a migratory bird population and the viability of that population.
- Full recovery would not occur in a reasonable time, considering the size of the project and the affected species' natural state.
- Impacts would be outside the natural range of variability for long periods of time or would be permanent.
- Habitat is no longer functional and the degradation or loss of habitat is sufficient to cause native migratory bird populations to leave or avoid the area.

3.5.2.2 Alternative 1: No Action

There would be no direct adverse impacts to migratory birds from the continued implementation of authorized take of eagles.

Because the 2009 regulations did not incorporate standardized compensatory mitigation provisions, the Service has required compensatory mitigation on a case-by-case basis. This inconsistent application of compensatory mitigation would continue under the No-Action alternative and would likely result in more compensatory mitigation for bald eagles than under Alternatives 2, 4, and 5. The level of compensatory mitigation conducted for eagles under Alternatives 1 and 3 would likely be comparable to Alternative 5, and could have both adverse and beneficial negligible to moderate effects on migratory birds, depending on the species, but is likely to be significantly more beneficial than adverse overall.

3.5.2.3 Alternative 2: Current EMUs, Liberal Take Levels

Alternative 2, the more liberal take levels for bald eagles, would allow more individuals to be taken without compensatory mitigation than under the alternatives with conservative take levels, resulting in greater indirect impacts to migratory birds. More permits may be issued to existing projects, without securing compensatory mitigation requirements. Further, the compensatory mitigation provisions in Alternative 2 provide the least latitude to secure eagle conservation measures that would also affect other bird species, usually beneficially. Thus, this alternative has less potential to improve conditions for migratory birds than the other alternatives.

3.5.2.4 Alternative 3: Current EMUs, Conservative Take Levels

Under this alternative, the conservative take levels for bald eagles would allow fewer individuals to be taken without offsetting compensatory mitigation than under the alternatives with liberal take levels (Alternatives 2 and 4) but more than under Alternative 1. The effects of the different levels of offsetting mitigation required for eagles would, in many cases (though not always) also apply to migratory birds, usually beneficially.

The effects of applying compensatory mitigation under Alternative 3 would lead to less indirect, adverse impacts on migratory birds, because of the requirement that every incidental take permit involve a minimum level of compensatory mitigation. Much of that mitigation is likely to

provide additional benefits to migratory birds. Some adverse impacts could occur to migratory birds through such mitigation, but the effects are much more likely to be moderately beneficial overall. Further, the additional conservation measures that would likely be secured by coverage of more activities under permits with an extended duration would also increase the effects on migratory birds, and these are likely to be beneficial in most cases, but adverse in a few. Those would also range from minor to moderate as described in Alternative 2. Thus, the beneficial effects of compensatory mitigation on migratory birds would likely be greater overall under Alternative 3 than under Alternatives 1 and 2.

3.5.2.5 Alternative 4: Flyway EMUs, Liberal Take Levels

Effects from incidental take permits, including requirements for compensatory mitigation, would be similar to Alternative 2, except they would be based on flyway EMUs rather than the current EMUs (Service regions and BCRs) and there would be largely beneficial effects to migratory birds from incorporation of the LAP cumulative effects analysis in the regulations. Compensatory mitigation would be required if permits are issued that exceed the LAP take limit and environmental analysis shows that such mitigation is warranted to achieve compatibility with the modified eagle Preservation Standard. Alternative 4 would provide some flexibility to require compensatory mitigation in circumstances where take would exceed the LAP take limit, or if otherwise needed to maintain the persistence of local populations across the geographic range of bald or golden eagles. That provision would likely have minor to moderate beneficial impacts to migratory bird habitat.

The ability to apply compensatory mitigation in the larger flyway EMUs could mean that compensatory mitigation may be implemented farther away from where project impacts occur. For example, a project and its impacts may occur on the Atlantic coast in Maryland, but compensatory mitigation may be applied in Maine. There would be no impacts from compensatory mitigation on migratory shorebirds in Maryland, as it would not take place at that location; however, there would be either beneficial or adverse impacts on migratory birds in Maine where the compensatory mitigation is implemented. In some cases, the same species of migratory birds may experience the effects both of the project impacts in Maryland, including avoidance and minimization measures required under the eagle permit, and of the compensatory mitigation in Maine. In other cases, the effects in Maryland and Maine could occur to different migratory bird species. The overall effects to the different species of migratory birds from compensatory mitigation required under eagle permits that are applied in the flyways would be more positive than negative because measures that benefit eagles are more likely to benefit other migratory birds than adversely affect them.

Under Alternative 4, the LAP cumulative effects analysis would be incorporated into the regulations as a buffer to the more liberal take rates allowed in this alternative. Service-authorized take within the LAP would not be authorized if it would exceed 5% of the estimated total LAP size unless further analysis demonstrates that permitting take over 5% of that LAP is compatible with the preservation of eagles. In some cases, projects that are unable to obtain an

eagle-take permit may not go forward, though, in the Service's experience, those that abandon or site elsewhere represent a small minority. For those new projects that are not implemented, adverse impacts to migratory birds and habitat would not occur. The majority simply proceed without authorization to take eagles, generally resulting in greater negative effects on migratory birds.

3.5.2.6 Alternative 5: Flyway EMUs, Conservative Take Levels (Preferred Alternative)

The effects under Alternative 5 would include some from Alternative 3 and some from Alternative 4. The effects of more conservative take limits and extending the maximum permit duration would be the same as in Alternative 3. Effects of adopting flyway EMUs rather than the current EMUs, the modification of the definition of the preservation standard, and the incorporation of the LAP analysis would be the same as in Alternative 4.

The overall beneficial or adverse effects of compensatory mitigation on local populations of migratory birds would likely be greater under Alternative 5 than under Alternative 4, due to increased participation in the permit program that is likely to result from extending the maximum permit duration to more closely align with the duration of long-term projects and the associated conservation measures that would thereby be secured. Moreover, the greater than one-to-one ratio of compensatory mitigation that would be required for golden eagle incidental take permits under Alternative 5 would additionally affect migratory birds, for the most part beneficially.

Expected impacts to migratory birds from this alternative would range from minor and adverse to a small number of species to major and beneficial to other species, with beneficial effects being overall more prevalent.

3.6 OTHER PERMITTED TAKE

3.6.1 Affected Environment

The Service issues several other types of permits that authorize take of eagles under the Eagle Act. This section discusses the current take authorized for both eagle species for take categories collectively called Other Permitted Take (OPT), which includes take for scientific, educational, depredation, falconry (golden eagles), and Native American religious purposes (discussed in *3.7 Cultural and Religious Issues*).

3.6.1.1 Eagle Permits under the Bald and Golden Eagle Protection Act

Specifically, the take categories considered as OPT for the purpose of this PEIS include:

- 50 CFR §22.21−Scientific Collection & Exhibition;
- 50 CFR §22.22−Native American Religious Use (discussed in *Section 3.7, Cultural and Religious Issues*);
- 50 CFR §22.23−Depredating Eagles;

- 50 CFR §22.24−Falconry; and
- 50 CFR §22.25−Inactive Nest Take During Resource Development or Recovery.

As discussed in more detail in *2.2 Alternative 1: No Action*, the baseline population size for both species of eagle is the number of estimated eagles in 2009 populations. The amount of authorized take that would be considered part of the baseline for this PEIS, and therefore would not be subject to an offsetting mitigation requirement in populations where the take limit is zero, would be unchanged from the 2009 numbers. This baseline take, presented in the 2009 FEA, is based on multi-year averages of reported take from 2002–2007. Historical take refers to all take, including those from existing permits (issued before 2009).

§22.21 Scientific Collecting

The Service may, under the provisions of this section, issue a permit authorizing the taking, possession, transportation within the U.S., or transportation into or out of the U.S. of lawfully-possessed bald eagles or golden eagles, or their parts, nests, or eggs for the scientific or exhibition purposes of public museums, public scientific societies, or public zoological parks. The Service will not issue a permit under this section that authorizes the transportation into or out of the U.S. of any live bald or golden eagles, or any live eggs of these birds.

The Service has not authorized any take of live eagles from the wild for eagle exhibition. All live eagles held under exhibition permits are non-releasable birds, generally transferred from rehabilitators, which because of physical conditions have been determined as unlikely to survive if released. In the six years prior to 2009, scientific collecting permits that authorize take from the wild for bald eagles had been authorized only in Alaska, where bald eagles were not listed under the ESA. In addition, prior to bald eagle delisting, some scientific research was authorized under ESA recovery permits. As shown in Table 3-9 and Table 3-10, an estimated average annual take of three golden eagles (Table 3-9) and an estimated average annual take of seven bald eagles (Table 3-10) under this section is included in the environmental baseline condition. From 2010–2015, a total of 32 bald eagle eggs (annual average of about five per year) were taken for scientific research purposes, all from Regions 1 and 3 (Table 3-11).

Table 3-9. Estimated average annual authorized lethal and non-lethal take reported for the golden eagle (2002–2007)—current baseline.

Service Region	22.21 Scientific and Exhibition Permits	22.22 Religious Take Permits	22.23 Depredation Permits	22.24 Taken for Falconry	22.25 Nest Take for Resource Recovery Permits
1	0	0	5	0	<1 [a]
2	1	24	0	0	3 [b]
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	2	0	8	6	3
7	0	0	12	0	0
8	0	0	0	0	0
Total	**3**	**24**	**25**	**6**	**6**

Note: [a] One nest authorized over six years. [b] Where the permit did not specify a limit, reported take is provided.

Table 3-10. Estimated average annual authorized lethal and non-lethal take reported for the bald eagle (2002–2007)—current baseline.

Service Region	22.21 Scientific and Exhibition Permits (Reported) [a]	22.23 Depredation/Hazing Permit (Reported) [b]
1	0	2
2 (SW)	0	0
3	0	8
4	0	0
5	0	0
6	4	2
7 (AK)	3	2
8	0	0
Estimated Average Annual Total	**7**	**14**

Note: [a] Permits authorized included take of eggs, trap and release of birds, and killing of birds. [b] Take authorized and reported hazing was primarily for airports and landfills.

Table 3-11. Permitted take reported 2010–2015—bald eagle.

Service Region	22.21 Scientific Collecting (Number of Eggs)	22.27 Inactive Nest Removal	22.27 Active Nest Removal [b] (Emergency)	22.26 Disturb (Productivity)
1	9	5	0	5
2 (SW)	0	2	1	0
3	13	4	3	44
4	0	21	1	32
5	0	7	1	0
6	0	0	0	0
7 (AK)	0	21	0	29
8	0	0	0	0
Total	**22**	**60**	**7** [a]	**110** [c]
Estimated Annual Average (6 years)	**3.6**	**10**	**1.2**	**18**

Note: This table includes all reported take with predicted or actual effects on eagle populations and all reported nest take, whether or not there was a loss of productivity. The table does not include other reported take that does not have a population effect (e.g., hazing, salvage of feathers, trap & release, etc.). [a] *No loss of productivity at four of these nests (eagles used alternate or substitute nest).* [b] *Includes nests being built prior to egg-laying.* [c] *Loss of productivity for one nesting season.*

§22.23 Take of Depredating Eagles

Under these provisions, the Service may issue permits to intentionally take eagles after the Service has determined that the take permit is necessary for the protection of wildlife, agricultural, or other interests in a particular locality. Such take can either be lethal (limited to certain methods) or non-lethal, such as hazing, where the animal's sense of security is disturbed to such an extent that it decides to leave the area. While hazing may occasionally result in injury to an eagle or meet criteria for a prohibited disturbance, the vast majority of eagles hazed under depredation permits are unharmed. Hazing most often occurs at airports to prevent injury or loss of human life as the result of collision between aircraft and eagles, which also results in the death of the eagles involved in the collision.

Before issuing an eagle depredation permit, the Service must consider: (1) the direct or indirect effect that issuing such permit will likely have upon the wild population of bald or golden eagles; (2) whether there is evidence to show that bald or golden eagles have in fact become seriously injurious to wildlife or to agriculture or other interests in the particular locality to be covered by the permit, and the injury complained of is substantial; and (3) whether the only

way to abate the damage caused by the bald or golden eagle is to take some or all of the offending birds. From 2002–2007, an average of 25 golden eagles per year (Table 3-9) and 14 bald eagles per year (Table 3-10) were permitted to be taken under this section, and that level of take is included in the environmental baseline condition.

Since 2009, permits to haze eagles have dramatically increased, reflecting the growth of bald eagle populations. As a result, the Service now issues dozens of hazing permits to airports across the U.S. Between 2010 and 2015, the Service also issued five permits to trap, relocate, and release bald eagles and five permits to trap, relocate, and release golden eagles. However, the Service has not issued any eagle depredation permits for permanent removal of eagles from the wild from 2009–2015.

§22.24 Eagle Falconry

Under the provisions of this section, the Service may authorize the possession and transportation of golden eagles for falconry purposes. Falconers may take only golden eagles that are depredating. A golden eagle may be taken only from a livestock or wildlife depredation area declared by USDA Wildlife Services and permitted under §22.23, or from a livestock depredation area authorized in accordance with Subpart D, Depredation Control Orders on Golden Eagles. From 2002–2007, an average of six depredating golden eagles per year from Service Region 6 (Table 3-9) were permitted to be taken for falconry purposes, and that level of take is treated as the environmental baseline.

The implementing regulations for depredation permits require that, before authorizing an eagle to be taken for depredation, the Service must find that the only way to abate the damage is to take some or all of the offending birds. In order to comply with that regulation, by policy, the Service's Mountain-Prairie Regional Office (Region 6) first provides permits to haze and harass golden eagles, and then to trap and relocate golden eagles, in response to documented depredation. However, if these methods do not address the depredation, permits to take the offending eagles from the wild will be issued. In recent years, permits to haze and harass and to trap and relocate golden eagles have been issued. The Service has received no reports that these methods have been insufficient, or requests for additional authorization to address these instances of depredation by removing eagles from the wild. As the result, no falconers have been permitted by the Service to trap and retain eagles since 2007, although in 2011 a few falconers trapped golden eagles based on a management decision that has since been determined to have been inconsistent with the regulations.

§22.25 Take of Golden Eagle Nests for Resource Development and Recovery

Under the provisions of this section, the Service may issue a permit authorizing removal or destruction of inactive golden eagle nests during a resource development or recovery operation if the taking is compatible with the preservation of the area nesting population of golden eagles. For the purposes of the current regulations for this permit, the area nesting population

has been defined as the number of pairs of golden eagles known to have a nesting attempt during the preceding 12 months within a 10-mile radius of a golden eagle nest. This requirement is being replaced under the proposed regulations. An estimated, average annual take of six inactive golden eagle nests was authorized under this section between 2002 and 2007 (Table 3-9), and that level of take is treated as the environmental baseline condition. There were 10 such permits issued for golden eagles from 2010–2015 (Table 3-12), all in Region 6 (an average of almost two per year).

Table 3-12. Permitted take reported 2010–2015—golden eagle.

Service Region	22.22 Native American Religious Use—Collect (kill)	22.27 Inactive Nest Removal	22.27 Active Nest Removal (Emergency)	22.25 Nest Take for Resource Recovery Permits
1	0	1	0	0
2	122	0	1	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	23	0	10
7	0	0	0	0
8	0	0	0	0
Total period	**122**	**24** [a]	**1**	**10** [b]
Estimated Annual Average (6 years)	**20**	**4**	**<1**	**1–2**

Note: This table includes all reported take with predicted or actual effects on eagle populations and all reported nest take, whether or not there was a loss of productivity. The table does not include other reported take that does not have a population effect (e.g., hazing, salvage of feathers, trap & release, etc.). [a] *Sixteen destroyed; eight relocated.* [b] *Five destroyed; five relocated.*

3.6.1.2 Eagle Permits under the ESA

Bald eagles were removed from the federal list of endangered and threatened wildlife in 2007. Prior to the delisting of the bald eagle in 2007, applicants had been including bald eagles in Habitat Conservation Plans (HCPs) that officially granted the permittees ESA authorization and came with assurances of enforcement discretion with regard to the Eagle Act. A few applicants included golden eagles in HCPs as "covered non-listed species," which provided coverage for golden eagle take under the ESA if golden eagles ever became listed under the ESA. Those permits were also issued with enforcement discretion assurances with regard to the Eagle Act. In 2008, the Service put regulations in place that officially allow ESA Incidental Take Permits (ITPs) to serve as Eagle Act authorizations (50 CFR 22.11). Now, applicants can receive formal

Eagle Act authorization under an ESA ITP when eagles are covered in the HCP. However, no such permits have been approved yet, although several are in progress for bald eagles. Although there are numerous older, existing ESA permits that cover eagles, none has reported any take between 2009 and the present.

3.6.2 Environmental Consequences

3.6.2.1 Alternative 1: No Action

Under the No-Action alternative, none of the proposed or alternative revisions to the Eagle Act would be adopted, and the current management regime would remain in place. The level of OPT—e.g., take authorized under Eagle Act Sections 22.21, 22.22 (considered in *3.7 Cultural and Religious Issues*)*, 22.23, 22.24 and 22.25*—would continue to be guided by 2009 take limits. Any new, authorized take of golden eagles or new, authorized take of bald eagles above EMU thresholds must be at least equally offset by compensatory mitigation (specific conservation actions to replace or offset project-induced losses).

Overall, because eagle populations have sustained existing levels of take, conditions of OPT would be expected to remain the same if the current regulations remained in place. As such, the No-Action alternative would likely have no impact on other types of permits to take eagles. Specific recent take data support this conclusion:

- Given that the reported bald eagle take levels from 2010–2015 appear to be consistent with the baseline levels established from 2009 averages, the No-Action alternative would likely have no impact on this type of take.
- Given that the reported golden eagle take levels from 2010–2015 are lower than the previous average and the baseline, it appears that continuing the current regulations would not impact this type of take.

3.6.2.2 Impacts Common to All Action Alternatives

The historical levels of OPT from 2002–2007 are considered the baseline conditions affecting eagle populations. Therefore, the impacts analyses on OPT will largely consider the potential effect of the proposal on future, above-baseline levels within regulatory permit types. However, if data confirm the suspected decline in golden eagle populations, and we determine that active remedial measures are warranted, then the Service could reduce the level of OPT currently considered baseline.

For all alternatives, in cases where permitted take would exceed the EMU take limit, all take above that limit must be offset by mitigation that would commensurately reduce ongoing mortality from other sources. Since 2009, take limits for golden eagles have been set at zero throughout the United States. Accordingly, all permits for golden eagle take would exceed the take limits and so must incorporate offsetting mitigation. In other words, offsetting compensatory mitigation would be required for all take of golden eagles, such that there is no authorized increase in net anthropogenic mortality (74 FR 46836–46879, Sept. 11, 2009). The

effect of this mitigation must be that no net increase in mortality occurs within the EMU where the take is authorized.

The only proposed regulatory changes that specifically apply to OPT are minor revisions to §22.25, including changing the geographic area of evaluation from the area nesting population to the nesting territory. This clarification would not be expected to impact the number of eagle permits granted, including other permitted take.

Because the proposed regulations would not revise any provisions of the regulations for scientific collection, tribal religious use, depredation, falconry, or nest take for resource development or recovery, there would be no direct impacts on other permitted take where average demand for OPT is lower than the baseline allowable take limit.

To analyze the extent to which the proposed and alternative revisions could impact OPT, the following considerations were taken into account and are discussed below:

- Authorization of golden eagle take east of the 100th meridian;
- How are permit applications prioritized among the various regulatory take categories?
- What is the trend of future demand for types of OPT?
- Can the "supply" of offsetting mitigation match potential increases in demand for OPT?

Authorization of Golden Eagle Take in the Eastern United States

In all the Action Alternatives, the Service would establish an EMU for the golden eagle east of the 100th meridian and allow issuance of permits for golden eagles in the eastern U.S. As in the rest of the EMUs, take levels in the eastern U.S. would also be set at zero unless the take is offset. Therefore, any take of golden eagles east of the 100th meridian would need to be compensated for with offsetting mitigation. There is no baseline level of take for golden eagles east of the 100th meridian.

The establishment of an EMU east of the 100th meridian for golden eagles could encourage permit applications in this new EMU. So, while the number of permits could increase from zero, the establishment of a permitting regime would likely have a beneficial impact on eagle populations in this region, because activities that currently take golden eagles in the East occur anyway without implementation through permits of conservation measures and mitigation to address impacts to golden eagles. Thus, the establishment of the eastern golden eagle EMU could increase OPT in the region. However, because all take would require offsetting mitigation where none had been implemented previously, the impact on eagle populations would be beneficial. However, the Service does not anticipate that the benefits of issuing golden eagle take permits in the eastern United States would be great enough to halt potential declines in golden eagle populations. Unless the populations can begin to grow, there would be no effects to other types of permits to take golden eagles.

Prioritization

To address the possibility that demand exceeds the Service's scientifically-based take limits, the final 2009 regulation (74 FR 46386) contains permit issuance criteria to ensure that requests by Native Americans to take eagles from the wild—where the take of live, wild eagles is absolutely necessary to meet the religious purposes of the tribe, as opposed to the use of feathers and parts that may be obtained from the National Eagle Repository (NER)—are given first priority over all other take, except as necessary to alleviate safety emergencies (permit regulations governing take and possession of eagles by Native Americans are set forth in 50 CFR 22.22.) The American Indian Religious Freedom Act (AIRFA, 42 USC 1996) sets forth federal policy to protect and preserve the inherent right of American Indians to express and exercise their traditional religions, including but not limited to, access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites.

If emergency and Native American religious needs can be met, the issuance criteria further provide that programmatic permit renewals are given third priority. Projects to promote and maintain public health and safety have fourth priority. For golden eagle nest take permits, resource development and recovery operations have fifth priority. Assuming those interests are met, bald eagle take for other interests may be permitted as long as total take authorizations do not surpass take limits (74 FR 46386).

Minor revisions are being proposed to the prioritization order. First, third priority for renewal of programmatic permits would be removed. Under all the Action Alternatives there would be one permit type only, rather than standard permits and programmatic permits. Second, the priority for Native American Religious Take permits would be clarified as applying only to any increased need for take that exceeds the 2009 baseline for Native American take of eagles. Historical tribal take for religious use requiring take of eagles from the wild that has been ongoing, but not authorized, does not need to be prioritized, because it is part of the baseline. Thus, any authorization of previously unauthorized tribal take for religious use would not affect EMU take limits and consequently would not require offsetting compensatory mitigation. The minor revisions being proposed are not expected to have any effect on OPT.

Permit Regulation Revisions

The Service anticipates that all the Action Alternatives contain some revised provisions to the eagle incidental take and eagle nest take regulations that would increase permit coverage for eagle take, converting unauthorized existing take to authorized take and securing additional conservation measures for eagles. Those include eliminating ACPs and the criterion currently applicable to programmatic take permits that any authorized take after implementing ACPs is unavoidable. That criterion would be replaced with the standard that take must be reduced to the maximum degree practicable. Also the requirement to use specific protocols for required pre-application surveys would streamline and shorten the permitting process, allowing the Service to issue permits more efficiently. The associated increased conservation measures that

would result from issuing more permits would have beneficial effects on both species of eagle. Although these changes would not be significant enough to change the trajectory of golden eagle populations, they could cumulatively result in authorizing increased levels of unmitigated take under other types of take permits in the longer term (once take levels are reassessed and adjusted in the six-year cycle).

Demand for Other Permitted Take

The projected demand for OPT of eagles is an important consideration in analyzing whether that take would be affected by the proposed limits. In the current situation, the baseline take in these categories is greater than the average reported take from 2010–2015, which is indicative of relatively stable demand. The Service's recent data and experience do not indicate increasing demand in the categories of scientific collecting, depredation (except for hazing at airports), or inactive nest take for resource development and recovery. Native American religious use is discussed in *3.7 Cultural and Religious Issues*. Nest-take permits required for wind energy development, an area of high expected growth, are primarily covered under 50 CFR 22.27.

Falconry

With respect to take authorized under 50 CFR 22.24 for take of eagles for falconry, the Eagle Act limits those eagles to depredating golden eagles, which is discussed in *3.6.1 Affected Environment*.

In public scoping for this PEIS, comments about falconry were a major theme (see *Appendix B, Comments Received on the Draft Programmatic Environmental Impact Statement and Responses*). In general, falconers who commented seek to loosen the limitations on the take of depredating golden eagles for falconry. They largely seek to reinstate the program authorizing eagle trapping in depredation areas for falconry and use it as a tool to acquire eagles. In addition, they propose to improve the program by including wind generation facilities as approved locations for take by falconers, and they would like to increase the authorized number of eagles taken from six per year to the total required or funded by wind energy companies. Falconers also suggested that they could breed and release golden eagles as a compensatory mitigation strategy for take permitted under eagle nonpurposeful take permits.

These constituent pressures reveal a potential for increased demand of golden eagle take for falconry. While the Service no longer issues permits for possession of golden eagles for falconry because that permitting program has been delegated to State agencies under federal guidelines (*see* 50 CFR 22.24), it retains the authority to issue permits to take depredating eagles, which are the only eagles that may be taken for falconry. However, the trajectory of falconry permits is a separate issue from the regulations being proposed here; the limitations on take of depredating eagles are not the result of these permit regulations, but are based on the status of golden eagle populations and the need to maintain their numbers in the wild.

Resource Development and Recovery

With respect to take authorized under 50 CFR 22.25 for take of eagle nests for resource development and recovery, the baseline take of this type is six (Table 3-9) and the average annual take from 2010–2015 was two nests (Table 3-12). The Service expects that, with increasing development of energy-related projects, requests for permits to take golden eagle nests for resource development and recovery are likely to increase. These permits are subject to the requirement for offsetting mitigation, because of the preservation standard of the Eagle Act, so increased demand could to some degree be accommodated. Hard limits would likely be the result of the need to preserve important nest sites for golden eagles, and not the result of the permit regulations being proposed.

Nest Take

The proposed revisions to nest-take permit issuance requirements (50 CFR 22.27) would likely have no impact on other permitted take, because the baseline take level for golden eagle nests (Table 3-10) is 10 nests per year, and the average demand from 2010–2015 has been one to two (Table 3-12), with no evidence suggesting that demand will rise to meet the baseline in the foreseeable future.

3.6.2.3 Alternative 2: Current EMUs, Liberal Take Levels

Take Levels

Bald Eagle

In the liberal-take scenario, continuing to use the current eagle management units would not affect OPT. The bald eagle EMU take limits without offsetting compensatory mitigation are set at 8% for most EMUs, 4.5% in the Southwest, and 0.7% in Alaska. Applied to the estimated 2009 U.S. bald eagle population (excluding Alaska) of 72,434 (Table 3-2), this would yield an annual take limit of 5,772 eagles in the coterminous United States, compared to the baseline of 16 bald eagles taken annually from all authorized take from 2002–2007, except Alaska (Table 3-10). From 2010–2015, permits for disturbance, active nest removal, and scientific collecting (using the mean number of fledged bald eagles per nest to calculate take resulting from active nest take and disturbance at a nest) resulted in an average annual take of 15 bald eagles and six bald eagle eggs per year (Table 3-11).

If permits were issued allowing aggregate take up to the proposed, liberal level in any given EMU, or in all EMUs combined, and if these take levels were actually reached, then there should be no additional, long-term, downward pressure on bald eagle populations in any of the EMUs. In other words, this alternative would be able to meet the management objective of providing for stable or increasing bald eagle populations in all of the EMUs over the coming century, assuming that the median 2009 population estimates are accurate and are not overestimates.

Given this, and the fact that recent take history is about equal to the baseline, the limit of 5,795 is highly unlikely to cause any change in the number of permits issued for OPT.

For Alaska, the take limit of 0.7% applies to the estimated population of 70,554 (Table 3-2), yielding a take limit of 494 bald eagles (0.007 x 70,544). The baseline take from Alaska is five eagles per year, and the estimated take from 2010–2015 is roughly eight eagles from disturbance, collecting, active and inactive nest removal. Therefore, there is considerable room between the baseline and limit, such that the take limit will not impact other sources of permitted take.

For the Southwest (Pacific Flyway south of the 40th latitude line), the take limit of 4.5%, applied to the estimated population of 447 (Table 3-2), would yield a take limit of 20 bald eagles (.045 $\times$ 447). The baseline take from the Southwest is zero, and the observed take from 2010–2015 was removal of two inactive nests. Given that there is currently zero unmitigated take of bald eagles in the Southwest, OPT of bald eagles in the Southwest would not likely be affected by Alternative 2.

Golden Eagle

Continued use of BCR EMUs as the management unit under Alternative 2 would not affect OPT take levels, because it is a continuation of current practice. In the liberal-take scenario, the golden eagle take limit is set at zero throughout the United States, without offsetting mitigation. By definition, this leads to a take limit of zero above the baseline level without the requirement for offsetting mitigation, when applied to the estimated golden eagle population of 41,490 (Table 3-7). From 2010–2014, permits for golden eagle take, including active nest take and disturbance at a nest, using the mean number of fledged golden eagles per nest to calculate take, translates to an average annual take of 22 golden eagles reported per year, of which 20 were for Native American Religious Use (Table 3-12). Given that this recent take history (22 per year) is lower than the baseline (64), it does not appear that a zero limit without offsetting mitigation would impact the number of eagle permits granted for OPT overall.

With respect to take authorized under 50 CFR 22.21 for take of eagles for scientific collection and exhibition, because the prioritization hierarchy in place does not prioritize permits for this use, there could be years when requests for scientific collecting permits that require permanent removal of eagles from the wild cannot be met. However, this seems unlikely to occur since the baseline includes three golden eagles taken annually for this use (Table 3-9), and there was no reported take of live eagles for this purpose from 2010–2014 (Table 3-12). The Service does not allow live eagles of either species to be taken for exhibition purposes, and none of the numerous research projects permitted under scientific collecting permits that are ongoing or recently completed have required take of live eagles from the wild (other than temporary capture for purposes of banding or marking).

With respect to take authorized under 50 CFR 22.23 of depredating eagles, all of the permitted activity in the past six years consists of hazing or trap-and-release activities. While the

permitted activity may temporarily impact individual eagles, it does not result in population impacts at the regional or national scale. The baseline for this type of golden eagle take is 25; reported take from 2010–2015 does not include take with no population effect. Where requests for permits may exceed the number compatible with the preservation of eagles, permits above baseline for permanent removal from the wild of depredating eagles would not be available unless the take can be offset. However, considering the potential for decline in golden eagle populations, and since alternatives to killing golden eagles or retaining them in captivity are available, the Service is unlikely to issue depredation permits that do not require golden eagles to be relocated and released to the wild.

In sum, even under Alternative 2, which of all the Action Alternatives has the least potential to slow the potential decline in golden eagle populations, it is unlikely that permitted take of golden eagles under other permit types would be affected in the foreseeable future.

Permit Regulation Revisions

The effects of the proposed regulations changes in Alternative 2 are described in *3.6.2.2 Impacts Common to All Action Alternatives*. However, Alternative 2 would not allow for any compensatory mitigation for incidental eagle take above EMU take limits. The effects of limiting compensatory mitigation to take that exceeds EMU take limits would likely counteract any benefits to bald eagle populations that might accrue through increased permit coverage. The net effect would likely be that there would be no short- or long-term effects to OPT from the regulatory changes proposed under Alternative 2.

3.6.2.4 Alternative 3: Current EMUs, Conservative Take Levels

EMUs

The effects of maintaining the current EMU configurations under Alternative 3 are the same as those discussed in 3.6.2.3 for Alternative 2 (i.e., no effect on OPT).

Take Levels

Bald Eagles

Alternative 3 would allow for more growth of bald eagle populations than Alternative 2; comparable to the effects of Alternative 1. Based on the effects analysis for bald eagles in *3.2.2 Environmental Consequences*, the bald eagle take limits would allow for take of up to 3,742 bald eagles in the lower 48 states above the baseline of 16 bald eagles taken annually from 2002–2007. The only region where the more conservative take levels could affect OPT of bald eagles is in the Southwest. However, the revisions to the eagle incidental take permit regulations proposed under Alternative 3 (see below) would likely result in implementation of more conservation measures, resulting in a higher level of bald eagle population growth than under Alternative 2. Higher population numbers would allow the Service to adjust unmitigated take levels upward when the Service revises take limits at six-year intervals. The result would be

that, even in the southwestern EMU, higher take levels are likely to keep pace with any expected increase in demand for OPT, and so not affect OPT.

Given that the take history from 2010–2015 is about equal to the baseline, the limit of 3,742 is unlikely to cause any change in the number of permits issued for OPT.

In Alaska, the allowable take level for bald eagles would be 494 bald eagles. The baseline take from Alaska is five eagles per year, and the estimated take from 2010–2015 is roughly eight eagles from disturbance, collecting, active and inactive nest removal. Therefore, the considerable difference between the baseline and take limit would not affect other sources of permitted take.

Golden Eagles

Take limits would be zero above baseline for golden eagles. The analysis here for Alternative 3 is the same as for golden eagles in *3.6.2.3 Alternative 2: Current EMUs, Liberal Take Levels*; all take above baseline must be compensated by mitigation.

Permit Regulation Revisions

Maximum permit duration under Alternative 3 would be 30 years. To the extent that the availability of longer-term permits increases annual demand, this could affect the number of permits that are available for OPT. This could occur if the change in maximum duration itself encourages more permit applications, owing to the greater certainty of maintaining a long-term permit. Assuming the prioritization of permits does not change, this would not affect Native American religious use permits, discussed in *3.7 Cultural and Religious Issues*, but it could affect scientific collecting, or depredation permits for bald eagles, which are prioritized at the same level as incidental take permits. However, the extended permit duration (with its accompanying increase in permit demand and coverage and associated conservation measures), along with additional compensatory mitigation requirements under Alternative 3, is likely to have beneficial effects on eagles. For bald eagles, any effects to OPT of an increased demand for bald eagle permits would be positive.

As noted in the discussion of take levels, there is still room under the baseline to accommodate the level of recent permit demand from 2010–2014 (Table 3-11 and Table 3-12); however, if higher levels of demand for OPT grow to exceed the baseline, and the demand for incidental take is increased by the extension of permit durations to 30 years, then OPT could be reduced. This is not likely, however, because, as also noted above, there is no current data to suggest that demand for OPT would rise over baseline in the foreseeable future. Thus, take levels would be unlikely to be reached for bald eagles (except in the Southwest), and once they were, all take under §22.26 and §22.27 would have to be offset.

For other permit provisions, the analysis for *3.6.2.2 Impacts Common to All Action Alternatives* applies to Alternative 3.

3.6.2.5 Alternative 4: Flyway EMUs, Liberal Take Levels

Flyway EMUs

Under this alternative, the Service would use the flyways as the EMUs for both species. Use of flyways as EMUs is expected to have subtle benefits to eagle populations because mitigation would be targeted on eagles from populations that experience the permitted take. However, those effects would be minor and not expected to have any effect on OPT, particularly since OPT is not expected to change significantly in the foreseeable future.

Under this alternative and Alternative 5, "compatible with the preservation of eagles" would be defined as "consistent with the goals of maintaining stable or increasing breeding populations in all eagle management units and persistence of local populations throughout the geographic range of each species."

Take Levels

Bald and Golden Eagles

The impacts of "liberal" take levels analyzed for Alternative 2 apply to the same levels proposed here in Alternative 4, for both bald and golden eagles.

Permit Regulation Revisions

The analysis for the Impacts Common to All Action Alternatives and Alternative 2 applies here. Under this alternative, the LAP cumulative effects analysis would be incorporated into the regulations and the preservation standard would be modified to include maintaining the persistence of local eagle populations throughout their range. However, the modified eagle preservation standard and codification of the LAP analysis are not expected to substantively change the number of permits issued. Thus, there would be no adverse impacts to OPT because the conditions that could cause reductions to OPT (lower limits, greater demand) would not be triggered. Even if these two regulatory changes were to result in fewer permits, the conditions under which OPT could be reduced would not be reached. In sum, the regulatory components of Alternative 4 are not likely to affect OPT.

3.6.2.6 Alternative 5: Flyway EMUs, Conservative Take Levels (Preferred Alternative)

Flyway EMUs

The analysis for Alternative 4 in *Section 3.6.2.5* applies here for Alternative 5.

Take Levels

The analysis of take levels for Alternative 3 in *3.6.2.4* applies here for Alternative 5 for both bald and golden eagles, except that the take limit for bald eagles in Alaska would be 6%, the same as over most of the rest of the U.S. The higher take limit would be even less likely to affect OPT for bald eagles in Alaska than as described under Alternative 3.

Permit Regulation Revisions

The effects from the proposed rule changes in Alternative 5 would be those discussed under *3.6.2.2 Impacts Common to All Action Alternatives*, as well as the effects of extending the maximum permit duration discussed in Alternative 3 in *3.6.2.4*. The only significant difference is how eagles, and thus other permitted take of eagles, would be affected by the compensatory mitigation requirements of Alternative 5.

Mitigation

Alternative 5 and Alternative 3 have the most beneficial compensatory mitigation requirements for golden eagles. The benefits in Alternative 3 are the result of a minimum level of compensatory mitigation that would be required for every incidental take permit, over and above compensatory mitigation required for take that would exceed take limits. Under Alternative 5, the benefit would be the result of the greater than one-to-one compensatory mitigation ratio required for take that would exceed EMU take limits. The compensatory mitigation benefits of Alternative 3 would also apply to bald eagles, but the greater than one-to-one compensatory mitigation ratio in Alternative 5 would not. This enhanced mitigation for golden eagles under Alternative 5 is expected to provide a higher likelihood of achieving the Service's eagle management objective. The enhanced mitigation for golden eagles could lead to a reevaluation of take limits, thereby easing any prior impacts on OPT if over time, demand for OPT moves closer to the existing baseline.

However, as with the other alternatives, Alternative 5 is not likely to affect OPT in the foreseeable future.

Summary

Assuming relatively stable demand for OPT and continuation of current eagle population trends, it is unlikely that the proposed rule revisions would affect the availability of OPT permits because the baseline take would be sufficient to meet historic demand.

3.7 CULTURAL AND RELIGIOUS ISSUES

3.7.1 Affected Environment

The Service's amended regulatory and management frameworks for authorizing incidental take of eagles may have real and perceived psychological and tangible effects on culture and religion. The way that cultural interaction takes place depends on the uniquely human capacity to use complex symbolic representation in the expression of meaning (Lamendella, 1980). Ritual behavior is the quintessential form of symbolic expression through largely nonverbal action and is often used to strengthen the social structures of society. Ritual very rarely addresses trivial issues and is often directed to solve problems where the outcome has great uncertainty (e.g., life, prosperity, war, etc.) (Laughlin and Stephens, 1980). Ritual, and the

symbols employed, can be essential to the well-being of humans and the culture(s) in which they interact by providing meaning and purpose to their lives.

3.7.1.1 Spiritual Significance of Eagles to Native Americans

Archeological finds in North America are rife with evidence of the importance of eagles in many cultures dating to pre-European settlement. The Fort Ancient people, a mound- building culture in Ohio, included the beak of an immature golden eagle in the grave goods of a human burial site dating from earlier than A.D. 1400, perhaps signifying status (Brady-Rawlins, 2007). The presence of wing bones for golden eagles and bald eagles in excavations of mounds in Illinois is cited as indication that the eagles may have been killed for their plumage and used in ceremonial functions (Parmalee, 1958). Other research in Iowa revealed an assemblage of more than 260 broken and splintered lower legs of raptors, including eagles, which may have been evidence of trade in ceremonial birds (Fishel, 1997). The use of eagles in tribal ceremonies in central California was ascertained by archaeological excavations revealing their bones as burial objects in three cultural horizons. One notable find was an eagle skull with an abalone ornament over one eye (Heizer and Hewes, 1940).

Bald eagles and golden eagles remain sacred to many American Indian tribes and tribal members and are central to the religious practices of some tribal cultures in North America and other localities throughout the species' range. A number of comments provided during the public notice and comment period for the Draft PEIS were from tribes testifying to that reality. As one example, the Osage Nation stated:

> *When it comes to tribal religious activities, the eagle holds a vital and fundamental place in the Osage way of life. It is a sacred bird to our people. … The eagle is one of our main clan animals, representing the Tsi shu or Sky People. Different species of eagles (golden, bald, immature, etc.) form the basis for various Osage bands, clans, and religious ceremonies.*

American Indian interests are unique and unlike any other interests due to the status of federally-recognized tribes as governmental sovereigns, as well as the unique relationship between the U.S. government and each tribe. There exists a separate federal trust responsibility to tribes, which among many other things, safeguards indigenous religious practices, cultural practices, places, sites, and objects. Moreover, the Eagle Act specifically carves out an exception allowing the Service to authorize possession and take of bald and golden eagles for the "religious purposes of Indian Tribes" (16 USC 668a).

3.7.1.2 Eagle Symbolism in U.S. History

The U.S. Congress chose the bald eagle to be depicted on the official seal of the U.S., selecting it over both the originally-proposed golden eagle, because the golden eagle was also found in Europe, and more famously, the wild turkey. The original seal has changed only slightly in 200 years and appears on the national and President's seal; the mace of the House of

Representatives; on currency and coins; and is used by various military units (Lawrence, 1990). Later, when establishing the Bald Eagle Protection Act of 1940 (the precursor to the Bald and Golden Eagle Protection Act) the enacting clause crafted by Congress read, in part: "…the bald eagle thus became the symbolic representation of a new nation under a new government in a new world; and … by that act of Congress and by tradition and custom during the life of this Nation, the bald eagle is no longer a mere bird of biological interest but a symbol of the American ideals of freedom." As the nation's symbol, the bald eagle represents U.S. citizens' sense of autonomy, courage, and power. Today, bald eagle imagery is ubiquitous in American culture and society, attesting its widespread symbolic importance (USFWS, 2007d).

Since the 1970s, the bald eagle has also come to symbolize wildlife conservation in the United States. The dramatic changes in its population status reflect the ecological footprint of people on this continent. Prior to colonialism, the bald eagle flourished. Populations experienced declines during the westward expansion of the American frontier and the Industrial Revolution, and by the early 1970s, the bald eagle nearly became extinct due to expansive use of chemical pesticides during the post-World War II economic expansion—only to recover as the nation's growing ecological awareness led to the ban on DDT use in the U.S. and the passage of environmental laws such as NEPA and the ESA. For many Americans, the bald eagle now symbolizes the ecological consciousness of society and the health of the environment (USFWS, 2007d).

3.7.1.3 Federal and Tribal Statutes

American Indian Religious Freedom Act (AIRFA) (42 USC 1996)

AIRFA sets forth federal policy to protect and preserve the inherent right of American Indians to express and exercise their traditional religions, including but not limited to, access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites.

Morton Policy and Department of Justice Memorandum

The 1975 Morton policy statement provides Native Americans protection from federal prosecution, harassment, or other interference to "…possess, carry, use, wear, give, loan, or exchange among other American Indians, without compensation, all federally protected birds, as well as their parts or feathers (DOI, 1975)."

The Department of Justice (DOJ) memorandum issued in 2012 formalizes and memorializes the longstanding (Morton) policy; and serves to eliminate uncertainty and concern regarding enforcement of federal bird protection laws as they relate to the cultural and religious activities of federally recognized tribes and their members (USDOJ, 2012). Specifically, the DOJ memorandum clarified that members of federally recognized tribes may acquire from the wild, without compensation of any kind, naturally molted or fallen feathers of federally protected birds without molesting or disturbing such birds or their nests. The protection from

enforcement these policies apply to possession without a federal permit do not extend to commercial trade of feathers and eagle remains, or to killing or otherwise removing a live eagle from the wild without a permit.

National Historic Preservation Act of 1966, as amended (NHPA) (54 USC 300101 et seq.)

Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties. Federal agencies accomplish this by following the Section 106 regulations, "Protection of Historic Properties" (36 CFR Part 800). The Section 106 regulations set forth a process by which agencies: (1) define their APE (the Area of Potential Effect--the geographic area in which the project occurs and that includes properties that may be affected by the action); (2) evaluate the effects of any federal undertaking on historic properties in the APE (properties included in, or eligible for inclusion in, the NRHP (National Register)); (3) consult with State Historic Preservation Officers (SHPOs), Tribal Historic Preservation Officers (THPOs), and other appropriate consulting parties regarding the identification and evaluation of historic properties; (4) assess effects on historic properties, and resolve any adverse effects; and (5) consult with appropriate American Indian tribes (tribes) and Native Hawaiian Organizations (NHOs) to determine whether they have concerns about historic properties of religious and cultural significance in areas of these federal undertakings. Issuing a permit to a third party is generally considered a federal undertaking. The NHPA created the National Register of Historic Places (NRHP), which establishes what is historic and worthy of preservation. Among the listings in the NRHP are places deemed to be of historical significance to Native American tribes.

For example, Mount Taylor TCP was determined to be eligible for listing on the NRHP in 2008. The Pueblos of Acoma, Zuni, Laguna, Jemez, Isleta, the Hopi Tribe, the Navajo Nation, and the Jicarilla Apache Nation all view Mount Taylor as a living, breathing entity that embodies a spiritual essence. Part of the San Mateo Mountains in New Mexico, Mount Taylor is a place where traditional practitioners go to conduct traditional cultural and religious activities. Over time, these have included, but are not limited to the collection of plants, stones, minerals, pigments, soil, sand, and feathers; catching eagles; hunting game and birds; pilgrimages to place offerings; and visiting shrines and springs. The Jemez tradition prescribes that the individuals visit the shrine(s) near the top of the mountain to leave offerings, and then proceed to prescribed areas lower on the mountain and its mesas to catch the eagles (USFS, 2008).

Some tribes and tribal members may consider eagle nests sacred sites, as provided for in the AIRFA, and a Traditional Cultural Property (TCP) under the NHPA. A TCP is a designation that may accompany a historic property identified within the APE via the NHPA process. It is an area of religious and cultural importance and it is that importance that may make the property eligible for inclusion on the National Register of Historic Places. TCPs are not limited to currently-recognized Indian lands, and they occur across the entire aboriginal settlement area. Properties of religious and cultural importance may be areas where eagles nest and have nested within living memory, their presence becoming a contributing element for determining

eligibility under NHPA (King, 2006; Tanji, 2008). Thus, a landform or landscape known for eagle habitation—a ridgeline, canyon, lakeshore, river valley, mesa, mountain, etc.—may be considered by tribes as suitable for designation as a property of religious or cultural importance.

Because issuance of a permit is considered an undertaking under NHPA, issuance of an eagle permit triggers NHPA and Section 106 review. Eagle habitat or nest(s) may constitute religious or cultural importance and should be an important part of the Area of Potential effect as defined for the Section 106 review.

Section 106 compliance may require government-to-government consultation with tribes. Each Regional Permit Office coordinates with its Regional Historic Preservation Officer to ensure necessary NHPA consultations take place with the appropriate parties, which can include the cultural resources staff for any affected tribe. The Service complies with Section 106 on a case-by-case basis for permits that have the potential to affect historic properties. If it is determined to be more efficient for all parties, the Service may also consult with appropriate stakeholders to develop state or regional Programmatic Agreements that will govern compliance with NHPA for the issuance of permits to take eagles in specific states or regions.

A search of the database of historic properties listed (or eligible for inclusion) on the NRHP yielded 29 sites that may be associated with eagle habitat and that are likely to be considered properties of religious and cultural significance by Indian tribes (Table 3-13). This list is considered far from comprehensive, but is included primarily to illustrate the types of sites associated with eagles and eagle nests. Some sites with religious and cultural significance may not have completed the evaluation process for listing on the National Register, or tribes may not have initiated the process. According to the Section 106 regulations, a property is considered an historic property if it is listed on, or *eligible for* (emphasis added) listing on, the National Register. Thus, a lack of formal listing does not lessen the need to consider a property; instead, it emphasizes the need for close coordination with appropriate parties at the project planning stage.

Table 3-13. Sites listed on the NRHP and TCPs associated with Native American tribes in eagle habitat (2015).

State	County	Resource Name	Tribal Affiliation
California	San Diego	*Kuchamaa* (Tecate Peak) TCP	Kumeyaay
California	Riverside	Tahquitz Canyon TCP	Cahuilla
California	Inyo	Coso Hot Springs TCP	Not identified
California	Humboldt	De-No-To Cultural District TCP	Not identified
California	Del Norte	Mus-yeh-sait-neh Village and Cultural Landscape Property TCP	Not identified
Nevada	Spring Valley	Swamp Cedar Area TCP*	Shoshone, Gushute

Arizona	La Paz	Eagletail Petroglyph Site	Yavapai and Maricopa
Arizona	Pima	I'itoi Mo'o (Montezuma's Head) and 'Oks Daha (Old Woman Sitting) TCP	Tohono O'odham
Arizona	Pima	Pascua Cultural Plaza TCP	Yoeme
Arizona	Apache	Canyon de Chelly	Navajo
Massachusetts	Nantucket	Nantucket Sound TCP*	Mashpee Wampanoag Tribe, Wampanoag Tribe of Gay Head (Aquinnah)
Montana	Lewis and Clark	Eagle's Site	Not identified
Montana	Big Horn	Annashisee lisaxpuatahcheeaashisee (Medicine Wheel on the Big Horn River) TCP	Arapaho, Crow Nation, Nez Perce
South Dakota	Meade	Bear Butte	Sioux, Cheyenne
Oklahoma	Delaware	Basset Grove Ceremonial Grounds TCP	Seneca, Cayuga
Oklahoma	Kay	White Eagle Park	Ponca Nation of Oklahoma
Nebraska	Saunders	Pahuk	Pawnee, Omaha
New Mexico	McKinley, Cibola	Mount Taylor TCP*	The Pueblos of Acoma, Zuni, Laguna, Jemez, Isleta; the Hopi Tribe; the Navajo Nation; the Jicarilla Apache Nation
Arizona	Cococino	Red Butte TCP*	Havasupai, Hopi
Nebraska	Holt	Eagle Creek Archaeological Site	Not identified
Nebraska	Sioux	Agate Fossil Beds National Monument	Cheyenne, Lakota
Wyoming	Crook	Inyan Karan Mountain	Sioux, Cheyenne
Oregon	Curry	Eagle Rock	Not identified
Wisconsin	Grant	Eagle Valley Mound District	Not identified
Wisconsin	Richland	Clipped Wing Eagle Mound	Not identified
Wisconsin	Richland	Eagle Township Mound Group	Not identified
Wisconsin	Richland	Hunting Eagle Mound	Not identified
Wisconsin	Jackson	Black Hawk Powwow Grounds TCP	Ho-Chunk
Minnesota	Scott	Ma-ka Yu-so-ta (Boiling Springs) TCP	Dakotah, Sioux

*Source: NRHP, 2015. Note: *Eligible for inclusion on the NRHP*

Tribal Statutes

Some tribes designate the bald and/or golden eagle as threatened or endangered or of other special conservation status. For example, the Navajo Nation's Endangered Species List added the golden eagle as threatened and the bald eagle as endangered in 2008 (one year after it was delisted from the federal endangered species list). The Navajo Nation Golden and Bald Eagle Nest Protection Regulations are designed to establish circular buffers around all eagle nests on the Navajo Nation; protect nesting eagles, their eggs and young from human activities within those buffers during the breeding season; and designate the types of permanent structures that may be constructed within those buffers (NNDFW, 2008a; NNDFW, 2008b).

Table 3-14 represents information obtained through an online literature search of tribal policies, codes, constitutions, and resource-management documents. As shown in the table, at least three tribes explicitly list the bald and/or golden eagle as threatened or endangered: the Nez Perce Nation, the Navajo Nation, and the Mille Lacs Band of the Ojibwe. Nineteen other tribes stipulated protection of the bald and/or golden eagle; these are indicated as "Other

Table 3-14. Tribal status for bald eagles and golden eagles (2015).

Tribal Entity	Location(s)	Bald Eagle	Golden Eagle
Swinomish Tribe	Washington	Other Protected	Other Protected
Jamestown Tribe S'Klallam	Washington	Other Protected	Other Protected
Spokane Tribe of Indians	Washington	Other Protected	Other Protected
Nez Perce Nation	Idaho	Endangered	Unknown
Warm Springs Tribe	Oregon	Other Protected	Other Protected
Navajo Nation	New Mexico	Endangered	Threatened
Chickasaw Nation	Oklahoma	Other Protected	Other Protected
Citizen Potawatomi Nation of Oklahoma	Oklahoma	Other Protected	Other Protected
Sault Ste. Marie Tribe of the Chippewa	Michigan	Other Protected	Other Protected
Mille Lacs Band of the Ojibwe	Minnesota	Endangered	Endangered
White Earth Band of the Ojibwe (Chippewa Indians)	Minnesota	Other Protected	Other Protected
Lac du Flambeau Band of Lake Superior Chippewa Indians	Wisconsin	Other Protected	Other Protected
Stockbridge–Munsee Band—Mohican Nation	Wisconsin	Other Protected	Other Protected

Red Lake Band of Chippewa Indians	Minnesota	Other Protected	Other Protected
Oglala Sioux Tribe	South Dakota	Other Protected	Other Protected
Spirit Lake Tribe	North Dakota	Other Protected	Other Protected
Eastern Band of Cherokee	North Carolina	Other Protected	Unknown
Oneida Nation of New York	New York	Other Protected	Other Protected
Seneca Nation of Indians	New York	Other Protected	Unknown
Gros Ventre and Assiniboine Tribes of Fort Belknap	Montana	Other Protected	Other Protected
Crow Tribe of Montana	Montana	Other Protected	Other Protected
Fort Peck Tribes—Assiniboine & Sioux	Montana	Other Protected	Other Protected
Blackfeet Nation	Montana	Other Protected	Other Protected

Note: "Other Protected" includes statutes specifically prohibiting take of migratory birds, eagles, and/or raptors, and deferment to federal protections, including the Eagle Act or the MBTA. Some documents dating before 2007 also cite the ESA. "Unknown" means federal or tribal protection is unknown.

Protected" in Table 3-14. "Other Protected" indicates that the tribal code, constitution, etc. contains language similar to that of the Eagle Act, ESA, or MBTA.

The information provided in Table 3-14 is likely not comprehensive and some tribes may have laws protecting eagles that are not published or otherwise publicly available.

3.7.1.4 Native American Religious and Cultural Uses of Eagles and Eagle Parts

While eagles have a special spiritual significance for many American Indian cultures, the cultural practices and ceremonial rites associated with eagles take different forms in different tribal beliefs and practices. Eagles and eagle parts are used in a variety of Native American religious and cultural ceremonies, including baptismal, womanhood, marriage, burial, healing, and seasonal ceremonies that are intrinsically tied to Native American spiritual beliefs. In some cultures the spirit or soul of the eagle might visit a person during a vision quest; in others, eagle medicine is associated with war and the wearing of eagle feathers symbolized war honors; and in still others the ceremonial use of eagles blesses the participants and their families and results in good health and a constructive life (De Meo, 1995).

In some tribal cultures, the capture—and sometimes killing—of an eagle is an integral part of the traditional religious practice. In others, killing an eagle is expressly forbidden; eagle feathers for ceremonies must be obtained without harming an eagle or its ability to fly, sometimes by capturing eagles, securing fewer feathers than would disable the eagles from flight, and then releasing the eagles. Many other Native American traditional practitioners only use eagle parts and feathers salvaged as molted feathers or from eagle remains that are found (De Meo, 1995).

Outside of rituals and practices that depend on possession of eagle feathers and parts, the very existence of eagles as live beings in the wild is deeply important to many tribes. As examples, the following quotes are from some of the letters from tribes submitted during the public comment period for the proposed regulations and Draft PEIS. Here is some of what the San Carlos Apache Tribe wrote:

> *Both the Bald Eagle (Itsa ligai'i) and the Golden Eagle (Itsa nichaahi) have been known to the Apache people since the time of creation. Many of our clans fall under the designation of belonging to the Eagle Clan group, and in this way eagles are considered relatives to the Apaches. Eagles are living beings, and were created with unique and essential spiritual powers. Among all of the creations on Mother Earth, eagles alone have the ability to travel between the terrestrial realm and the presence of the Creator. Because of this, eagles act as intercessors, carrying our prayers. Eagles are essential to our culture and to our lives. Our destiny is linked to their survival. All things associated with eagles are, therefore, sacred to us…. The taking of the life of an eagle is very much akin the taking of a human life, to Apaches.*
>
> *For hundreds of years the nesting places of eagles have been known to our elders…. Once a nest was established, Apaches would not collect sustenance from the surrounding area any longer. That place was considered to belong to the eagles from then on. When an eagle chooses to nest in a location that humans are using, the humans should withdraw and relocate their operations.*

And, from the Gila River Indian Community:

> *The O'Otham word for eagle, ba 'ag, is mentioned in O'Otham oral traditions and figures prominently in the creation narratives of the Four Southern Tribes (Gila River Indian Community; Salt River Pima-Maricopa Indian Community; Ak-Chin Community; and the Tohono O'Odham Nation), as well as O'Otham song culture. Respect for all living beings is constant in every part of Himdag (Our way of Life). Modern development that disrupts the spiritual balance of nature affects us as O'Otham people. The well-being of eagles is therefore intricately linked to the well-being of the Akimel O'Otham.*

3.7.1.5 Permits for Indian Religious Purposes

A 1962 amendment to the Eagle Act authorized the take of eagles for religious purposes of Indian tribes as requested by the Secretary of the Interior, who was concerned about the effect prohibiting all take of golden eagles would have on Indian religious and cultural use.

The Service issues three types of permits related to Indian religious activities under 50 CFR § 22.22:

- An *Eagle American Indian Religious (EAIR) Permit* is available for various religious activities. The Service established the National Eagle Repository (NER) as a central clearinghouse to collect and distribute eagle parts. Members of federally-recognized tribes may request eagles, parts and feathers for Indian religious purposes from the NER.
- A *Native American Eagle Aviary (i.e. Eagle Aviary) Permit* authorizes tribal entities engaged in religious activities to possess lawfully acquired bald eagles or golden eagles for Indian religious use.
- An *Eagle American Indian Religious Take (EAIRT) Permit* authorizes take of bald or golden eagles that is necessary for a traditional tribal religious ceremonial purpose that requires eagles to be taken from the wild.

National Eagle Repository

The National Eagle Repository (NER), located outside Denver, Colorado, serves as a collection point for dead eagles. Many of these birds have died as a result of electrocution or collisions with vehicles or infrastructure, unlawful shooting and trapping, or from natural causes. No one may salvage an eagle, dead or alive, or eagle parts for any purpose, including eagles or eagle feathers found by Native Americans on Indian lands. Rather, salvaged eagles are to be sent to the NER for distribution to permit applicants; thus, members of federally recognized tribes may only obtain eagles through the federal eagle permit system (*see* Native American Eagle Aviaries below). Once a permit is authorized, the Service sends the designated eagle or eagle parts from the NER to the applicant.

Roughly 42,000 orders have been filled at the repository since the building opened in 1995. In 2013–2014, the repository received about 2,400 birds and shipped almost 4,000 orders for eagles and eagle feathers to Native Americans. Over 1,000 of these orders filled were for whole eagles. Table 3-15 shows the most recent available statistics for the NER (USFWS, 2014b).

A member of a federally recognized tribe must submit a written application for an EAIR Permit. Applicants for eagles, parts, and feathers from the NER may request only one eagle or the equivalent parts of one eagle per application, and may have only one application pending at a time. Applications are processed in the order in which they are received. Only members of federally recognized tribes may legally possess eagle parts under a religious use permit.

While the NER provides thousands of Native Americans with eagles and eagle parts, criticisms of the system include: long processing delays, poor condition of some eagle parts and feathers received, lack of processing priorities (i.e., strict first come-first served policy), and failure to acknowledge sovereignty of tribes. The Service conducted a series of tribal consultations throughout the U.S. to discuss the processing of requests for eagles from the Repository and identify ways to reduce waiting times for tribal members (USFWS, 2012).

Table 3-15. NER annual report, 10/1/2013 to 9/30/2014.

Service Region	Whole Eagles & Eagle Parts Received *	Whole Eagle Orders Filled	Eagle Feathers & Parts Orders Filled	Combined Orders Filled
1	239	135	376	551
2	65	479	1,113	1,592
3	591	129	357	486
4	352	24	114	138
5	229	24	110	134
6	492	170	519	689
7	216	3	13	16
8	125	62	240	302
Total	**2,309**	**1,026**	**2,842**	**3,868**

*Source: USFWS, 2014b. Note: *The incoming bird count is not complete as birds received in September 2015 were still being evaluated. The final total number of birds and bird parts received will probably be about 2,400.*

Native American Eagle Aviaries

In accordance with 50 CFR 22.22, in order to provide assistance to federally recognized tribes' ability to possess live, non-releasable eagles for religious uses, the Services' Migratory Bird Permit Office implemented the Native American Eagle Aviary (Eagle Aviary) Permit. Eagles housed in the aviaries are birds rescued from the wild because of sickness or injury and treated by wildlife rehabilitators, but the nature or severity of injuries prevent the birds from being returned to the wild. These eagles are then cared for, for the remainder of their lives at the aviary. Through the permitted aviary, Native Americans have an additional source of eagle feathers (through molting) for their cultural and religious needs. Table 3-16 lists existing and planned future aviaries.

Permits to Take Eagles from the Wild

Some Native Americans must capture a bird the traditional way in the wild, as their ancestors did, to properly perform sacred ceremonies. For Native Americans, permits to take eagles from the wild (50 CFR 22.22) are currently limited to tribes that can attest to a traditional religious need to take live, wild eagles for which the NER does not provide an adequate substitute. For example, as described above, the Service has issued an annual permit to the Hopi every year since 1987 allowing the take of up to 40 golden eagles per year. Most recently in 2012, the Service issued the NAT a permit for the one-time take of up to two bald eagles—the first permit the Service has issued for the take of bald eagles for religious purposes under the Eagle Act, although the Service has permitted take of golden eagles for religious purposes in the past.

Table 3-16. Native American eagle aviaries.

Tribal Entity	# of Bald Eagles	# of Golden Eagles
Pueblo of Zuni	12	15
Pueblo of Jemez	0	2
Iowa Tribe of Oklahoma	29	8
Comanche Nation of Oklahoma	8	9
Citizen Potawatomi Nation of Oklahoma	14	1
Navajo Nation	4	0
San Carlos Apache Tribe*	Unknown	Unknown
Fort Belknap**	Unknown	Unknown

*Source: USFWS, 2015c. Note: *The San Carlos Apache Aviary is currently under construction (USFWS, 2015c). **USFWS awarded Fort Belknap funding for construction of an eagle aviary in 2012 (NAFWS, 2012).*

The Service has issued EAIRT permits to eight tribes in situations where the case was made sufficiently that wild-caught eagles were necessary to meet traditional religious and cultural needs. Table 3-17 lists all the eagle take permits the Service has issued to tribes.

A tribal official must apply on behalf of the tribe for an EAIRT Permit to take an eagle from the wild for religious use. Usually, permits provide specific limitations, such as times, dates, places, methods of takings, numbers and kinds of wildlife, location of activity, or circumscribed transactions. Each Service region coordinates and consults with the respective tribes and states on a case-by-case basis.

Table 3-17. USFWS eagle take permits issued to Native American tribes.

Year(s)	Tribal Entity	# of Golden Eagles	# of Bald Eagles
1987-Present	Hopi Tribe	Up to 40 nestlings	n/a
2007	Taos Pueblo	1 mature	n/a
2007	Pueblo of Isleta	2 mature	n/a
2010	Navajo	1 immature	n/a
2010	Pueblo of Pojoaque	1	n/a
2011, 2012	Pueblo of Jemez	Up to 6 total, either species	
2012–2015	Northern Arapaho	n/a	2 mature
2014, 2015	Jicarilla Apache Tribe	2 mature	n/a

Note: Numbers reflect authorized take, not reported take. Many of these permits were not successfully executed.

3.7.2 Environmental Consequences

3.7.2.1 Impacts Common to All Alternatives

The analysis of cultural and religious resources evaluates the adverse and beneficial effects from the proposed eagle rule revision as it relates to the cultural importance of eagles to American Indian tribes and the American people. Effects to Native American tribe(s) or individuals could be emotional or spiritual if the permit issuance (or resulting development) is perceived as desecration of something sacred, including any TCPs. The magnitude of the impact may be significant if it results in take of wild eagles or eagle nests. In most cases, it may be difficult to reasonably avoid or mitigate these potential impacts, but they would be analyzed and addressed during consultation.

For many tribes, the eagle's cultural value is centered on the existence and local presence of wild eagles. Some tribes could experience adverse effects under all alternatives because any permitting of existing and future incidental take of wild eagles is contrary to cultural and spiritual values. The magnitude of the impact could vary somewhat under each alternative and would depend on the take levels, tenure of incidental take permits, and the type of mitigation required.

Adverse, direct impacts could occur if the ability of American Indian tribes to obtain eagles or eagle parts for traditional religious purposes is hindered, or if the cultural value of eagles for individuals (e.g., tribal members, member of American public) is compromised as a result of the issuance of take permits. Conversely, if permits are issued to cover existing activities that are currently operating without permits or future activities that may not otherwise apply for permits, impacts would likely be beneficial as conservation measures are applied to operations that are not currently implementing those measures now or would not do so in the future.

The issuance of an incidental take permit in or close to a TCP with known eagle habitat can affect tribal cultural values. The Service will conduct consultation, as necessary, on a case-by-case basis. Issuance of permits requires a Section 106 review, which would result in an increased level of identification and evaluation of TCPs compared to when projects move forward without permits. Section 110 of the NHPA reinforces that eligible (or listed) TCPs would be managed and maintained in a way that considers the preservation of its historical, archaeological, and cultural values in compliance with Section 106. Under Executive Order 13175, Consultation and Coordination with Tribal Governments, each Service Regional Director, in coordination with the Service Regional NAL and Regional Historic Preservation Officer, conducts government-to-government consultation with the tribes in their region and would do so for permits authorizing activities that may affect TCPs. Under NEPA, individual EAs or EISs tiered from this PEIS could result in the development and implementation of agreements in consultation with Indian tribes regarding the means by which adverse effects on such TCPs would be considered.

Indirect emotional or spiritual impacts would not be limited to Native American tribes or individuals. As described in *3.7.1 Affected Environment*, as the nation's symbol, the bald eagle has a special significance to many Americans, and it is also a treasured species among wildlife enthusiasts. For some, the concept of authorizing eagle take under any circumstance is perceived as offensive and inconsistent with values they hold related to patriotism and/or conservation.

3.7.2.2 Impacts Common to All Action Alternatives

The impacts described under *3.7.2.1* apply to all the Action Alternatives. In addition, various new regulatory provisions, including clarified mitigation requirements, extended maximum permit duration, and application of the "practicability" standard to all permits, are designed to make the eagle incidental take permits more workable for project owners and operators. As a result, levels of authorized eagle incidental take will increase, which will result in increased implementation of avoidance and minimization measures to minimize risk to eagles. Such permits would also require funding for compensatory mitigation measures for take that exceeds take limits (i.e., all permits for golden eagle take).

All Action Alternatives are designed to reduce actual take by encouraging more permit applications, which would increase authorized take and decrease unauthorized take. The goal of the proposed revisions is to reduce actual take by authorizing take that requires the implementation of avoidance, minimization, and mitigation measures associated with eagle permits, which would benefit eagle populations. In this way, the Action Alternatives are expected to reduce the magnitude of impacts on tribal members for whom eagles are central to cultural and spiritual values. Incentivizing project proponents to obtain permit coverage will also increase project monitoring and the collection of eagle remains, resulting in more eagle remains making their way to the NER and an average decrease in the wait times for tribal members to receive eagle parts and feathers for religious and cultural use. Without this incentive, eagles killed at projects that remain unpermitted would not be sent to the NER and the potential religious and cultural use of those eagles would be lost.

Under all Action Alternatives, the issuance of permits for golden eagles east of the 100th meridian could exacerbate the impacts described under *3.7.2.1*—namely, spiritual and/or emotional distress based on values and principles about any incidental take of eagles being permitted.

Different limits for unmitigated take, EMUs, permit durations, and permit criteria and conditions within the Action Alternatives would influence the type and extent of effects, as described under each alternative.

3.7.2.3 Alternative 2: Current EMUs, Liberal Take Levels

Potential impacts to cultural and religious issues would be similar to those discussed in *3.7.2.2 Impacts Common to All Action Alternatives*. With the higher take levels for bald eagles proposed

under this alternative, minor adverse impacts could occur to those who oppose all authorized take of eagles due to cultural and/or symbolic values. This could include tribes whose cultural value depends on the existence of wild eagles, but also include conservationists or anyone who might perceive increased take rates of the bald eagle as compromising the nation's symbol.

3.7.2.4 Alternative 3: Current EMUs, Conservative Take Levels

Potential impacts to cultural and religious issues would be similar to those discussed in *3.7.2.2 Impacts Common to All Action Alternatives.* Extending the maximum duration of incidental take permits to 30 years would likely increase the overall level of *authorized* take, including from the future development of wind and other energy generation facilities, transmission lines, and public service infrastructure projects, but would decrease the overall level of actual take because more existing and future operations are expected to apply for permits and implement conservation measures to avoid, minimize, and mitigate their impacts on eagles. The duration increase could cause the perception that incidental take permits would allow certain industries (e.g., wind) to take large numbers of eagles. As such, minor adverse perceived psychological impacts could occur on those whose cultural value depends on the existence of wild eagles, but could also include anyone that perceives the 30-year duration as overly accommodating of commercial interests. In reality, permitting industrial projects that would not otherwise seek permits is expected to reduce actual take as described above resulting in more wild eagles across the landscape and a decrease in the actual psychological impacts on this cultural value.

An increase in the number of projects seeking incidental take permits issued for wind and other energy generation, transmission lines, and public service infrastructure raises the likelihood that projects applying for permits are sited near TCPs. However, the permit process provides the obligation to consult under Section 106 of the NHPA, and so impacts to TCPs should actually be somewhat decreased in comparison with the current proliferation of such projects without eagle permits. Indirect emotional and spiritual impacts to tribes or individuals may occur, because extending the maximum duration of incidental take permits may be viewed as damaging to eagles or as direct support for the wind industry or infrastructure development in general over the interests of tribes. However, the increased compliance under the Eagle Act that would be expected to result from Alternative 3 would better protect eagles because of the eagle conservation measures and compensatory mitigation that are required under permits, which are designed to result in more wild eagles across the landscape.

An increase in the number of authorized projects would be accompanied by a moderate increase in eagle remains received from permittees who are required to search for and report the eagles taken by their operations, which they otherwise would not be required to do absent an enforcement action. The increase in searching and reporting would lead to more eagle remains in suitable condition being sent to the NER for distributions to tribal members. The average wait time to receive requested eagle parts from the NER would decrease, and in the long-term would have moderate, beneficial impacts on tribal members who submit requests to

the NER, particularly if the NER receives more of the golden eagles that are killed, which are highly sought after.

EMU take limits for bald eagles under Alternative 3 are lower than under Alternative 2, which means more compensatory mitigation would be required (once permit issuance reached the lower take limits). However, the likelihood that requests for permits would come close to even these more conservative take limits is essentially nil. Alternative 3 would require a minimum level of compensatory mitigation for every incidental take permit. Those mitigation requirements would have additional, moderate, beneficial impacts on eagle populations and also on those who value and/or use eagles for cultural reasons.

3.7.2.5 Alternative 4: Flyway EMUs, Liberal Take Levels

Potential impacts to cultural and religious issues would be similar to those discussed in *3.7.2.2 Impacts Common to All Action Alternatives,* and *3.7.2.3 Alternative 2: Current EMUs, Liberal Take Levels*, except the modified preservation standard and codification of the LAP analysis would better protect eagles at a more local scale, benefitting tribes, conservationists, and others who culturally value eagles.

The requirement under Alternative 4 to evaluate cumulative impacts to the local area population (LAP) and limit authorized take to 5% of the LAP would enhance cultural interests in local eagle populations as compared to Alternatives 1–3.

3.7.2.6 Alternative 5: Flyway EMUs, Conservative Take Levels (Preferred Alternative)

The potential impacts discussed in *3.7.2.2 Impacts Common to All Action Alternatives*; *3.7.2.4 Alternative 3: Current EMUs, Conservative Take Levels*; and LAPs under *3.7.2.5 Alternative 4: Flyway EMUs, Liberal Take Levels*, would essentially be combined under this alternative. Extending the maximum duration of incidental take permits to 30 years would likely increase the overall level of authorized take, including from the future development of wind and other energy generation facilities, transmission lines, and public service infrastructure projects, but would decrease the overall level of actual take because more existing and future operations are expected to apply for permits and implement conservation measures to avoid, minimize, and mitigate their impacts on eagles. Indirect emotional or spiritual impacts to tribes or individuals would be similar to those discussed under Alternative 3. However, Alternative 5 does not include the requirement for a minimum level of compensatory mitigation for every permit that would be required under Alternative 3, and in this respect, could be less beneficial with respect to the cultural significance of bald eagles. However, compensatory mitigation for golden eagle take that exceeds EMU take limits would be required at a ratio of 1:2 to 1 (plus, where appropriate, additional mitigation to account for risk and uncertainty with regard to the specific method(s) of mitigation) which could not only better mitigate the currently high levels of unauthorized golden eagle take, but also reduce the magnitude of emotional, spiritual, and cultural impacts to those for whom the golden eagle has important cultural and spiritual

significance. Overall, Alternative 5, by being the most protective of eagles, also carries fewer adverse effects and more beneficial effects with regard to cultural values.

3.8 SOCIOECONOMIC RESOURCES

3.8.1 Affected Environment

The analysis of socioeconomic resources identifies those aspects of the social and economic environment that may be affected by the proposed revisions to the 2009 permit regulations. It is outside the scope of this programmatic analysis to discuss project- or site-specific socioeconomic impacts as they relate to demographics, noise, jobs, or taxes. The industries most likely to be directly affected include long-term infrastructure and public service projects, such as real estate development and transportation, and public utility, resource development, and energy projects.

Economic considerations for developers include project finance, contracts or agreements, and weighing the cost of obtaining and complying with an eagle take permit against the risks, financial and nonfinancial, of operating without one. The societal impacts analysis focuses on how recreational opportunities, aesthetic and other societal values might be affected by the proposed revisions.

3.8.1.1 Project Finance and Economic Development

Companies utilize project financing when an infrastructure investment needs long-term financing from sources outside the parent company. This type of financing is typically used by real estate development, transportation, public utility, dam, and renewable energy projects. In general, investors base their investment decision on the projected profits and associated risks of the potential project. As noted by Comer, “because many risks are present in such transactions, often the crucial element required to make the project go forward is the proper allocation of risk” (1996). Typical risks associated with project financing include construction, operational, supply, offtake, repayment, political, and currency (Fletcher and Pendleton, 2014). Operational risk, in particular, may be impacted if the infrastructure’s location coincides with bald or golden eagle habitat, which could potentially lead to take without prior authorization. As such, there would be potential that the project would no longer continue to generate the forecasted revenue to repay investors. One approach to manage operational risk would be to obtain insurance (such as an eagle permit) to reduce the potential consequences of conflicts with eagles.

3.8.1.2 Planning Considerations

Wind Energy Guidelines and Eagle Conservation Plans

In some situations, eagles and other raptors, bird species, and bats, collide with spinning wind turbine blades. In addition, the windiest and best locations for wind energy production often coincide with prime eagle habitat and migratory corridors. As advances in wind energy

technologies and increased interest in renewable energy sources have resulted in rapid expansion of the wind energy industry in the U.S., the Service developed Voluntary Land-Based Wind Energy Guidelines in 2012 to help shape the siting, design, and operation of the wind industry with regard to wildlife protection. The Service guidelines also provide a structured, scientific process for addressing wildlife conservation concerns at all stages of land-based wind energy development, as well as Best Management Practices for site development, construction, retrofitting, repowering, and decommissioning.

The Service also developed Eagle Conservation Plan Guidance for wind energy that includes recommendations on evaluating the risk to eagles posed by a proposed site for a wind generation facility, categorizing a site based on that risk, the protocols for pre-construction and post-construction studies, and options for mitigating impacts, among other issues. The Service strongly recommends that companies planning or operating wind power facilities in areas where eagles occur work with the agency to implement that guidance completely as part of the process of developing an application for an eagle take permit. As of 2009, permits are available to take eagles in the course of conducting other lawful activities and to take eagle nests when necessary to protect human safety or the eagles. Wind energy companies are not technically required to have an eagle take permit to operate, but will violate the Eagle Act if take of an eagle occurs during construction or operations without first obtaining a permit.

Electric Utilities and Avian Protection

The transmission of energy from where it is generated to where it is used involves millions of miles of conducting lines of various sizes, towers, poles, and other hardware, all of which pose a varying range of collision or electrocution risk to eagles (and other birds). Transmission lines pose risk of collision to flying birds, and in some locations eagles choose to nest on large towers. The smaller distribution lines and their equipment (e.g., transformers) can also pose risk of electrocution.

In the 1990s, the Service launched an effort to reduce power line hazards that kill eagles and other raptors, calling for increased industry awareness, research on ways to reduce electrocutions, collection of bird mortality data, public outreach, identification and correction of problems on Service lands, and enforcement efforts to promote the development of Memoranda of Understanding (MOUs) and avian protection plans with power companies. Efforts to increase industry awareness included teaming with a consortium of industry and non-profit groups to produce and distribute over 4,000 copies of “Raptors at Risk,” an award-winning video that documents the electrocution problem and shows utilities how to protect birds. Copies were made available to every Service special agent, every national wildlife refuge in the U.S., and every state fish and game agency, as well as many private organizations, including Audubon Society chapters and electric utility companies (USFWS, 2001).

The Service has forged proactive partnerships with industry to address the electrocution threat to eagles and other birds, including remedial action. Utility companies in Utah retrofitted

approximately 260 power poles to make them bird-friendly, and in FY 1999 the utility industry in Utah reportedly spent approximately $223,000 to prevent raptor electrocutions. In the Uvas Valley near Hatch, New Mexico, a wintering area for many raptors including golden eagles, meetings with the local electric power company secured the retrofitting of power poles at an estimated cost of $40,000 (USFWS, 2000). A city in Kansas agreed to retrofit all 8,000 transformers in its electric power system after learning that its power lines had electrocuted an eagle (USFWS, 2001).

Efforts to secure voluntary compliance have also often been successful. Holy Cross Electric of Colorado earmarked $1 million for protecting migratory birds, marking the first time a company has agreed to fund such efforts voluntarily (USFWS, 2000). In 2002, an historic MOU covering Wyoming and Colorado was signed with Xcel Energy and the Service's Denver, Colorado, Regional Office in concurrence with the Department of Justice (Manville, 2005). A utility company in Oregon developed and implemented a multi-year avian protection plan for the Klamath Basin, an area that has the largest wintering population of bald eagles in the lower 48. The company was expected to spend as much as $1 million on efforts to prevent raptor electrocutions over a five-year period (USFWS, 2005). A large rural electric cooperative in Wyoming pledged to update its Avian Protection Plan and budgeted approximately $1.1 million for proactive retrofitting and another $1 million for two large bird protection projects to reduce take of golden eagles (USFWS, 2010a).

As part of the Avian Power Line Interaction Committee, the Service helped develop resources to describe the effort of the Service and utilities to address these issues, including *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (APLIC, 2006) and *Avian Protection Plan Guidelines* (APLIC and USFWS, 2005).

Enforcement

The Service uses enforcement as a last resort, preferring to first work collaboratively with companies to minimize risk to eagles and ensure the long-term health of eagle populations through the issuance of take permits. However, if companies repeatedly ignore the problem, the Service may undertake enforcement action against them (USFWS, 2000; USFWS, 2014c). Companies operating without an eagle take permit risk federal penalties, including criminal prosecution, under both the MBTA and the Eagle Act for any unauthorized take of eagles. The Eagle Act prohibits anyone from taking, possessing, or transporting a bald or golden eagle, or the parts, nests, or eggs of such birds without prior authorization. This includes inactive nests as well as active nests. The first criminal offense is a misdemeanor with maximum penalty of one year in prison and $100,000 fine for an individual ($200,000 for an organization). The second offense becomes a felony with maximum penalty of two years in prison and $250,000 fine for the offending individual ($500,000 for an "organization" such as a business). The Eagle Act also currently provides for maximum civil penalties of $12,500 for each violation. *See* 50 CFR 11.33. Under the MBTA, which prohibits take and sale of listed birds including eagles, take alone is a misdemeanor violation with maximum penalty of six months in prison and $15,000 fine, and

commercialization is a felony violation with a maximum penalty of two years imprisonment and $250,000 fine ($500,000 for an organization) (USFWS, 2012).

Moon Lake Electric Association in Colorado was the first company to be criminally convicted of MBTA and BGEPA violations in connection with bird electrocutions. The plea agreement included $100,000 in fines and restitution, three years of probation, a signed MOU with the Service, implementation of an avian protection plan, and the retrofit of poles that were killing raptors (Manville, 2005).

The Department of Justice's first-ever prosecution of a wind generation facility operator for "unpermitted avian takings" resulted in a utility company agreeing to a $1 million settlement for killing 14 golden eagles and at least 149 other protected birds at two of the utility's wind generation facilities. Another utility company also agreed to pay fines for killing hundreds of protected birds in Wyoming with its turbines, and must pay $10.5 million in fines, restitution, and community service. In 2009, the company pleaded guilty to all 34 counts of unlawfully taking golden eagles, hawks, and ravens in violation of the MBTA, having killed 232 eagles in Wyoming from January 2007 to the present and will spend the next five years on probation, during which time it has been ordered to spend $9.1 million to repair or replace its equipment to protect migratory birds from electrocution in Wyoming. As part of its plea agreement, it has committed to a comprehensive plan to continue such efforts in partnership with the Service, to seek eagle take permits for each project, and to work to prevent future eagle deaths. This utility company will spend approximately $600,000 annually to implement the compliance plan, as well as to apply for a programmatic permit at each of the four wind projects (DOJ, 2014; Indian Country, 2015).

Other companies have been fined for activities that occurred during the construction phase of a project. For example, in 2005, a company responsible for the destruction of an eagle nest tree on property where it was building a housing development in Collier County, Florida, pleaded guilty to violating the Eagle Act and was fined $356,125—one of the largest penalties ever assessed under this statute. An individual associated with the company also pleaded guilty to violating the Eagle Act and was sentenced in 2006 to a $5,000 fine and three years on probation (USFWS, 2012). In 2008, an Alaska power company pleaded guilty to destroying a bald eagle nest while building a hydroelectric project, and must pay a $50,000 fine and $75,000 in restitution (USFWS, 2008b).

Financial Risks

Companies operating without a permit, avian protection plan, or eagle conservation plan can also risk their project financing. For example, NaturEner operates the 189-MW Rim Rock wind generation facility in Montana. In 2011, the California Public Utilities Commission approved two contracts between San Diego Gas & Electric (SDG&E) and NaturEner. SDG&E, a Sempra Energy subsidiary, agreed to buy renewable energy credits from the Rim Rock project at a fixed price. The Sempra Energy utility also agreed to invest about $285 million in tax equity financing in the

project. Using a roughly $300 million construction loan from Morgan Stanley, NaturEner built the Rim Rock wind generation facility and brought it online in 2013. NaturEner planned to use the tax equity financing from SDG&E to pay off the loan to Morgan Stanley.

The contracts require NaturEner to develop plans for protecting bats and birds at the Rim Rock wind generation facility before SDG&E makes the equity investment. SDG&E has filed a lawsuit to get out of the aforementioned contracts, claiming that NaturEner has not met these contractual obligations intended to ensure that the project operates in compliance with federal environmental laws. NaturEner worked with the Service to develop an avian protection plan for the Rim Rock wind generation facility, and recently finished an eagle conservation plan. NaturEner offered to indemnify SDG&E from any financial risks related to harming birds and bats at the wind generation facility, but SDG&E refused. If SDG&E fails to make its equity payment, Morgan Stanley can foreclose on NaturEner USA, NaturEner Holding, NaturEner Wind Energy, plus the Rim Rock project and the Glacier 1 and 2 wind generation facilities totaling 210 MW. The Glacier wind generation facilities are under contract to SDG&E (Platts, 2013).

Nonpurposeful Programmatic Take Permits

In 2011, enXco, an EDF Energies Nouvelles Company (seller), entered into a 25-year PPA with Pacific Gas and Electric (PG&E) Company (buyer) for the Shiloh IV Wind Project, a 102-MW wind facility in Solano County, California. The project became operational in 2012 and qualified for PTCs to meet the commercial delivery terms of the PPA (USFWS, 2014f).

In 2014, the Service issued its first five-year programmatic wind permit to Shiloh IV Wind Project LLC, which requires the company to engage in conservation measures that protect eagles while providing greater regulatory certainty for the company. EDF Renewable Energy's Eagle Conservation Plan includes offsetting mitigation, such as retrofitting 133 electric distribution poles to minimize the potential for electrocutions. The plan was prepared in close coordination with the Service using eagle conservation guidelines developed for the wind energy industry (USFWS, 2014e; USFWS, 2014f).

The EDF Group subsidiary had the option of applying for a 30-year permit under a rule published in 2013 (since vacated), but the company declined out of concern it would need to begin the permit process over again if the thirty-year permit duration provisions could be struck down. For its part, the wind industry has generally sought the longer-term permits, with the vast majority of the companies currently in the process of applying for permits indicating they would apply for permits with durations of longer than five years if the regulations were finalized as proposed on the basis they are needed to align with and secure long-term power purchase agreements (NWW, 2015).

3.8.1.3 Societal Issues

Quality of life can be characterized as a person's well-being and happiness. What constitutes a positive quality of life is subjective and cannot be solidly defined. For this analysis, quality of life

considerations focus on those elements that the public generally associates with a high quality of life as they could relate to development that affects eagles: recreational values of birding, including its educational value, and the aesthetic value of viewing an eagle or knowing it exists.

Recreational Values

The recreational value of natural resources can link residents to an area or attract new residents to an area. Proximity to nature, in particular to public lands, can influence where people choose to live and how much people are willing to pay for housing (i.e., property values). Research by Hand et al. (2008) indicates that people make regional housing and labor market decisions based in part on the availability of and proximity to public lands, such as forests, lakes, mountains, etc. Living proximate to public lands provides amenities such as convenient access to recreation and wildlife viewing, and can also include disamenities such as crowds, litter, and noise. That is, population movement and migration into environmentally desirable areas can be explained by the presence of and density of natural resources and associated environmental amenities. Additionally, housing prices in certain regions of the U.S. are higher based on overall proximity and access to public lands (Hand et al., 2008).

Eagles can contribute to recreational values such as birding. According to the 2011 National Survey of Fishing, Hunting and Wildlife-Associated Recreation published by the Service, about 47 million Americans over the age of 16 observed birds (USFWS, 2011c). In 2011, the 11.9 million visits to National Wildlife Refuges primarily for birding generated over $257 million in economic activity, $73.9 million in job income, and 3,269 jobs (USFWS, 2013b).

In part due to the public attention bald eagles attract, they have an educational value as well. Birdwatching can be used to foster ecotourism as a source of income. Many nature centers and nonprofit environmental organizations create revenue through birdwatching tours. These kinds of activities can also be used to introduce students and children to the outdoors in order to foster an appreciation for nature.

Aesthetic Values

Landscape appearance and scenery can be important public land amenities, not just as recreation opportunity settings, but also as elements of the region's identity. Resource values such as clean air and water quality, scenery and natural landscape, open space, and the number of recreation opportunities (including wildlife watching and birding) can be economic assets themselves for local economies. Eagles can provide spiritual enrichment and an appreciation of nature; sighting a bald or golden eagle can fulfill an aesthetic value.

Non-Use and Existence Values

The value held by natural resources for purposes other than direct use is called non-use value and has been well-documented in the literature (Brookshire, 1983). There is value in knowing that bald and golden eagles exist, even for those who have never seen one. The existence value of an eagle reflects the benefit people receive from knowing that it exists, or its intrinsic value.

In general, it is not possible to use market prices or other revealed preference methods (e.g., consumer behavior) to capture the existence value of the bald or golden eagle. The concept itself is controversial, as many oppose the notion of assigning dollar values to a species such as the bald or golden eagle. However, disasters such as the Exxon Valdez and more recently with the BP oil spill have created the need and opportunity to estimate non-use values of species and environmental resources. "Stated preference" survey methods such as the contingent valuation method involve directly asking people, based on a specific hypothetical scenario and description of the environmental good or service, how much they would be willing to pay (WTP) for a change in that environmental good or service.

Eagles have served as powerful symbols in numerous cultures throughout history. In the United States, Congress chose the bald eagle to be depicted on the official seal. In its capacity as the nation's symbol, the bald eagle generally represents Americans' sense of autonomy, courage, and power. Today, bald eagle imagery is ubiquitous in American culture, attesting to the widespread symbolic importance of bald eagles in U.S. society (USFWS, 2007d). As the nation's symbol, the bald eagle has a high existence value compared to other species (Ninan, 2009). Three example studies in the U.S. valuing bald eagle conservation were found as a result of a basic online literature search. The first surveyed Wisconsin households and found an average WTP of roughly $21 annually to avoid further loss of the species (Boyle and Bishop, 1987). Another study in 1991 surveyed New England households and found an average WTP of about $32 to $45 annually, depending on the choice format used (Stevens et al., 1991). The third example was a 1993 survey of Washington visitors that an average lump sum WTP of $245 to $350 depending on the question format (Swanson, 1993).

The bald eagle is also widely portrayed as a symbol of environmental progress, concern, and/or general awareness. The remarkable decline and recovery of bald eagles coincides with the emergence of the ecological movement in the United States in the late 1960s: bald eagles nearly became extinct due to expansive use of chemical pesticides during the booming post-World War II years, but then recovered dramatically when growing ecological awareness led to increased regulation of pesticides and the passage of numerous laws protecting wildlife and the environment. To many Americans, the bald eagle has come to exemplify ecological consciousness and the health of the environment (USFWS, 2007d).

3.8.2 Environmental Consequences

The analysis for socioeconomics evaluates the social and economic effects, both positive and negative, of the proposed revisions to the permit regulations as they relate to businesses and industries likely to develop in areas where eagles occur, and to the aesthetic and recreational values of the public. The impact analysis hinges on the cost, conditions, risks, and delays associated with the issuance of permits to applicants for development as it relates to the proposed eagle rule revisions. Direct impacts include potential impediments to development or project delays, and potential benefits would include streamlining the incidental take permit process and facilitating legally compliant development. The proposed revisions could indirectly

impact investors, manufacturers, and property and use values. Management choices could also indirectly impact the recreational or aesthetic values.

3.8.2.1 Impacts Common to All Alternatives

Incidental Take Permits

None of the alternatives would affect the status or terms and conditions of already-issued permits.

3.8.2.2 Alternative 1: No Action

Nonpurposeful Programmatic Take Permits

Under the No-Action alternative, compensatory mitigation requirements would not be clarified or standardized, which creates uncertainties for applicants with regard to costs. In the case of renewable energy projects, compensatory mitigation costs can affect different parts of the DSCR equation and would be project-specific. Additional capital expenditures for physical and technological assets and associated employee training could increase overhead costs. In these cases, operating costs (e.g., additional staff for monitoring) could increase, which would cause the net operating income to decrease and also lower the DSCR for a wind project.

In general, the five-year tenure of current programmatic permits could dissuade future "buyers" of a PPA. If the permit is subject to renewal every five years, there is a least the theoretical potential that permit conditions can substantially change upon renewal. The possibility of costly equipment updates and pauses in energy production could discourage investors.

Under this alternative, the Service cannot issue permits for golden eagle take east of the 100th meridian. With some eastern states setting goals to generate a certain percent of electricity demand from renewable sources by a certain date, wind power is likely to play an increasing role in meeting that goal. While no golden eagle deaths from wind turbines have so far been reported in the eastern United States, increased wind energy development will eventually result in eagle take and render developers at risk of federal prosecution. Under the No-Action alternative, potential enforcement actions for unauthorized take would likely create adverse impacts to developers east of the 100th meridian, which could be moderate to significant to those individual companies. The financial risk and cost of criminal prosecution could be significant in the short term and long term.

Under the No-Action alternative, there would be moderate beneficial effects to recreational and aesthetic values from the compensatory mitigation that may be required for any bald eagle take permit. In addition to the potential for more abundant bald eagle populations, much of this compensatory mitigation would likely be habitat-based, which would result in preservation of undeveloped and less developed land, and in some cases, restoration of ecological functions, which can benefit recreationists and those who value "natural" landscapes and wildlife.

There would likely be moderate adverse impacts to recreational and aesthetic values with regard to golden eagles from Alternative 1, because the high level of golden eagle mortality from unauthorized take of golden eagles would not be addressed.

3.8.2.3 Impacts Common to All Action Alternatives

Under all Action Alternatives, the issuance of permits for golden eagles east of the 100th meridian would create beneficial impacts to project proponents that were previously unable to obtain permits. Any take of golden eagles would need to be offset with compensatory mitigation, which may be relatively costly for small developments. As the number of incidental take permit applications from both existing and future projects would likely increase, in the short term, permit issuance could be delayed due to Service staffing issues, especially as no permits have previously been issued for golden eagle take east of the 100th meridian.

Incidental Take Permits

The Action Alternatives would lessen uncertainty for developers by clarifying that take be reduced to the maximum degree practicable. That, plus the establishment and promotion of conservation banks, in-lieu fee programs, and other third-party arrangements as an alternative to developing individual mitigation measures for each project would likely increase the number of incidental take permit applications and issued permits. An overall increase in applicants could delay permit issuance as the Service adjusts to the increase in applications from both existing operators and future developers, including for golden eagle take permits east of the 100th meridian. However, in the long term, the permit process would become more streamlined by tiering from this programmatic analysis for future NEPA analyses associated with individual permits.

Clarifying and standardizing compensatory mitigation requirements would allow companies to more accurately estimate costs for offsetting mitigation and properly allocate needed funds. It would also create more certainty and allow for more accurate upfront cost estimates, which would allow companies to negotiate compensatory mitigation requirements as part of any project finance contract or agreement, instead of potentially shouldering additional costs in the future.

Revisions to the eagle rule would be less likely to affect electric utility companies, which are often able to raise large amounts of capital for large-scale, long-term projects. Many are well-established companies with consistent revenue streams and relatively high levels of investment equity from funds and individuals alike.

Permit Application Processing and Amendment Fees for Commercial Entities

The Action Alternatives would include an increase in the permit application processing fee and amendment fee for commercial entities under both eagle incidental take permit regulations and eagle nest take permit regulations for permits up to but less than five years. In both cases, the application fee would increase from $500 to $2,500 and the amendment fee would increase

from $150 to $500. The proposed fee would recover a larger portion of the actual cost to the Service, including technical assistance provided to the potential applicant by the Service prior to receiving the actual permit application package. For homeowner permits, the fees would remain the same, even though federal agencies are directed to recoup the full costs of processing permits. The Service estimates that fewer than 100 entities would be subject to these increased fees, including for renewing or amending permits.

Societal Impacts

It is outside the scope of this PEIS to conduct a contingent valuation survey to estimate the "willing to pay" test (WTP) for eagles as a result of the proposed revisions. However, all the Action Alternatives are designed to reduce actual take by encouraging more permit applications for take that otherwise would not be minimized or offset by mitigation.

3.8.2.4 Alternative 2: Current EMUs, Liberal Take Levels

Higher unmitigated take levels for bald eagles under this alternative would benefit eagle permit applicants when compensatory mitigation is not required, but would cause minor to moderate, adverse impacts to recreational and aesthetic values associated with eagles. Those impacts would be due both to the perception that total (authorized and unauthorized) take would increase and therefore the bald eagle population would decline, and to the actual, long-term effects of less compensatory mitigation being implemented, including habitat-based mitigation. In actuality, the bald eagle population would not be expected to decline; if bald eagle take levels were reached, there is an approximately 50% chance that take might exceed the actual sustainable level at the population objective, but it is unlikely that demand for bald eagle permits would be high enough to approach the liberal take levels under this alternative, except in the southwest EMU. Golden eagle EMU take limits would remain at zero under this alternative resulting in no difference from the Impacts Common to All Action Alternatives.

3.8.2.5 Alternative 3: Current EMUs, Conservative Take Levels

Although lower than Alternative 2, Alternative 3's increased unmitigated take levels for bald eagles (from current levels) would likely cause minor adverse impacts to recreational and aesthetic values associated with eagles due to the perception that bald eagle population would decline. Unmitigated take levels for golden eagles would remain at zero under this alternative.

Extending the maximum duration to 30 years also is likely to result in the perception that incidental take permits would allow some industries to take a greater number of eagles without sufficient oversight, despite the provisions for reassessing fatality rates, effectiveness of measures to reduce take, the appropriate level of compensatory mitigation, and eagle population status at five-year intervals. Conservationists and birdwatchers and other appreciators of wildlife and eagles in particular could perceive the extended tenure as compromising eagle populations. As such, minor adverse impacts could occur to the aesthetic values associated with eagles.

Extending the maximum duration of incidental take permits to 30 years would create beneficial impacts to applicants for long-term infrastructure, renewable energy, and public infrastructure projects with regard to a project finance, because the 30-year permits would more closely match the long-term contracts between buyers and sellers. This would better equip developers to negotiate capital expenditures and maintenance and operation costs into the terms of the financial agreement. Furthermore, 30-year permits would decrease the operational risk of the project because future revenue streams would be more certain. Thus, the likelihood of the project receiving financing and going forward may increase. Under this alternative, we anticipate a greater volume of applications for permits for long-term activities in the future, although we expect the number to increase gradually. Utility-scale wind energy facilities and electric transmission companies are likely to be the most frequent long-term permit applicants because of the known risk to eagles from collisions with wind turbines and electric power lines. Although businesses in other business sectors, such as railroads, timber companies, and pipeline companies could also apply for permits, we anticipate the number of permit applicants in such sectors to be minimal.

Some smaller wind projects may be less likely to request long-term permits given the administration fee of $15,000 every five years. The lower processing fee for applications for permits of less than five years ($2,500) compared to five years or more ($36,000) might further dissuade smaller wind projects from requesting a longer-term permit.

In the short and long term, electric utilities would benefit under Alternative 3. The application of existing APLIC guidelines to a specific project location (that is, utilizing appropriate measures from the suite of solutions described in those guidelines to address the specific issues applicable to the risk factors posed by the lines in the area to be permitted) would enable projects to qualify for long-term, incidental take permits.

3.8.2.6 Alternative 4: Flyway EMUs, Liberal Take Levels

As with Alternative 2, higher unmitigated take levels for bald eagles under Alternative 4 would benefit eagle permit applicants when compensatory mitigation is not required. However, under Alternative 4, codification of the LAP analysis into the regulations, along with the modified preservation standard, could result in increased compensatory mitigation requirements for some permittees, which could be minor and adverse to most entities to whom this requirement would apply, but could be moderate for smaller entities. On the other hand, requests to permit take that exceeds the LAP are expected to be relatively rare.

The higher unmitigated take levels would cause minor to moderate adverse impacts to recreational and aesthetic values associated with eagles. Those impacts would be due both to the perception that total (authorized and unauthorized) take would increase and therefore the bald eagle population would decline, and to the actual, long-term effects of less compensatory mitigation being implemented, including habitat-based mitigation. In actuality, the bald eagle population would not be expected to decline; if bald eagle take levels were reached, there is an

approximately 50% chance that take might exceed the actual sustainable level at the population objective, but it is unlikely that demand for bald eagle permits would be high enough to approach the liberal take levels under this alternative, except in the southwest EMU.

The additional compensatory mitigation requirements that would result from codification of the LAP analysis into the regulations and the modified preservation standard could ameliorate the adverse effects to recreationists and those who to whom eagles have particular existence value, particularly eagles in their locality.

3.8.2.7 Alternative 5: Flyway EMUs, Conservative Take Levels (Preferred Alternative)

The adverse and beneficial potential impacts discussed under *3.8.2.3 Impacts Common to All Action Alternatives*; *3.8.2.5 Alternative 3: Current EMUs, Conservative Take Levels*; and *3.8.2.6 Alternative 4: Flyway EMUs, Liberal Take Levels* would be combined under this alternative. Adverse socioeconomic impacts would likely be moderate under this alternative for small projects if higher costs of compensatory mitigation due to the greater than 1:1 compensatory mitigation ratio for golden eagle take and the compensatory mitigation that may be required based on take exceeding the LAP take limit cannot be absorbed or takes several years to amortize. Small or new companies (with projects sited in an area with high risk to eagle mortality) may not have the capital to absorb or amortize compensatory mitigation costs; therefore, adverse impacts could be significant for those companies. Effects to larger companies and companies that can site outside of areas where their projects have a high level of risk to eagles would be adverse, but minor.

The $8,000 Administration Fee in the preferred alternative in this final PEIS is significantly lower than what the Service proposed ($15,000), reducing the burden on smaller operators seeking long-term eagle incidental take permits, and thus resulting in lower impacts than under Alternative 4.

The long-term beneficial effects to eagles from increased mitigation requirements for golden eagle take permits, the added protection of eagle populations at the local scale, and the increased permit coverage and associated conservation measures resulting from availability of long-term permits would have moderate to major beneficial impacts to those who value eagles and eagle habitat aesthetically and recreationally.

3.9 CLIMATE CHANGE

3.9.1 Affected Environment

Scientific research published in peer-reviewed journals and synthesized by groups such as the Intergovernmental Panel on Climate Change (IPCC) and the U.S. Climate Change Science Program depicts a global climate that is changing. The following elements of climate change are known with near certainty (IPCC, 2014):

- Human activities are changing the composition of Earth's atmosphere. Increasing levels of greenhouse gases like carbon dioxide (CO_2) in the atmosphere since pre-industrial times are well documented and understood.
- The atmospheric buildup of CO_2 and other greenhouse gases is largely the result of human activities such as the burning of fossil fuels.
- An "unequivocal" warming trend of about 1.0 degrees to 1.7 degrees Fahrenheit occurred from 1906–2013. Warming occurred in both the Northern and Southern Hemispheres and over the oceans. The major greenhouse gases emitted by human activities remain in the atmosphere for periods ranging from decades to centuries. It is virtually certain that atmospheric concentrations of greenhouse gases will continue to rise over the next few decades.
- Increasing greenhouse gas concentrations tend to warm the planet.

In addition to increases in global average air temperatures, the IPCC reports that the earth's warming trend has also resulted in increases in global average ocean temperatures, widespread melting of snow and ice, and rising global average sea level. There have also been changes in precipitation patterns. Furthermore, the IPCC concluded that it is very likely that over the past 50 years, cold days, cold nights, and frosts have become less frequent over most land areas, and hot days and hot nights have become more frequent. According to the IPCC, however, it is uncertain how much warming will occur, how fast that warming will occur, and how the warming will affect the rest of the climate system including precipitation patterns.

Climate change has already had observable effects on the environment. Glaciers have shrunk, ice on rivers and lakes is breaking up earlier, plant and animal ranges have shifted, and trees are flowering sooner. Effects that scientists had predicted in the past would result from climate change are now occurring: loss of sea ice, accelerated sea level rise, and longer, more intense heat waves.

Scientists have high confidence that global temperatures will continue to rise for decades to come, largely due to greenhouse gasses produced by human activities. The IPCC, which includes more than 1,300 scientists from the U.S. and other countries, forecasts a temperature rise of 2.5 to 10 degrees Fahrenheit over the next century. According to the IPCC, the extent of climate change effects on individual regions will vary over time and with the ability of different societal and environmental systems to mitigate or adapt to change.

The changing climate impacts society and ecosystems in a broad variety of ways. Impacts that are currently visible throughout the U.S. and will continue to affect these regions are summarized below (USGCRP, 2014a; EPA, 2014).

- Northeast: Heat waves, heavy downpours, and sea level rise pose growing challenges to many aspects of life in the Northeast. Infrastructure, agriculture, fisheries, and ecosystems will be increasingly compromised.

- Northwest: Changes in the timing of streamflow reduce water supplies for competing demands. Sea level rise, erosion, inundation, risks to infrastructure, and increasing ocean acidity pose major threats. Increasing wildfire, insect outbreaks, and tree diseases are causing widespread tree die-off.
- Southeast: Sea level rise poses widespread and continuing threats to the region's economy and environment. Extreme heat will affect health, energy, agriculture, and more. Decreased water availability will have economic and environmental impacts.
- Southwest: Increased heat, drought, and insect outbreaks, all linked to climate change, have increased wildfires. Declining water supplies, reduced agricultural yields, health impacts in cities due to heat, and flooding and erosion in coastal areas are additional concerns.
- Midwest: Extreme heat, heavy downpours, and flooding will affect infrastructure, health, agriculture, forestry, transportation, air and water quality, and more. Climate change will also exacerbate a range of risks to the Great Lakes.
- Great Plains: Projected increases in temperature and more frequent droughts will further stress the region's primary water supply, the Ogallala aquifer. Changes in water availability are likely to present challenges to agriculture and key wetland habitats, such as prairie potholes.
- Alaska: Over the past 50 years, Alaska has warmed twice as fast as the national average. Warming is contributing to the thawing of Alaska's permafrost. Warming is contributing to the loss of protective sea ice along Alaska's northwestern coast, leading to increased rates of coastal erosion. Warming is altering marine and terrestrial ecosystems, causing changes in the extent and location of habitat for fish and wildlife.

Blunden et al. (2011) documented 2013 as among the 10 warmest years on record, with 2012 as the warmest for the U.S. Further, they report that atmospheric CO_2, methane, and nitrous oxide all continued to increase in 2013. As in previous years, each of these major greenhouse gases once again reached historic high concentrations.

U.S. Global Change Research Program (USGCRP, 2014a) reported average temperatures are projected to increase by about 4.5 degrees Fahrenheit in the U.S. by the 2080s. Warming temperatures projected for the next 50–100 years will result in declines in forest growth and agricultural crops. Sea level rise poses widespread and continuing threats to both natural and built environments and to the regional economy. Increasing temperatures and the associated increase in frequency, intensity, and duration of extreme heat events will affect public health, natural and built environments, energy, agriculture, and forestry.

Increased temperatures are expected to cause shifts in seasonal prey availability for birds and change the phenology (synchronicity) of breeding for migratory species. Climate change may alter energy requirements and food availability for overwintering eagles (Harvey et al., 2012). For example, long-term climate change may affect air temperatures, wind velocity, cloud cover, and precipitation, all of which influence eagle energy demands. Changes in river temperatures

and flows may affect the abundance and accessibility of salmon carcasses, which overwintering eagles feed upon. Also, regional climate change models predict substantial site-to-site variability in future air temperatures, precipitation, cloud cover, and wind speeds due to local factors such as topography, snow cover, and land–water contrasts. Because eagles are mobile and opportunistic predators, poor overwinter feeding conditions in one area may lead them to seek alternate prey or move to other areas where feeding conditions are more favorable.

3.9.2 Environmental Consequences

The CEQ's *Revised Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions* advises that actions subject to NEPA compliance should be evaluated along two dimensions relative to climate change impacts: (1) the effects of GHG emissions from a proposed action and alternative actions on global climate change; and (2) the effects of climate change to a proposed action or alternatives, including the relationship to proposal design, environmental impacts, mitigation, and adaptation measures (CEQ 2014).

This PEIS considers activities that would be permitted as a result of the proposed action to be connected activities. These can be analyzed at the programmatic level for their potential to impact GHG emissions and thus climate change. Additional NEPA compliance would be evaluated based on an individual project's parameters.

3.9.2.1 Impacts of the Proposed Action on Climate Change

Since neither the No-Action alternative nor any of the Action Alternatives would directly produce emissions or emissions reductions, there would be no direct impacts to climate change, either adverse or beneficial, from the alternatives. However, in an informal review in 2014 of programmatic permit requests across the U.S., the Service found that a clear majority of programmatic permit requests (16 of 23) were from wind facility developers; the remainder were from electric utilities (three for transmission lines) or Department of Defense (three for training activities), and one for other construction activities (USFWS, 2014a). Therefore, to the extent that the changes in permitting regulations lead to an increase in the replacement of current or future fossil-fuel-based energy supplies with wind energy, indirect benefits to climate change (that is, benefits that occur later in time than the issuance of the permit itself) could occur in the form of avoided or reduced GHG emissions. In the global context of climate change, these potential beneficial impacts are likely to be minor at most because: (1) in general, the eagle permit does not authorize the activity itself but only the impacts to eagles from the activity, so only a very small number, if any, of planned wind projects would be terminated altogether because they are unable to obtain eagle take permits; and (2) even taken together, wind energy facilities that apply for and obtain eagle permits would offset a very small relative proportion of global emissions, but with the potential for cumulative significance in concert with other national and international efforts to mitigate or avoid further climate warming.

Other projects that could require long-term eagle-take permits include electricity transmission lines; other energy development like solar, oil and gas, hydropower, or geothermal;

construction of major pipelines; and long-term operational maintenance of major infrastructure, such as highway systems. Except for electricity transmission lines, these project types are expected to represent the minority of long-term, eagle-take-permit requests in the foreseeable future, well behind wind energy. While any individual project would need to be evaluated by the project proponent for its potential to emit greenhouse gases and thus contribute to climate change, it is not expected that the new regulations would lead to more such projects. Other activities that might require short-term permits include new transportation projects and residential and commercial development; but impacts on climate that can be attributed to eagle-take authorization are at most negligible. In sum, there would likely be no impacts to climate change from the No-Action or Action Alternatives.

The only differences in the magnitude of potential beneficial impacts on climate change among the alternatives would be if one alternative might lead to an incrementally higher number of new wind projects. Alternatives 3 and 5, which propose extending the maximum permit duration to 30 years, could produce these impacts. Section *3.8 Socioeconomic Resources* discusses this issue in detail.

3.9.2.2 Impacts of Climate Change on the Proposed Action

Climate change is itself a cumulative impact of multiple human activities. Climate change influences vegetation, water, and disturbance frequencies, and these changes, in turn, influence one another. A change in one aspect causes a cascade of responses that in some cases counteract, and in others magnify, the initial change. Such interactions make prediction of the likely effects of climate change difficult at particular locations, even if the nature of the climate change is known.

The cumulative effects of climate change on the bald and golden eagles and ecosystem components that determine sustainability are considered in Chapter 4. At this point it is certain only that changes will occur, but the mode, timing, or magnitude of changes or environmental responses, even at a regional scale, cannot be known. The impacts of climate change will become part of the ongoing process undertaken by the Service to monitor the population and habitat conditions for bald and golden eagles, with resulting adjustments to the parameters of bald and golden eagle management, including the regulations that define the permit program.

3.10 TRANSBOUNDARY EFFECTS

Alternative 1 may have some impacts to Canadian and Mexican populations of bald eagles and golden eagles. Under this alternative, failing to increase compliance with the Eagle Act could result in greater un-mitigated take of Canadian golden eagles in the United States during migration and in winter, and for bald eagles from Mexico that may summer in the southwestern U.S. Alternatives 2-5 are likely to be more beneficial for trans-boundary eagle populations, with the greatest benefits from Alternative 5 because of the 1.2 to 1 compensatory mitigation ratio

for golden eagles. The preferred alternative (Alternative 5), because of measures designed to reduce ongoing mortality, is expected to protect the current populations of both species in the United States and is likely to provide a greater level of protection for bald eagles or golden eagles breeding in Canada or Mexico but migrating or wintering in the United States.

Chapter 4. CUMULATIVE IMPACTS

4.1 CUMULATIVE ACTIONS CONSIDERED FOR BALD AND GOLDEN EAGLES

Where permits for "disturbance take" and limited "take resulting in mortality" (50 CFR 22.26) or "nest take" (50 CFR 22.27) are under consideration, analysis of the environmental effects of permit issuance is required under NEPA, including cumulative effects. Cumulative effects are defined as: *"the incremental environmental impact or effect of the proposed action, together with impacts of past, present, and reasonably foreseeable future actions"* (40 CFR 1508.7; 50 CFR 22.3), and include direct as well as indirect effects. Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (40 CFR 1508.8(b)). The temporal scale for analysis of reasonably foreseeable future actions extends for the predicted duration of the impacts of indirect and cumulative actions, not just for the duration of a project or permit. In addition, cumulative effects address the effects of past, present, and reasonably foreseeable future actions in bald eagle and golden eagle breeding home ranges, foraging habitat for all age classes, and "important eagle use areas" as defined in 50 CFR 22.3. Analysis may include impacts to eagles or habitat that may occur on or near federal, state, and private land which may have direct, indirect, and cumulative effects associated with and/or exacerbated by a broad suite of threat factors (i.e., including, but not limited to, mortality and disturbance).

Not all of the individual adverse impacts, especially to habitat, may be construed as "take" under the Bald and Golden Eagle Protection Act, but they may still have cumulatively significant adverse impacts to populations. These impacts should be analyzed in order to meet responsibilities under the BGEPA, NEPA, MBTA, and Executive Order 13186. Where cumulative impacts to populations may occur, take levels may ultimately require future analyses and potential revaluation.

4.1.1 Poaching

Eagles were once shot for bounties, and were killed wantonly during "shoot-offs" (i.e., recreational events to eliminate eagles during lambing or calving season, or events to determine who could shoot the most eagles in an amount of time) (Dale, 1936; Palmer, 1988). In theory, shooting of both species of eagle should have ended with inclusion under the Bald and Golden Eagle Protection Act in 1940 (bald eagle) and 1962 (golden eagle). This was not the case, however. Beecham and Kochert (1975) indicated that four (11%) of their study sample were illegally shot. Russell and Franson (2014) determined that illegal shooting was among the top four causes of death among eagles submitted to the National Wildlife Health Center from 1975–2013; however, because many of the necropsied eagles were opportunistically found and sent to the laboratory, this may not be entirely representative of this cause of death. In a more

representative contemporary sample of satellite-tagged eagles, USFWS (2016) estimated that approximately 1,000 golden eagles are being illegally shot each year in the U.S., roughly 17% of all mortality. Fatality by illegal shooting adds to annual cumulative loss of bald eagles and golden eagles at an unknown, but likely high, rate.

Poaching is a factor in past, present, and foreseeable future cumulative impacts on population levels considered in this PEIS. Based on past and continuing trends, the potential for poaching to cumulatively contribute to changes in populations numbers is high, and thus, may contribute to a re-analysis of take levels in the future.

4.1.2 Trapping

Trapping using animal parts as bait is a legal method to take furbearers and to control depredating animals over much of the U.S. Because bald eagles and golden eagles scavenge for carrion, permitted trapping is of concern for take of both species where its range overlaps with desired furbearers. Trapping of furbearers using snares, leg-hold traps, and strychnine sets designed to kill offending predators has been a known cause of death of golden eagles, historically and in the present day (Katzner et al., 2012). Bycatch of bald eagles and golden eagles was reported incidental to furbearer trapping in eastern Canada (USFWS, 2010b), with nearly 300 cases for a 26-year period in Quebec, Canada (G. Fitzgerald, Université de Montréal, personal communication). Bald eagles and golden eagles have also been reported as trapping bycatch in the U.S. (Bortolotti, 1984; Russell and Franson, 2014). Bortolotti (1984) noted that female eagles appeared more prone to incidental trapping than males. The annual quantity of eagles killed or injured as “bycatch” in the U.S. has not been calculated, but is considered to be an ongoing threat where furbearer trapping is practiced (USFWS, 2010b).

Trapping is a factor in past, present, and foreseeable future cumulative impacts on population levels considered in this PEIS. Based on past and continuing trends, the potential for poaching to cumulatively contribute to changes in populations numbers is moderate, and thus, may contribute to a re-analysis of take levels in the future.

4.1.3 Lead Poisoning

Lead metal has been amply documented to have negative effects on raptors, including eagles (Lumeij, 1985; Franson, 1996; Kramer and Redig, 1997; Wayland et al., 1999; Pattee and Pain, 2003; Wayland et al., 2003; Church et al., 2006; Fisher et al., 2006; Hunt et al., 2006; Cade, 2007; Pain et al., 2007; Gangoso et al., 2009; Watson et al., 2009; Stauber et al., 2010; Kelly et al., 2011; Pagel et al., 2012; Franson and Russell, 2014; Langner et al., 2015). Bald eagles and golden eagles in most areas of their range are exposed to food sources with expended lead bullets (e.g., from varmint shooting, offal piles, non-recovered game, contaminated and weakened live prey, and other sources) (Hunt et al., 2006), which are ingested and result in lethal and sub-lethal lead levels (Pattee et al., 1990; Kelly et al., 2011; Franson and Russell, 2014). Even in areas of southern California within the range of the California condor where lead bullets for rifles have been restricted, lead has been found at levels which negatively impact

individual raptors (Kelly et al., 2011). Eagles with sub-lethal lead burdens may not die immediately, and can suffer for long periods after exposure (Kramer and Redig, 1997). Lead poisoning of raptors can induce golden eagles and other raptors to become extremely thirsty, and with lead poisoning, ungainly and clumsy. Chronic sub-lethal lead exposure has potential to debilitate both species of eagles; to induce starvation; to increase susceptibility to disease, predation, and injury (including drowning in stock tanks); to decrease reproductive success; and to increase potential for electrocution and/or impact with structures and vehicles (Kramer and Redig, 1997; Craig and Craig, 1998; Kochert et al., 2002). Cade (2007), Hunt et al. (2006), Kelly et al. (2011), Pagel et al. (2012), and Franson and Russell (2014) provide further examples of lead effects on eagles and their behavior.

Finkelstein et al. (2012) suggested that California condors may never recover without the removal of lead ammunition from available prey. Golden eagles may be similarly affected since they are facultative scavengers over a large portion of the year and in comparable habitat. Bald eagles have been impacted by lead for decades in midwestern and eastern states (Franson and Russell, 2014).

Lead poisoning is a factor in past, present, and foreseeable future cumulative impacts on population levels considered in this PEIS. Based on past and continuing trends, the potential for lead poisoning to cumulatively contribute to changes in population numbers is moderate to high, and thus, may contribute to a re-analysis of take levels in the future.

4.1.4 Poisoning

Direct and indirect poisoning of bald eagles and golden eagles occurs throughout their entire range, and can impact local and regional populations by affecting reproductive success and behavior. Poisoning is estimated currently to cause 17% of golden eagle deaths per year (USFWS, 2016). Nearly 26% of deaths of bald eagles necropsied at the National Wildlife Health Laboratory between 1975 and 2013 were attributed to poisoning (Russell and Franson, 2014).

Mercury has been a concern in raptor poisoning. Published studies on eagle poisoning are limited. However, research suggests mercury has had limited impact on golden eagles but is of concern for bald eagles (Langner et al., 2015). Mercury generally enters the food chain via atmospheric deposition from coal-fired energy production originating in Asia and the United States (Eisler, 1987; Corbitt et al., 2011), and can create neurochemical impacts in both species. More published examples regard bald eagles because of their being top-order predators in mainly aquatic ecosystems where mercury contamination appears to be more prevalent (Wiemeyer et al., 1993; Rutkiewicz et al., 2011).

Anticoagulant rodenticides, especially second-generation brodifacoum rodenticide, have become more ubiquitous on the landscape and have poisoned diurnal and nocturnal raptors (Elliott et al., 2014; Rattner et al., 2014). Brodifacoum is a long-acting anticoagulant rodenticide that interferes with normal blood clotting. At present, there are no established lethal or sublethal concentrations of this rodenticide for birds. Rodenticide poisoning, while often

targeting small mammals (i.e., rats and mice) not often used by eagles as prey, still remains a concern for eagles throughout their range due to the species' scavenging behavior. The extent to which rodenticide applications can indirectly affect eagles, however, was demonstrated on Rat Island, Alaska, where a U.S. Fish and Wildlife Service effort to eradicate nonnative rats that were negatively affecting seabird nesting colonies killed 46 non-target bald eagles (Borrell, 2011). The use of landfills by eagles is not uncommon (Turrin et al., 2015), and eagles can contact phenobarbital when they have fed on veterinary-euthanized pets discarded in un-covered landfills (Millsap et al., 2004). Selenium has been attributed to impede bald eagle productivity in the Great Lakes region (Bowerman et al., 1994). Other contaminants including but not limited to PCB congeners, PBB-, DDE-, DDD-, and DDT-related compounds (see *4.1.11 DDT Contamination*), have been attributed to impacting eagle reproduction. While mortalities caused by poisoning are often rare events and sparse in the published literature, locating a dead or dying eagle which has been poisoned is extremely rare. Because eagle carcasses are often found by chance in decomposed condition, discerning the true impact of rodenticides is difficult at best.

The following contaminants continue to be a concern for bald eagles and golden eagles (from USFWS unpublished data):

- Bromadiolone
- Chlorophacinone
- Coumachlor
- Diphacinone
- Warfarin
- Zinc phosphide
- Lead
- Manganese
- Iron
- Mercury
- Arsenic
- Molybdenum
- Zinc
- Copper
- Cadmium
- Brodifacoum
- Difenacoum
- Coumatetralyl
- Strychnine
- Avitrol
- Starlicide
- Organophosphates

- Carbamates
- Barbiturates
- NSAIDs

These types of poisoning are factors in past, present, and foreseeable future cumulative impacts on the population levels considered in this PEIS. Based on past and continuing trends, the potential for poisoning to cumulatively contribute to changes in populations numbers is moderate to high, and thus, may contribute to a re-analysis of take levels in the future.

4.1.5 Climate Change

Climate change by itself does not cause eagle mortality or nest abandonment. Climate change is likely to exacerbate existing threats, including invasive plants, disease, habitat loss, and it can affect migration routes (and overflight habitat), breeding territories, and wintering habitat. The terms "climate" and "climate change" are defined by the Intergovernmental Panel on Climate Change (IPCC). "Climate" refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC, 2007). The term "climate change" thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC, 2007). Various types of changes in climate can have direct or indirect effects on species. These effects may be positive, neutral, or negative, and they may change over time, depending on the species and other relevant considerations, such as the effects of interactions of climate with other variables (e.g., habitat fragmentation) (IPCC, 2007).

Long-term habitat changes caused by climate change have strong potential to affect the carrying capacity of the landscape for eagles by impacting the abundance and distribution of prey populations. Harvey et al. (2012) modeled climate change impacts to overwintering bald eagles and noted that a warming climate caused less salmon carcass biomass to be available as a food resource. They suggested warming winters and denser wintering populations of bald eagles will require them to seek alternative prey. This type of indirect change to prey populations may have long-term impacts to nesting and dispersal/wintering habitat, and it may affect conditioning of adult females prior to nesting (Harvey et al., 2012).

The El Niño Southern Oscillation (ENSO) appears to be impacted by climate change, and as such, has brought changes in patterns of rainfall in xeric habitat. Rainfall has been shown to be highly correlated with lagomorph abundance in the Chihuahuan desert (Lightfoot et al., 2010). Schloss et al. (2012) noted dispersal abilities of mammals, including lagomorphs and most sciurids, will be a limiting factor to their response to climate change. Under conservative climate change scenario predictions, lagomorphs, depending on species, have a low to high vulnerability to climate change, and may require assisted migration (Schloss et al., 2012). Lagomorphs are cyclic in population abundance (Fedy and Doherty, 2011). With the added

complexity of increased drought in highly variable xeric habitat (mountain ranges that are miles apart can have very different annual rainfall patterns due to ENSO), reductions in numbers of this favored prey of golden eagles can be expected, resulting in a decrease in overall reproductive success and survival of young in desert regions of the U.S. Bald eagles found in xeric habitat in the U.S. Southwest may be impacted by the loss of breeding habitat caused by reduction in precipitation, resulting in loss of open water habitat available to foraging. Baldwin et al. (2012) suggested that long-term changes in bald eagle prey and a decreasing trend in reproductive occupancy in coastal southern Florida have been a result of significant ecological changes and cascading events caused by higher summer temperatures and hyper-salinity in the local environment.

Climate change may subtly impact behavior or reduce reproduction in wide ranging species. Declines in counts at migration stations of migrating golden eagles have been reported in most areas in the western United States (Farmer et al., 2008; Smith et al., 2008), although Millsap et al. (2013) presented evidence these changes may be more the result of changes in migration pattern than changes in population size. For example, golden eagles may be shortstopping, (i.e., not migrating as far south as in prior years due to warmer winters) due to climate change, increased prey availability, or availability of more northerly wintering habitat.

McIntyre (2012) suggested that starvation may be of a larger concern than previously indicated, based on analysis of telemetry data from a sample of Alaskan golden eagles. Indeed, USFWS (2016) showed that starvation is the leading cause of death for golden eagles overall (24% of annual deaths), and it primarily affects first-year individuals. While starvation may be perceived as a natural process and a driver for natural selection, changes in landscape patterns through anthropogenic activity, increased and broader scale of drought, and changes in prey base caused by shifting ecosystems may increase the potential for this threat to golden eagle populations.

Climate change has also changed fire frequency directly and indirectly throughout most of the range of golden eagles. To date, no information has been accumulated on the effects of fire on golden eagles, either through direct take or through temporary or permanent habitat loss and conversion. However, golden eagles typically build stick nests on cliffs or, alternatively, in trees. Because of the flammable nature of those nests, and the habitat that surrounds nests, uncontrolled wildfire can induce loss of nests and, because eagles may have chicks during what would be considered fire season for most habitat, mortality of pre-fledge chicks. These instances of loss are not easily tracked by the Service.

Changes in fire frequency and impact to nesting tree availability may have a long-term deleterious effect on golden eagle nesting and foraging habitat throughout much of their range. Impacts from fire may result in the loss of nesting substrate or impact to foraging habitat and prey populations. It is unknown how many eagles and eagle nests are affected by wildfire each year; however, changes in wildland fire cycles, increases of invasive plants, and extended

drought are believed to be altering wildfire intensity and spatial area (Tidwell, 2013). Kochert et al. (1999) found that when scrubland habitat was burned, eagle nesting territories were lost and adjoining territorial eagles subsumed the previous habitat, resulting in fewer overall occupied nesting territories. While golden eagles may have up to 18 nests per territory, the loss of significant nests, extant or potential nest trees, or changes to the habitat may affect eagle retention and annual breeding (Kochert and Steenhof, 2012). This, in turn, can affect retention of golden eagle territories, prey availability within territories, availability of nesting substrate, and short- and long-term retention of territories.

Weather extremes appear to be, on average, increasing in the Western Hemisphere (see Seneviratne et al., 2012), and based on prior observation of weather extremes impacting golden eagles, it is reasonable to predict that increased impacts caused by storms, wind, heat, and cold may occur throughout the species range. Deaths of young eagles could be exacerbated by the effect of weather extremes. Eagle chicks can die of heat prostration; Beecham and Kochert (1975) noted that of 41 eaglets that died prior to fledging, 17 died of heat prostration. Phillips et al. (1990) noted mortality of eagle chicks that died of cold induced by late season storms. Millsap et al. (2004) reported weather-related deaths reduced fledging success of bald eagles in rural areas of western Florida. Steenhof et al. (1997) noted that the number of golden eagle territories in their study area where pairs laid eggs was inversely related to weather severity.

Climate change is a factor in past, present, and foreseeable future cumulative impacts on populations levels considered in this PEIS. Based on past and continuing trends, the potential for climate change to cumulatively contribute to changes in populations numbers is high, and thus, may contribute to a re-analysis of take levels in the future.

4.1.6 Loss and Fragmentation of Eagle Habitat

In areas of the contiguous United States, loss of nesting, foraging, and protective roosting habitat is a concern for the population stability for both eagle species (Kochert et al., 2002; USFWS, 2010c). Habitat loss can be due to climate change, invasive vegetation, wildfire-caused habitat conversion, energy and housing development, agricultural transition and increased livestock presence, recreation, and roadway construction/highway expansion. All of these affect available foraging habitat and suitable nesting locations, either quickly over days and months, or incrementally over years and decades. Human presence at varying levels on landscapes within the range of bald eagles and golden eagles is ubiquitous in the contiguous United States, and is increasing in Canada and Alaska. These human impacts can reduce incrementally the amount of habitat, and ostensibly the availability of prey, that eagles use during all life stages (i.e., breeding, wandering and dispersal prior to adulthood, movements to acquire a territory, and movements of territorial adults within their home range and during years of non-breeding) (Newton, 1998).

Differences in behavior between bald eagles and golden eagles create varying responses to habitat loss and temporal/spatial disturbance. Bald eagles appear less impacted by anthropogenic presence than golden eagles and thus can persist on landscapes with higher levels of human presence (Buehler, 2000). Habitat loss in areas with bald eagles appears to have negligible impacts, as bald eagle populations have increased since the 1960s despite habitat loss (USFWS, 2016). This tolerance may not be universal, however. For example, Anthony et al. (1995) reviewed indirect and direct impacts of increased human presence related to bald eagles in relatively undisturbed areas of the Pacific Northwest; they showed that repeated short-term disturbance had the potential to impact longer term fitness, survival, and reproductive success. At the other extreme, Millsap et al. (2004) showed bald eagles that occupied nesting territories in highly disturbed human residential developments in Florida had positive population growth rates. Millsap et al. (2004) attributed this to behavioral adaptations in the face of high prey densities in the urban and suburban areas.

The effects of habitat loss on golden eagles are less understood. Landscape development for recreation, energy production (and related activities), electricity transmission infrastructure, road construction, and other purposes all have the potential to fragment prey populations and to reduce the availability of foraging habitats. Increases in human presence in remote areas due to hiking, camping, rock climbing, energy development, and off-highway vehicles have the potential to reduce, or in some instances limit, the nesting potential and reproductive success of golden eagles. Steidl et al. (1993) found when observers were camped approximately 400 meters from nests of golden eagles, adults spent less time near their nests, fed their young less frequently, and fed themselves and their young up to 67% less food than when observers were camped 800 meters from nests. In studies of golden eagle populations in the Southwest (New Mexico and Texas) and the Front Range of the Rocky Mountains in New Mexico, Colorado, and Wyoming, Boeker and Ray (1971) reported that human disturbance accounted for at least 85% of all known nest losses for their study of 706 nesting attempts over a multi-year period.

Disturbance is often local in nature, but the cumulative loss of nesting opportunities and production of young may have an impact on local and regional eagle populations. Disturbance to eagles during the breeding season can lead to temporary or permanent abandonment of nesting territories, loss of young, and overall reduction of reproductive success. Golden eagles have been noted to be sensitive to some forms of anthropogenic presence (Palmer, 1988). Golden eagles avoid nesting near urban areas (Kochert et al., 2002). Individuals will occasionally nest near semi-urban areas where housing density is low and in ranch and farmland habitat. Golden eagles are extremely “skittish” and generally avoid human contact when possible (Palmer, 1988); they are “shy and retiring by nature” (Dixon, 1937: 56). High nesting mortality can occur due to overheating, chilling, or desiccation when young are left unattended by adults reacting to human intrusion (Boeker and Ray, 1971; Suter and Jones, 1981).

Habitat destruction is a factor in past, present, and foreseeable future cumulative impacts on population levels considered in this PEIS. Based on past and continuing trends, the potential for habitat destruction to cumulatively contribute to changes in populations numbers is high, and thus, may contribute to a re-analysis of take levels in the future.

4.1.7 Energy Production

Industrial-scale oil and gas production and commercial-scale facilities for wind and solar energy production are ecologically recent features on the landscape. Oil and gas production, ranging from small remote wells to large production facilities, started to be more widespread at the turn of the 19th century. Wind power has been used at smaller scales in the United States since the 1600s for grain grinding, sawmills, electricity, and pumping water for agriculture (Righter, 1996), and a large-scale turbine was used in the 1800s in Vermont to generate electricity before it was blown over (Manville, 2005). Ecological impacts can occur with fossil fuel and wind energy production (Kuvlesky et al., 2010; Jones and Pejchar, 2013). Sources of mortality of birds from fossil fuel energy production include evaporation ponds; reserve pits; flare tubes; and contamination and habitat fragmentation from pads, roadways, pipelines, and related infrastructure (Riley et al., 2012; Jones and Pejchar, 2013). Smith et al. (2010) showed substantial negative effects on golden eagles of oil and gas development in Wyoming and Utah. Mortality of wildlife from wind energy production includes impacts with meteorological towers and support guywires; blade strikes; altered bird movement and habitat use; and habitat fragmentation caused by tower supports, roadways, transmission wires, and related infrastructure (Manville, 2005). Mortality of wildlife at solar facilities results from impact trauma with panels, heliostats, and solar troughs; heat prostration and dehydration of grounded birds; singeing and immolation of birds mid-flight; alteration of bird movement and habitat use; and habitat fragmentation caused by solar fields, roadways, gen-tie, and transmission wires (Kagan et al., 2014; Manville, 2016).

Following a resurgence in the need for alternative energy in the U.S. by the 1970s, commercial-scale wind power electricity generation was planned and established primarily in California in the early 1980s (Braun and Smith, 1992). By 1990, California wind facilities were responsible for over 76% of the world's total wind energy production (Braun and Smith, 1992). Federal (EPACT 2005, EO 13423) and state mandates have increased the use of alternative energy, and subsequent federal and state financial subsidies were made available to project proponents in the early 2010s. Production from wind turbines increased to nearly 66 gigawatts by 2015 (DOE, 2016), and wind is projected to comprise 20% of electric energy production in the U.S. by 2030 (DOE, 2008). At present, approximately 90% of open applications for eagle take permits are for wind resource areas. Due to technological advances, wind energy facilities have expanded in geographic scope to encompass numerous wind resource areas (WRAs) in the contiguous United States. The trend for proposed wind generation projects in the United States and the continental distribution of bald eagles and golden eagles suggests overlap and the growing potential for mortality between eagles and wind projects. Wind energy can directly and

indirectly impact birds, including raptors and more specifically eagles (Hunt et al., 1997; Hunt et al., 1998; Smallwood and Karas, 2009; Noguera et al., 2010; Loss et al., 2013; Pagel et al., 2013; Smallwood, 2013; Zimmerling et al., 2013; Marques et al., 2014; Hunt and Watson, 2016).

In 2013, the USFWS generated conservation plan guidance for land-based wind energy (USFWS, 2013a). The availability of take permits, and the USFWS's need to assess the population-level effects of permitted actions, has greatly increased the necessity for understanding the spatial and numerical extent of existing and potential eagle mortality from wind turbine blade strikes.

The exact number of bald and golden eagle killed annually at wind facilities is unknown because many facilities do not monitor take, and many that do, do not provide or have not provided information to the USFWS (Pagel et al., 2013). Despite this, Pagel et al. (2013) showed that wind-turbine deaths of bald and golden eagles had been documented at least at 35 wind-energy facilities besides Altamont in 14 states. The number of bald eagles and golden eagles reported killed by Pagel et al. (2013) at non-Altamont wind facilities likely substantially underestimated the number of eagles killed at wind facilities throughout the United States. While Pagel et al. (2013) reported fewer bald eagles killed at wind facilities than golden eagles, this does not necessarily mean that there is less potential for deaths at wind facilities among bald eagles (Mojica et al., 2009). Reasons for lessened impacts to bald eagles is not clear, but were speculated by Pagel et al. (2013) to be related to fewer wind facilities near dense bald eagle populations, or related to lower carcass recovery rates at midwestern and eastern wind facilities. As further evidence of the potential for impacts to bald eagles, wind-farm deaths of the closely related white-tailed eagle (*Haliaeetus albicilla*) at one facility in Norway resulted in the near-extirpation of a local breeding population (Nygaard et al., 2010).

Energy production is a factor in past, present, and foreseeable future cumulative impacts on population levels considered in this PEIS. Based on past and continuing trends, the potential for energy production to cumulatively contribute to changes in populations numbers is high, and thus, may contribute to a re-analysis of take levels in the future.

4.1.8 Power Lines

Electrocution is considered to be one of the primary known causes of mortality of birds (Loss et al., 2014a) and raptors (Lehman, 2001; Lehman et al., 2007). Electrocution is known to impact bald eagles and golden eagles throughout their range (Russell and Franson, 2014; USFWS, 2016). Electrocution of golden eagles throughout their range in western North America has accounted for at least 25% of the discovered mortalities (Kochert et al., 2002). Beecham and Kochert (1975) noted that electrocution was responsible for 12 (43%) of the golden eagle mortalities in their study. Benson (1981) found that in a sample of 416 eagle carcasses in six western states, of 51 eagle carcasses fresh enough to determine cause of fatality, 41 were found to have been electrocuted. Hunt et al. (1998) indicated that 17% of a sample of 179 telemetered golden eagles were killed by electrocution. Unitt (2004) reported that 37 of 55

golden eagles were killed by electrocution in southern California from 1988 to 2003. Harness and Wilson (2001) documented at least 272 electrocutions deaths of golden eagles in North America from 1986 to 1996. Millsap et al. (2004) found that electrocution was one of two leading causes of death of satellite-tagged bald eagles in Florida, and Mojica et al., (2009) noted that line strikes and electrocutions are a major source of bald eagle mortality in the Chesapeake Bay area. Russell and Franson (2014) found that of the carcass submissions to the National Wildlife Health Center from 1975–2013, 17% of their sample of 753 eagles were found to have been killed by electrocution—372 bald eagles (12.5% of bald eagle deaths) and 381 golden eagles (27% of golden eagle fatalities). Most recently, USFWS (2016) estimated that about 500 golden eagles die annually in the U.S. from electrocution, accounting for 8% of all golden eagle deaths.

The Avian Power Line Interaction Committee (APLIC and USFWS, 2005; APLIC, 2006) has developed comprehensive guidelines to reduce electrocution-related mortality of many birds. In APLIC's words, "not all power lines are created equal. The APLIC documents are intended to illustrate the fundamental understanding of the risks and to illuminate the suite of solutions that can be utilized in a "toolbox" fashion to address specific issues for a given set of circumstances, in a specific time and place. Despite the existence of this guidance, electrocution remains (USFWS, 2014b) one of the Service's biggest concerns to long-term maintenance of golden eagle populations, as noted in eagle conservation plan guidance for compensatory mitigation planning (USFWS, 2013a). While power companies, line workers, and others related to the electrical infrastructure in the U.S. know how to prevent raptor and eagle electrocutions, the application of short- and long-term changes to electrical transmission and distribution poles and lines has not occurred at a broad scale within the U.S. Additionally, under Alternative 5 in particular, and to some extent under each of the Action Alternatives, compensatory mitigation may include measures to expedite the rate by which utility companies upgrade existing infrastructure, thereby facilitating the reduction of power line electrocutions and collisions for the both eagle species.

Injury or mortality by collisions of birds with utility wires is well-documented in Canada and the U.S. (Rioux et al., 2013; Loss et al., 2014a). APLIC, recently updated best practices (APLIC, 2012) to better address bird collisions. Mañosa and Real (2001) and Rollan et al. (2010) suggested that collision with power lines near nest sites may be negatively impactful to territories and the population of Bonelli's eagle (*Hieraaetus fasciatus).* Snyder and Snyder (1989) indicated that collisions with utility wires have killed and injured other large-winged raptors like California condors *(Gymnogyps californornianus).* Collisions with utility wires, primarily distribution lines, have not historically been considered a significant cause of mortality or injury of eagles; however, recent studies of satellite-tagged eagles suggest this factor does contribute to anthropogenic mortality of both species (Watts et al., 2015; USFWS, 2016). Because most new or existing utility lines and infrastructures are not monitored for line strikes for large or small birds, overall impact to eagles is unknown. Raptors have been impacted by new or existing

utility wires, raising this mortality threat as a concern (Drewitt and Langston, 2008). This can be especially true in areas where newer lines are constructed within and near eagle foraging habitats (Mojica et al., 2009; Watts et al., 2015).

Power lines are a factor in past, present, and foreseeable future cumulative impacts on populations levels considered in this PEIS. Based on past and continuing trends, the potential for power lines to cumulatively contribute to changes in population numbers is moderate to high, and thus, may contribute to a re-analysis of take levels in the future.

4.1.9 Collision with Aircraft

Using the Federal Aviation Administration Wildlife Strike Database (Dolbeer et al., 2013), U.S. Air Force Birdstrike Database (Zakrajsek and Bissonette, 2005), and the U.S. Navy Web Enabled Safety System, Washburn et al. (2015) tabulated that there were at least 234 reported eagle collisions with aircraft from 1990–2013. Washburn et al. (2015) calculated that aircraft collisions with bald eagles had increased by 2,200% during the 24-year period; collisions with golden eagles increased 400%. Washburn et al. (2015) found that airstrikes with eagles were mostly with civilian aircraft (197), and only 37 were with military (U.S. Air Force and U.S. Navy). Bald eagles were more likely to be hit by aircraft, with 200 reported strikes—173 by civilian aircraft and 27 by military. Bald eagle strikes occurred mostly in Alaska and Florida. Golden eagles were struck in 27 different incidents, with 17 strikes by civilian aircraft and by 10 military; all airstrikes were reported in western states, with almost half of those strikes reported in California. Golden eagles are sometimes indifferent to civilian and military overflight, which could lead to collisions for flights not related to reconnaissance and surveillance at nests (Grubb et al., 2010).

Airstrikes of bald eagles is a growing concern and a rising safety issue for pilots and passengers (Dolbeer, 2009; Dolbeer and Eschenfelder, 2003; Washburn et al., 2015). As the bald eagle population has increased post recovery, air strikes have concurrently increased in regions with higher concentrations of eagles (e.g., Alaska, Florida, and Chesapeake Bay). As eagles are large-bodied birds, hazards to pilots and passengers correspondingly increase (Dolbeer and Eschenfelder, 2003). To reduce potential for strikes, airfields (commercial and military) increasingly aggressively attempt to reduce or eliminate flying and perching eagles in the proximity of the landing field and all flight paths, as most air strikes were below 1,000 feet above ground level (Washburn et al., 2015). This will likely require more proactive management, including nest removal, active site abatement, and lethal take to reduce the abundance of bald eagles and golden eagles near airfields (USDA, 2005; Washburn et al., 2011).

Overall, collisions with aircraft themselves are likely to be relatively rare, and thus have low potential for adverse cumulative impacts on bald or golden eagle numbers.

4.1.10 Vehicle Collision

Roadway and railway collisions are a considerable source of mortality for wildlife worldwide (Trombulak and Frissell, 2001). Both bald eagle and golden eagle fatalities are not uncommon (Phillips, 1986; Millsap et al., 2004; Hunt et al., 1998; Loss et al., 2014b; Russell and Franson, 2014). Mortality occurs often after eagles are attracted to roadsides and train tracks by dead deer, dead elk, and other live or dead wildlife. Because of their inability to take off quickly, eagles may try to fly down or near open corridors to gain adequate speed to attain a safe elevation from oncoming vehicles, or fly perpendicular across the roadway when startled. Phillips (1986) found nearly 1,000 eagles killed on highways in Wyoming during one winter. Millsap et al. (2004) documented more suburban bald eagle fatalities from anthropogenic factors (primarily electrocution and vehicle collision) than rural counterparts, though most fatalities occurred in rural areas after dispersal from natal territories.

Hunt et al. (1998) noted in a telemetered sample of 179 golden eagles near Altamont that three eagles were killed by vehicles over the course of their four-year study. Russell and Franson (2014) found that of the carcass submissions to the National Wildlife Health Center from 1975–2013, 24.2% of their sample of 4,407 eagles were found to have been killed by trauma (mostly vehicle collisions), accounting for 22.9% of bald eagle deaths and 26.9% of golden eagle fatalities. Overall, collisions from all sources (vehicle, line-strikes, and turbine blade strikes) are estimated to kill about 500 golden eagles annually (about 9% of all golden eagle deaths; USFWS, 2016). USFWS (2013a) suggested a potential mitigation strategy is to keep roadsides with a high number of eagle fatalities clear of carrion in order to reduce eagle mortality from vehicle collisions.

Vehicle collision is a factor in past, present, and foreseeable future cumulative impacts on populations levels considered in this PEIS. Based on past and continuing trends, the potential for vehicle collision to cumulatively contribute to changes in populations numbers is moderate to high, and thus, may contribute to a re-analysis of take levels in the future.

4.1.11 DDT Contamination

The primary cause of the decline in populations of the peregrine falcon and bald eagle in North America from the 1940s through the early 1970s was contamination from a commonly used pesticide, DDT, and its subsequent bio-accumulated metabolite, DDE (Ratcliffe, 1967; Hickey and Anderson, 1968; Bitman et al., 1970; Grier, 1982; Nisbit, 1989; USFWS, 2007b). DDT is metabolized to form DDE, which blocks calcium deposition on the outer layer of eggshells, causing thinning, variation in shell pore size and density, and subsequent breakage and/or death of raptor embryos (Ratcliffe, 1967; Hickey and Anderson, 1968; Bitman et al., 1970; Peakall, 1970; Anderson and Hickey, 1972; Miller et al., 1976). Bald eagle populations declined substantially until DDT was banned in 1972 (Grier, 1982; USFWS, 2007b). Bald eagles still have some levels of DDE in their systems, but because of the U.S. ban of DDT, DDE levels have dropped significantly, thereby allowing for a successful recovery in all areas of its range in North

America. Golden eagles were not impacted at comparable demographic levels due to differences in diet; DDE did not concentrate to the same levels in the mammalian food chain compared to levels among prey fish and birds (Newton, 1998). This resulted in golden eagles having levels of DDT/DDE in their eggs in western states that did not seem to impair reproductive success (Ellis, 1979).

At this time, DDT/DDE levels in both species have become negligible. Thus, DDT contamination is a factor in past, cumulative impacts on the topics considered in this PEIS, but the potential for present or future cumulative action is low.

4.1.12 Disease

Extant and emerging diseases can have impacts on eagles. Disease outbreaks are often limited to instances when single or multiple eagles are collected, and are fresh enough where diagnostic tools can be used to discern morbidity. Russell and Franson (2014) found few diagnosable instances where infectious disease could be discerned. In their sample of 763 eagles submitted to the National Wildlife Health Center, only 5% of bald eagle remains, and 3% of golden eagle remains, could be correlated with an infectious disease. Aspergillosis, avian pox, *Staphylococcus sp. septicemia* (origin unknown), avian cholera (pasteurellosis) and West Nile virus were determined to be the primary causes of disease-induced mortality, with aspergillosis diagnosed to have killed 35 bald eagles and 15 golden eagles (Russell and Franson, 2014).

Avian vacuolar myelinopathy (AVM) has also been discerned to have killed at least 100 bald eagles in southeastern U.S. states (Thomas et al., 1998; Rocke et al., 2002; Wilde et al., 2005). This disease and the cyanobacteria with which it has been associated appear to be present in some southeastern U.S. reservoir ecosystems that support the invasive aquatic plant hydrilla (*Hydrilla verticillata*; Wilde et al. 2005). Because of the wide range and extent of this disease outbreak, combined with the likely continued expansion of hydrilla, it is reasonable to assume that additional bald eagles could be killed in the future.

Unexpected disease outbreaks have potential to kill eagles massed during winter foraging at concentration areas near water or other food sources. For example, at least 27 bald eagles in Utah were killed in 2013 by West Nile Virus that was remnant in concentrations of avian prey. Bald eagles may die in larger quantities in future events when they are massed near waterfowl populations that may have avian cholera, avian pox, aspergillosis, or AVM. Golden eagles are also susceptible to disease; however, because of their propensity to be in remote areas at low densities, disease is not expected to cause the same level of mortality.

Based on past and continuing trends, the potential for disease to cumulatively contribute to changes in populations numbers for bald eagles is high, and for golden eagles somewhat lower. These changes in populations levels may contribute to a re-analysis of take levels in the future.

4.1.13 Summary of Cumulative Impacts for Eagles and Eagle Habitat

Because of their complex ecology, bald eagles and golden eagles are subject to a myriad of threats each day. These include, but are by no means limited to, background contamination by lead bullets from offal and small mammals, exposure to rodenticides, electrocution caused by perching on a utility line, striking objects in pursuit of prey, or shooting. Other threats that may cause mortality or disturbance include starvation, trapping, drowning in water tanks, wildfire, researcher impacts, habitat loss (including fragmentation), disturbance, recreation, climate change, disease, changing prey distribution and abundance, weather extremes, and energy production. All of these threats individually and cumulatively could cause substantial impacts to local, regional, and continental populations of both species of eagle.

In areas with little human presence—for example, remote areas of the United States—both eagle species must contend with other eagles, peregrine falcons, inclement weather, climate change, prey fluctuations, wildfire accidents, and disease/parasites. Availability of food, followed by suitable nesting locations, are the primary factors that influence reproduction in eagle populations (Newton, 1979). Body condition levels in breeding females during courtship affects breeding success each year, and territories with low prey levels may be abandoned or infrequently used (i.e., eagles are present but do not breed) for over a decade (Kochert et al., 1999; Kochert and Steenhof, 2012; Watts, 2015).

Because they are wide-ranging, many individual eagles are exposed to human-made and natural threats over a wide geographic area each year. As human populations increase and more habitat is lost to agriculture, housing, and energy developments, urbanization, wildfire, and fragmentation, eagles have less of the natural, undisturbed habitats in which they evolved.

Assessing impacts of cumulative risk factors is difficult at best. Assessments may underestimate risks if the activities are situated in highly productive “source” habitats, which are often responsible for much of the annual fecundity of a raptor population (Newton, 1998). Effects may also be exacerbated if they result in segments of the population becoming isolated from each other. These latter cumulative effects may even occur when none of the individual effects have incurred “take” under the Bald and Golden Eagle Protection Act. It is also important to note that some of these activities are not solely harmful in their effects, and in some cases may ultimately prove to be benign or even beneficial. For example, high prey densities in urban wetlands in Florida support population growth in bald eagles (Millsap et al., 2004), and the proliferation of highway road kills, livestock carcasses, and expanding white-tailed deer (*Odocoileus virginianus*) populations in the eastern U.S. have increased food for golden eagles (though perhaps not to the extent that declines in native prey are offset).

Overall, these combined factors have not negatively affected the potential for population growth in bald eagles, as evidenced by the trends reported by USFWS (2016). However, cumulative factors may be contributing to possible ongoing or future declines of golden eagles.

For golden eagles, the evidence suggests that current high levels of mortality are having a bigger impact on populations than other factors (USFWS, 2016). Considering cumulative factors is an important aspect of the eagle permit analysis, and the LAP assessment that would be required under Alternatives 4 and 5 (optional under the remaining Alternatives) serves in that capacity by compiling information on, and analyzing, ongoing take in proximity to a prospective permit. Thus, the LAP analysis allows the Service to formally account for the most important of these impacts when assessing future take authorizations.

4.2 MIGRATORY BIRDS

4.2.1 Lead and Mercury Poisoning

Lead metal has been amply documented to have negative effects on multiple species of migratory birds, including terrestrial birds, waterfowl, and raptors (Bellrose, 1959; Redig, 1979; Eisler, 1988; Kendall et al., 1996; Kramer and Redig, 1997; Fisher et al., 2006; Hunt et al., 2006; Cade, 2007.) Impacted birds ingest lead shot, fragmented or whole bullets, or lead fishing weights, and incur lead toxicosis (Scheuhammer and Norris, 1996; Eisler, 1988; see also *4.1.3 Lead Poisoning*). Lead that is ingested results in lethal and sublethal lead levels to terrestrial birds, waterfowl, and raptors (Redig, 1979; Pattee et al., 1990; Franson and Pain, 2011; Kelly et al., 2011; Franson and Russell, 2014). Sublethal levels impact behavior, including feeding, breeding, and movement.

Mercury cycling in aquatic ecosystems is a concern for upper trophic-level shorebirds and piscivorous waterbirds over much of the U.S. and its territories (Heinz, 1979; Ohlendorf et al., 1988; Zillioux et al., 1993; Evers et al., 2008; Eagles-Smith et al., 2009). See *4.1.3 Lead Poisoning* for additional details.

4.2.2 Climate Change

Individual-, species-, and guild-level impacts of climate change to birds in North America are becoming apparent (Carey, 2009). Refer to *4.1.5 Climate Change* for additional background.

While some migratory bird species may benefit from climate change, many will not. Climate change will alter breeding, foraging, migration, and wintering behavior and habitat for migratory birds of all guilds through a myriad of cascading events and feedback loops (Crick, 2004; Carey, 2009). Some of these changes will involve subtle to wholescale habitat and vegetation shifts not only for microcosms, but also whole ecosystems will shift to higher latitudes and upper elevations, resulting in shifts in the distribution of insect and plant foods and avian diseases (Inouye et al., 2000; Parmesan and Yohe, 2003; Walther et al., 2002). In some areas of the U.S., climate change could result in wholescale vegetation change through insect infestations, stand-replacing wildfires, and local and regional extinctions of key habitat components (Small-Lorenz et al., 2013). Long-term droughts, variation in traditional precipitation patterns (snow, rain, monsoonal periods, storms, wind regimes, etc.), heat waves, and extreme weather events would have incremental impacts to the entire life cycle of birds

(McKechnie and Wolf, 2009). These in turn could lead to changes in migration phenology and foster shortstopping behavior as species react to changing migration corridors (Cotton, 2003; Jenni and Kéry, 2003; Emberg et al., 2014; see also discussion in *4.1.5 Climate Change* for a contemporary example with the golden eagle).

4.2.3 Habitat Destruction

Human-caused habitat loss, conversion, and degradation impacts migratory birds throughout the U.S. (Andren, 1994; Goss-Custard et al., 1995; Sutherland, 1996). Refer to *4.1.6 Loss and Fragmentation of Eagle Habitat* for additional background.

Most habitat changes impacting nesting, roosting, foraging, and migration habitat of birds occurs incrementally, yet some populations may not possess genetic or behavioral flexibility needed to adapt to habitat loss. Populations may be reduced when ecological niches are destroyed or degraded, leading to population reductions (Dolman and Sutherland, 1995; Sutherland, 1996). Large-scale habitat loss caused by utility-scale energy production (Sovacool, 2009), anthropogenic habitat conversion, or habitat degradation influenced or impacted by climate change (Opdam and Wascher, 2004) can cause permanent conversion of large expanses of suitable habitat in short ecological periods (Logan and Powell, 2001; McKinney et al., 2009). Studies of population declines of multiple species of birds show population stability can be influenced by loss of nesting, migration, or wintering habitat (Newton, 1998). Loss of habitat can affect annual productivity through reducing pre-breeding condition, increasing nest-predation rates, and reducing survival of young. Loss and fragmentation of migration and wintering habitat can impact survival (Robbins et al., 1989; Barrow et al., 2000; Jiguet et al., 2007).

Migration pathways for some birds are fixed, whereas others have broad-scale migration patterns and use different pathways each migration based on age/sex, weather, nutritional needs, and final destination. Loss of habitat, or creation of barriers at flight height (e.g., wind energy facilities, communication towers, urbanization), along migration routes can have subtle or overt impacts on individual fitness and potentially the status of a population (Meyers 1983; Robbins et al., 1989; Barrow et al., 2000; Mabee and Cooper, 2004; Manville, 2005; Barclay et al., 2007; Jiguet et al., 2007; Manville 2016).

4.2.4 Energy Production

Fossil fuel, wind, and solar energy production and their interrelated and interdependent actions have direct and indirect impacts on migratory birds. Each form of energy production may have different deleterious impacts to birds through habitat conversion or blunt force trauma from hitting wind tower blades, solar panels, heliostats, or parabolic troughs, or fossil fuel infrastructure during energy production. Refer to *4.1.7 Energy Production* and *4.1.8 Power Lines* for further information related to energy production.

As noted in *4.1.7 Energy Production*, energy production (fossil fuel, wind, and solar) can cause mortality of migratory birds (Osborn et al., 2000; Manville, 2005; Drewitt and Langston, 2006; Smallwood and Karas, 2009; Kuvlesky et al., 2010; Noguera et al., 2010; Riley et al., 2012; Jones and Pejchar, 2013; Loss et al., 2013; Smallwood, 2013; Zimmerling et al., 2013; Kagan et al., 2014; Marques et al., 2014; Manville, 2016). The number of birds impacted by energy development is unknown. Each form of energy production may have disproportionately high fatalities with certain guilds of species. For example, high numbers of raptors and passerines are struck by turbine blades during migration and forage flights (Mockrin and Gravenmier, 2012; Smallwood, 2013; Marques et al., 2014); waterbirds and other long distance migrants are killed through blunt force impact trauma and/or immolation at industrial-scale solar facilities (Kagan et al., 2014; Manville, 2016); and waterfowl, raptors, and sagebrush steppe birds are impacted by habitat fragmentation and loss and other sources through fossil fuel energy production (Braun et al., 2002; Ingelfinger and Anderson, 2004; Gilbert and Chalfoun, 2011; Fuller, 2013; Jones and Pejchar, 2013).

4.2.5 Power Lines

Power lines continue to be a source of numerous fatalities of migratory birds through electrocution and blunt force impact trauma. Refer to *4.1.8 Power Lines*.

Loss et al. (2014a) reviewed data from comparative studies on electrocution and collision fatalities of birds, and found evidence to suggest 12 to 64 million birds are killed by transmission and distribution lines in the U.S. each year. Further analysis indicated that between 0.9 and 11.6 million were killed annually by electrocution, and 8 to 57 million were killed annually by collision. Rioux et al. (2013) found a similar magnitude of estimated fatalities of birds in Canada, with a range of 2.5 to 25.6 million birds killed per year. Vulnerable birds that appear most at risk to collisions with transmission lines include waterfowl, waterbirds (grebes and cranes), and shorebirds, but Rioux et al. (2013) suggested that raptors and waterfowl fatalities via power lines may be increasing. Electrocutions caused by power distribution lines not built or maintained to APLIC (2012) standards continue to be a concern in the U.S. for raptors (Bevanger, 1994; Lehman, 2001; Lehman et al., 2007). Impacts of birds at communication towers (towers and guywires) appear to be comparable to fatalities caused by power lines in type and gross numbers (Kerlinger, 2000; Manville, 2000).

4.2.6 Collision with Aircraft

Aircraft colliding with birds has been a problem for the safety of pilots and for birds since aircraft first flew (Thorpe, 2003; Dolbeer, 2013). The Federal Aviation Administration has noted that avian collision with aircraft is a growing safety issue as commercial and military air flights increase in the U.S. (Dolbeer and Eschenfelder, 2003; Dolbeer, 2009; Dolbeer et al., 2013). In addition to safety, the economic losses due to bird strikes and the costs of bird-strike prevention are increasing in parallel to the increase in overall bird strikes (Allen, 2000; Allen and

Orosz, 2001; Dolbeer, 2009; Dolbeer, 2013). Refer to *4.1.9 Collision with Aircraft* for additional information.

Most birds that migrate or fly in open habitat are subject to collision with civilian or military aircraft (Zakrajsek and Bissonette, 2005; Dolbeer, 2006; Dolbeer et al., 2013; Washburn et al., 2013). Programs around airports exist to reduce the number of birds that may be impacted by aircraft (Martin et al., 2011; Van Belle et al., 2007). Dolbeer et al. (2013) suggest that bird strikes in the U.S. have increased by almost six times from 1990 to 2012. The scale of avian fatalities caused by aircraft incidents, and resulting impact to bird populations is currently not well understood.

4.2.7 Vehicle Collision

Vehicle collisions are among the leading causes of bird mortality in North America (Trombulak and Frissell, 2001; Bishop and Brogan, 2013; Loss et al., 2014b). See *4.1.10 Vehicle Collision* for more information. Estimates of the gross number of birds killed by vehicles in Canada was about 3,462 birds killed per 100 kilometer of road, or approximately 13,810,906 birds killed per year (Bishop and Brogan, 2014). Loss et al. (2014b) suggested between 89 and 340 million birds die annually on U.S. roadways per year, or an estimate of 19.4–98.5 birds killed per kilometer of road each year (median = 48.8). At present, there is limited information as to whether vehicle collisions are impacting bird populations in the U.S., either overall or for individual species (Bard et al., 2001).

4.2.8 DDT Contamination

DDT and its metabolite DDE impacted raptors and several piscivorous water birds in the United States from the mid-1940s through the latter portion of the 20th century, following its U.S. ban in 1972. (Mechanisms of delivery and impacts of DDE/DDT are discussed in *3.2.1.2 Population* and *4.1.11 DDT Contamination*.) Besides bald eagles, peregrine falcons, osprey, and brown pelicans were impacted by the world-wide use of DDT. Their populations have recovered in many areas to pre-DDT levels, with peregrine falcons being removed from the U.S. Endangered Species List in 1999 and brown pelicans removed in 2000 (ospreys were never listed)" (Bierregaard et al., 2014). Analysis of blood levels post-recovery suggested the metabolite DDE has decreased significantly in migrant peregrine falcons (Henny et al., 2009). DDE has recently been determined to cause eggshell thinning in California condors, which have acquired this contaminant from the fatty tissues of scavenged marine mammals on the Pacific Coast (Burnett et al, 2013). This has caused concern because of the already limited wild reproductive success of California condors.

4.2.9 AVM Disease

AVM is known to impact raptors and other species of waterbirds, including primarily American coots. AVM is discussed in *4.1.12 Disease*. Several species of ducks, shorebirds, and raptors besides American coots and bald eagles have been impacted by AVM, however not to the

extent of these two species (Thomas et al., 1998; Rocke et al., 2002; Wilde et al., 2005). At this time, this disease is restricted to reservoirs in the U.S. Southeast states, and besides the deaths of at least 100 bald eagles and many American coots, does not appear to be impacting populations of other species.

4.2.10 Conclusions

Migratory birds are impacted by multiple threats in the United States and other MBTA signatory countries. As shown above, these threats can vary by species, region, and time of year, in addition to differing by sex and age classes of a species. Perturbations in natural and human-modified environments impact nesting, roosting, foraging, migration, and wintering habitat of many bird species. Further, alterations in ecological and predator/prey relationships related to humans and climate change are negatively impacting many species of birds. Major threats affecting survival include vehicle strikes (car, truck, and aircraft); pesticides and other contaminants (lead, mercury, DDT/DDE); and disease (as shown by AVM). The effects of these factors may be exacerbated by climate change.

The cumulative impacts of threats mentioned above may be increased by the activities that require and obtain eagle permits that are the subject of this PEIS. These impacts, largely restricted to individual migratory birds and to a lesser degree their populations, will occur as a result of fatalities/injuries and loss and degradation of habitat at facilities and locations where eagles are authorized to be taken under permit. In most cases, the activities causing harm will go forward with or without a permit; the permit itself is not the mechanism that will cause the impacts. To the contrary, permit conditions can help reduce or alleviate impacts that would otherwise go unmitigated.

4.3 Other Permitted Take

The cumulative effects evaluation for other permitted take (OPT) primarily considers the potential for the factors noted in *4.1 Cumulative Actions Considered for Bald and Golden Eagles* to add to the impacts of the proposed alternatives and therefore require modification of permit limits or conditions. The analysis, therefore, is driven by the Service's projected ability to continue to meet its eagle management objectives, discussed in *3.2 Bald Eagle*, *3.3 Golden Eagle*, *3.4 Eagle Habitat*.

Cumulatively, the Service does not expect changes or appreciable impacts to the continuation or magnitude of OPT of eagles from any of the alternatives for the reasons discussed in *3.6 Other Permitted Take* primarily because the level of OPT included in the baseline exceeds the levels of reported OPT from 2010–2014.

Since the Service's decision to grant an incidental take permit is ultimately driven by whether the permitted activity would impose a cumulative adverse effect on eagle management objectives, the analysis of cumulative impacts is similar to the impact analysis for the proposed and alternative actions.

Under all the alternatives in the PEIS, power line retrofitting to substantially reduce injury and mortality of eagles is an integral tool both for permitting electric utilities and for addressing take from other permitted sources. The effect of the emphasis on power line retrofits will be beneficial to eagles and reduce the likelihood that cumulative impacts would affect other permitted take of both bald and golden eagles.

While the analysis of impacts in *3.6.2 Environmental Consequences* concluded that there was no difference in impacts to other permitted take between the liberal and conservative take limits (because under both take approaches demand for take was likely to remain below baseline, where limits do not apply), the cumulative impact could be different between the two with regard to bald eagle populations. That is, the higher (liberal) unmitigated take limit is more likely to lead to negative population trajectories over time that force re-evaluation of the baseline, by having authorized more eagle take and causing, or at least contributing to, eagle population pressures. The ability to secure a minimal level of compensatory mitigation for every permit issued under Alternative 3 would lessen those cumulative impacts. However, the likelihood that bald eagle populations will decline in the foreseeable future, under the conservative take limits of Alternative 5, is sufficiently low that the Service will have the opportunity to modify its management approach based on trends detected through population monitoring. Golden eagle populations and habitat are best protected under Alternative 5, as described in *3.3 Golden Eagle* and *3.4 Eagle Habitat.* On the whole, Alternative 5 is the least likely to result in cumulative adverse effects to potential applicants for other types of eagle take permits.

4.4 Cultural and Religious Issues

The cumulative effects evaluation with regard to cultural and religious values and resources primarily considers the potential for the factors noted in *4.1 Cumulative Actions Considered for Bald and Golden Eagles* to add to the impacts of the proposed alternatives and, as a result, affect those for whom eagles and locations historically used by eagles carry cultural and/or religious significance. The analysis centers on the Service's projected ability to continue to meet its eagle management objectives, discussed in *3.2 Bald Eagle*, *3.3 Golden Eagle*, *3.4 Eagle Habitat* above.

Impacts to eagle populations from collisions with vehicles, aircraft, wind turbines, and other human infrastructure; shooting; electrocution on power lines; DDT; climate change; AVM disease; and lead and mercury poisoning could create additive cumulative impacts with further authorized or unauthorized take of wild eagles to those with cultural values that require continued healthy populations of eagles.

Because breeding populations of bald eagles in the Southwest are growing more slowly than populations in other parts of the United States, such cumulative effects to eagles could be felt most by tribes for whom southwest populations of bald eagles are of special significance. However, the lower unmitigated take levels for the southwestern bald eagle population in all

the Action Alternatives are designed to better buffer that population by allowing it to continue to grow at a proportionally faster rate. In any event, the southwest populations are expected to continue growing under all action alternatives.

Under all the alternatives in the PEIS, power line retrofitting to substantially reduce injury and mortality of eagles is an integral tool both for permitting electric utilities and for addressing take from other permitted sources. The effect of power line retrofits is likely to be beneficial to eagles, with corresponding beneficial effects for tribes. Cumulative effects to bald eagles from power pole retrofits will also have beneficial effects on conservationists and those who place high value on protecting the nation's symbol.

With regard to projects for which the eagle permit is the only federal nexus or undertaking, the increase in the number of activities that will be covered under permits, and therefore analyzed for effects on TCPs under the NHPA, will increase over what would otherwise be the case.

Cumulative impacts to bald eagles could be different between the Alternatives with higher versus lower take limits. By having authorized more eagle take and causing, or at least contributing to, eagle population pressures, the higher (liberal) unmitigated take limit is more likely to lead to negative population trajectories over time that may force re-evaluation of the baseline. The ability to secure a minimal level of compensatory mitigation for every permit issued under Alternative 3 would lessen those cumulative impacts. However, the likelihood that bald eagle populations will decline in the foreseeable future, under the conservative take limits of Alternative 5, is sufficiently low that the Service will have the opportunity to modify its management approach based on trends detected through population monitoring. On the whole, Alternative 5 is likely to result in minor to moderately beneficial effects to eagles and, therefore to cultural values and resources.

4.5 SOCIOECONOMIC RESOURCES

With the exception of climate change, the potential for the most of the factors noted in *4.1 Cumulative Actions Considered for Bald and Golden Eagles* to impact socioeconomic resources is low, and any predicted effects of those factors would be purely speculative.

While the cumulative effects to eagles described in *3.2 Bald Eagle*, *3.3 Golden Eagle*, *3.4 Eagle Habitat* could translate to impacts to socioeconomic resources, those would be insignificant compared to effects from climate change; changes in demand for goods and services; and the effects of federal, state, and local regulations with direct application to the socioeconomic activities themselves, including approval of industrial uses, zoning, permits for construction and operation, leases and rights-of-way, taxation, subsidies, and so forth. Climate change in particular is likely to affect energy production and distribution, and the entire economy, as well as many socioeconomic norms and societal values. These effects are difficult to predict and are beyond the scope of this PEIS.

Chapter 5. SUSTAINABILITY AND LONG-TERM MANAGEMENT

5.1 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

NEPA Section 102(2)(C)(v) requires a discussion of whether implementing the proposed action would, for any reason, irreversibly commit resources that would no longer be available for other purposes. Examples might include a commitment to consume resources such as fuel, which cannot be recycled or reused. Such a commitment is intended to be described and then compared with the benefits of the project to compare those benefits to the irreversible commitment of such resources.

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road.

Permits that authorize the take of eagles by their nature legalize the loss of individual birds. However, eagles are a renewable resource in that individuals can be replaced if populations are healthy enough, and where that replacement is necessary to meet the overall goal of stable or increasing populations, these regulations will require such replacement. Moreover, the avoidance and minimization required as a condition of the permits issued under these regulations will reduce the overall number of eagles that will be taken, lessening the impacts of many activities on eagles from what would otherwise be the case. Overall, the revised eagle permit regulations would contribute to the protection of eagle populations from declines. It is important to note that take authorized under an eagle permit would have occurred anyway in many cases and legalizing such take under a permit allows the Service to place conditions, as described, on activities that would not otherwise have been required. Thus, eagle permits, by design, act to reduce and replace any commitment of eagle resources.

Terrestrial habitat loss would be associated with, but not caused by the issuance of some eagle take permits. Some of the permits may stipulate compensatory mitigation via habitat conservation measures, thus reducing the potential for any irreversible and irretrievable loss of natural resources. Furthermore, habitat loss or degradation that may occur with the implementation and operation of individually permitted projects may not be an irreversible or irretrievable use of resources since decommissioning of projects and site restoration may be feasible at the end of a project's life.

Overall, it is not expected that eagle rule revisions would result in a significant irreversible or irretrievable commitment of resources.

5.2 Short-Term Uses and Long-term Productivity

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

The revised eagle rule regulations would not have any direct impacts on short-term uses and long-term productivity of resources. Eagle permits do not authorize uses, they only authorize take of eagles by those uses. The productivity of habitats can be negatively impacted by individually permitted projects, but because the eagle permit only authorizes the take of eagles and not the underlying project itself, any impacts would be limited to those caused by negotiating and finalizing permit conditions.

Any impacts would be site-specific and of relatively short duration. Therefore, revised eagle rule regulations would not eliminate the potential for long-term productivity of habitat affected by permitted projects and, in the specific case of eagle populations, are designed to maintain and increase long-term productivity. No significant impacts to long-term productivity are expected to occur. It is not expected that implementation of the revised eagle rule would permanently narrow the range of beneficial uses of the human environment or adversely affect long-term productivity.

5.3 Unavoidable Adverse Environmental Effects

This section refers to those adverse effects that cannot be avoided as a result of proposed eagle rule revisions. Implementation of the proposed action is intended to move toward an overall improved condition, but some adverse environmental effects would occur.

Impacts on bald and golden eagles would be largely beneficial in comparison to effects in the absence of these regulations. However, short-term negative impacts are possible in cases where sustainable take is overestimated; these would be more likely under Alternatives 2 and 4 than under the other Alternatives. In many of these cases the need for corrective action will become apparent as part of the adaptive management process.

There would be indirect, adverse impacts from potential loss and fragmentation of eagle habitat, and reduced habitat values and suitability during implementation of permitted projects, though the eagle regulations themselves would not be the root cause of any loss and fragmentation of eagle habitat caused by permitted projects beyond that caused by negotiating and finalizing permit conditions.

There would be indirect, adverse impacts on populations of migratory birds from possible take of birds and from potential migratory bird habitat loss, habitat fragmentation, and reduced

habitat values and suitability during implementation of permitted projects, although again, this would primarily be caused by construction and operation of the projects themselves and not implementation of the eagle regulations.

Chapter 6. CONSULTATION AND COORDINATION

An EIS must be prepared when a federal government agency considers approving an action within its jurisdiction that significantly affects the quality of the human environment. An EIS aids federal officials in making decisions by presenting information on the physical, biological, and social environment of a proposed action and its alternatives.

This PEIS has been prepared with input from and coordination with interested tribal governments, agencies, organizations, and individuals. CEQ regulations [40 CFR 1500–1508] require an early scoping process to determine the issues related to the proposed action and alternatives that the EIS should address. The purpose of the scoping process is to identify important issues, concerns, and potential impacts that require analysis in the EIS and to eliminate insignificant issues and alternatives from detailed analysis. Public involvement is a vital component of NEPA for vesting the public in the decision-making process and allowing for full environmental disclosure.

6.1 PUBLIC PARTICIPATION

The public participation and interagency coordination elements of the NEPA process promote open communication between the lead federal agency and other regulatory agencies, Native American tribes, stakeholder organizations, and the public. A notice of availability of the Draft PEIS was published in the Federal Register (81 FR 27934, May 6, 2016), which opened a 60-day public comment period.

6.1.1 Scoping Process

The Service planned and implemented a public input scoping process to identify issues to consider when revising the eagle nonpurposeful take permit regulations for this NEPA effort. The purpose of scoping is to provide interested agencies, stakeholder organizations, Native American tribes, and the public an opportunity to provide comments regarding potentially significant environmental issues and the scope of the environmental analysis, including alternatives, and help to inform the eagle management program and the Service decision to prepare either an EA or an EIS. Service staff who had been implementing the 2009 eagle permit regulations identified a number of priority issues for evaluation during this scoping process, including the following: eagle population management objectives, programmatic permit conditions, compensatory mitigation, and criteria for nest removal permits.

Five public scoping meetings were held in Sacramento, California; Minneapolis, Minnesota; Albuquerque, New Mexico; Denver, Colorado; and Washington, DC, between July 22, 2014, and August 7, 2014. These meetings consisted of a narrated overview video presentation and 10 large informational displays with supplemental informational handouts. Representatives from

the Service were available to answer participants' questions and listen to their ideas and concerns. Approximately 213 people attended the meetings, and all were encouraged to submit written comments.

The Service developed a website, http://www.eaglescoping.org, where visitors could go to see the same information that was presented at the public meetings, including the overview video presentation and informational displays. Links to the Service e-mail for public comments were included on the site.

The Service received a total of 536 comments during the public comment period. Upon removal of duplicates, there were a total of 517 unique comments, of which many included additional attachments (e.g., scanned letters, one picture, and supporting documents). In addition to the comments received, two organizations provided spreadsheets with additional comments. First, the Friends of Blackwater provided a spreadsheet of 46 supporters of their comment. Second, the National Audubon Society provided a spreadsheet of 25,349 comments in support of their comment and 2,064 personalized comments.

Most of the comments could be categorized into eight major thematic areas:

- General comments against the killing of eagles (or for eagle protection);
- Proposed 30-year permit is too long (or keep the permit length at five years);
- Other permit length comments;
- Falconry concerns or changes to eagle take for falconry;
- Comments generally against wind energy facilities;
- Comments generally in favor of wind energy facilities;
- A need exists for more research (or there is not enough information); and
- Form letters originating from an organization, but sent by individuals.

In addition to being part of these general themes, many of the comments contained specific recommendations for the Service to consider regarding eagles and eagle management. The full scoping report is available at http://www.eaglescoping.org.

The Service considered the scoping comments in preparing this Final PEIS.

6.1.2 Draft PEIS Public Review Period

The Service provided a 60-day review and comment period beginning with the publication of the proposed rule, which also served as a notice of availability for the Draft PEIS in the Federal Register. Comments on the Draft PEIS could be submitted directly through Regulations.gov (with a link from the PEIS website: http://www.eagleruleeis.org).

The Service received 780 comments on the proposed rule and Draft PEIS. Comments were received from states, tribes, non-governmental organizations, industry associations, individual companies, and members of the public. The Service considered all comments received during the Draft PEIS review period in preparing the Final PEIS.

On December 10, 2016, a notice for the Final PEIS was published in the Federal Register by the Environmental Protection Agency, as required by law. The Record of Decision (ROD) was signed on December 12. 2016 and made available to the public on the Service's website at https://www.fws.gov/birds/management/managed-species/eagle-management.php.

6.2 Consultation with Government Agencies and Tribal Governments

6.2.1 Agency Consultation

Appendix C, Government Agencies and Organizations Consulted contains the list of state and federal government agencies, as well as non-government organizations that provided comments on the draft PEIS and/or proposed regulations.

6.2.2 Tribal Consultation

Federal agencies are required to consult with Native American tribes as part of the Advisory Council on Historic Preservation Regulations' Protection of Historic Properties [36 CFR 800] when implementing Section 106 of the NHPA. Accordingly, NHPA outlines when federal agencies must consult with tribes and the issues and other factors this consultation must address. In addition, pursuant to EO 13175, executive departments and agencies are charged with engaging in regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications, and they are responsible for strengthening the government-to-government relationship between the U.S. and tribes.

The Service also consulted with federally-recognized tribes as part of its commitment to carry out its trust responsibility to those tribes consistent with Executive Order 13175, Consultation and Coordination with Indian Tribal Governments (65 FR 67249, Nov. 9, 2000), the Department of the Interior's Consultation Policy (DOI, N.D.), and the Service's Native American Policy (USFWS 2016b).

In 2013 and 2014, the Service conducted webinars and met with tribes regarding eagle management and permitting actions, including revised eagle rule regulations. Table 6-1 lists the tribes and tribal organizations that were consulted or attended informational meetings.

Table 6-1. Tribal consultation and informational meetings on eagle management and permitting actions.

Service Region	Tribe	Date of Meeting or Letter
Region 1	Nez Perce Tribe	March 11, 2014
	Shoshone-Bannock Tribes	March 17, 2014
Region 2	Navajo Nation	November 19, 2013; December 11, 2013; and August 19–20, 2014

	Isleta Pueblo	November 25, 2013, and December 11, 2013
	Zuni Pueblo	December 11, 2013; January 21, 2014; and August 19–20, 2014
	Jicarilla Apache	December 11, 2013, and January 23, 2014
	Osage Nation	January 24, 2014
	Santa Ana Pueblo	December 11, 2013 and February 13, 2014
	Gila River Indian Community	April 15, 2014
	Iowa Tribe of Oklahoma	April 17, 2014 and August 19–20, 2014
	San Carlos Apache	April 30, 2014; August 19–20, 2014; August 26, 2016
	Yavapai Apache Nation	May 14, 2014
	Hopi Tribe	December 11, 2013
	Pueblo of Laguna	December 11, 2013
	Pueblo of Cochiti	December 11, 2013
	Pueblo of San Felipe	December 11, 2013, and August 26, 2014
	White Mt. Apache	December 11, 2013, and September 24, 2014
	Pueblo of Jemez	December 11, 2013; August 19–20, 2014; May 25, 2016
	Pueblo of Taos	December 11, 2013
	Mescalero Apache	December 11, 2013
	Yavapai Prescott Indian Tribe	June 17, 2014
	Citizen Potawatomi Nation of Oklahoma	August 19–20, 2014
	Comanche Nation of Oklahoma	August 19–20, 2014
	Inter Tribal Council of Arizona	June 12, 2014
	All Apache Council	June 17, 2014
Region 3	The member tribes of the Great Lakes Indian Fish & Wildlife Commission (Misi-zaaga'iganiing (Mille Lacs), Nagaajiwanaang (Fond du Lac), Bikoganoogan St. Croix (Danbury), Gaamiskwaabikaang (Red Cliff), Mashkiigong-ziibiing (Bad River), Ginoozhekaaning (Bay Mills), Waaswaaganing (Lac du Flambeau), Gete-gitigaaning (Lac Vieux Desert), Zaka'aaganing (Mole Lake/Sokaogon), Gakiiwe 'onaning (Keweenaw Bay), Odaawaa-zaaga'iganiing (Lac Courte Oreilles)	September 16, 2016

Region 4	A letter was sent to all federally recognized tribes within the region inviting them to consult with the Service. No tribes responded.	Invitation extended September 2013
Region 5	Tribe of Gay Head (Aquinnah)	December 17, 2013
	Tonawanda Seneca Nation	December 17, 2013
Region 6	Cheyenne	November 19, 2013 and/or March 20-21, 2014
	Chippewa Cree	November 19, 2013 and/or March 20-21, 2014
	Comanche	November 19, 2013 and/or March 20-21, 2014
	Confederated Salish & Kootenai Tribes	November 19, 2013 and/or March 20-21, 2014
	Crow Tribe	November 19, 2013 and/or March 20-21, 2014
	Eastern Shoshone Tribe	November 19, 2013 and/or March 20-21, 2014
	Kiowa	November 19, 2013 and/or March 20-21, 2014
	Lower Brule Sioux Tribe	November 19, 2013 and/or March 20-21, 2014
	Navajo Nation	November 19, 2013 and/or March 20-21, 2014
	Northern Arapaho Tribe	November 19, 2013 and/or March 20-21, 2014
	Northern Cheyenne	November 19, 2013 and/or March 20-21, 2014
	Northern Ute Tribe	November 19, 2013 and/or March 20-21, 2014
	Osage Nation	November 19, 2013 and/or March 20-21, 2014
	Ponca Tribe of Nebraska	November 19, 2013 and/or March 20-21, 2014
	Prairie Band Potawatomi Nation	November 19, 2013 and/or March 20-21, 2014
	Pueblo of Pojoaque	November 19, 2013 and/or March 20-21, 2014
	Pueblo of San Felipe	November 19, 2013 and/or March 20-21, 2014
	Rosebud Sioux Tribe	November 19, 2013 and/or March 20-21, 2014
	Santa Ana Pueblo	November 19, 2013 and/or March 20-21, 2014
	Santa Clara Pueblo	November 19, 2013 and/or March 20-21, 2014
	Santee Sioux Nation	November 19, 2013 and/or March 20-21, 2014
	Shoshone-Bannock Tribes	November 19, 2013 and/or March 20-21, 2014
	Sisseton-Wahpeton Oyate	November 19, 2013 and/or March 20-21, 2014
	Southern Ute	November 19, 2013 and/or March 20-21, 2014
	Spirit Lake Tribe	November 19, 2013 and/or March 20-21, 2014
	Taos Pueblo	November 19, 2013 and/or March 20-21, 2014
	Ute Indian Tribe of Uintah and Ouray Agency	November 19, 2013 and/or March 20-21, 2014
	Ute Mountain Ute Tribe	November 19, 2013 and/or March 20-21, 2014
	Western Shoshone Te Moak	November 19, 2013 and/or March 20-21, 2014
Region 7	ANCSA corporations	Invitation extended September 2013
	All Alaska tribes	Invitation extended September 2013

Region 8	Letters were sent to 54 tribes, followed by phone calls and emails	July, November, December 2013

6.3 List of Preparers

This PEIS was prepared and reviewed by a team from the USFWS. A team associated with the environmental contractor Solv assisted the Service in conducting research, gathering data, and preparing the PEIS and supporting documents. Table 6-2 identifies team members and their roles.

Table 6-2. List of preparers.

Organization	Name/Title	Project Role
USFWS	Eliza Savage, Eagle Rule Revision Project Program Manager	Cultural Resources; Contributor: all sections
	Brian Millsap, National Raptor Coordinator	Bald Eagle; Golden Eagle; Eagle Habitat
	Emily Bjerre, Raptor Program Wildlife Biologist	Bald Eagle; Golden Eagle; Eagle Habitat
	Joel Pagel, Raptor Ecologist	Migratory Birds; Cumulative Effects
	Noah Matson	Mitigation; Public Involvement
	Erin Carver, Senior Economist	Socioeconomic Resources
Solv, LLC	Bruce Kaplan	Climate Change

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Chapter 8. ACRONYMS AND GLOSSARY

8.1 ACRONYMS

ACP	Advanced Conservation Practices
AHY	After-Hatching-Year
AIRFA	American Indian Religious Freedom Act
AM	Adaptive Management
ANPR	Advance Notice of Proposed Rulemaking
APE	Area of Potential Effect
APLIC	Avian Power Line Interaction Committee
ATY	After Third Year
AVM	Avian Vacuolar Myelinopathy
AWEA	American Wind Energy Association
BCC	Birds of Conservation Concern
BBS	Breeding Bird Survey
BCR	Bird Conservation Region
BGEPA	Bald and Golden Eagle Protection Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO_2	Carbon Dioxide
CRM	Collision risk model
DOI	Department of the Interior
DOJ	Department of Justice
DDD	Dichloro-Diphenyl-Dichloroethane
DDE	Dichlor-Diphenyl-Dichlorethylene

DDT	Dichloro-Diphenyl-Trichloroethane
DM	Departmental Manual
DSCR	Debt Service Coverage Ratio
EA	Environmental Assessment
EAIR	Eagle American Indian Religious
EAIRT	Eagle American Indian Religious Take
ECPG	Eagle Conservation Plan Guidance
EDF	Électricité de France
EIS	Environmental Impact Statement
EMU	Eagle Management Unit
ENSO	El Nino Southern Oscillation
EO	Executive Order
ESA	Endangered Species Act
FEA	Final Environmental Assessment
FR	Federal Register
GHG	Greenhouse Gas
h	Take Rates
H	Take Limits
HCP	Habitat Conservation Plan
HY	Hatching Year
IPCC	Intergovernmental Panel on Climate Change
ITP	Incidental Take Permits
LAP	Local Area Population

MBTA	Migratory Bird Treaty Act
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MW	Megawatt
N	Number
NAL	Native American Liaison
NARP	Native American Religious Permits
NAT	Northern Arapaho Tribe
NBEMG	National Bald Eagle Management Guidelines
NEPA	National Environmental Policy Act
NER	National Eagle Repository
NHO	Native Hawaiian Organization
NHPA	National Historic Preservation Act
NNDFW	Navajo Nation Department of Fish and Wildlife
NOA	Notice of Availability
NOI	Notice of Intent
NRHP	National Register of Historic Places
NSAIDs	Nonsteroidal Anti-inflammatory Drugs
NWHC	National Wildlife Health Center
OEM	Original Equipment Manufacturer
OPT	Other Permitted Take
PBB	Poly-Brominated-Biphenyl
PBR	Potential Biological Removal
PCB	Poly-Chlorinated-Biphenyl
PEIS	Programmatic Environmental Impact Statement

PG&E	Pacific Gas & Electric
PPA	Power Purchase Agreement
PTC	Production Tax Credits
REA	Resource Equivalency Analysis
ROD	Record of Decision
ROFR	Right of First Refusal
SDG&E	San Diego Gas & Electric
SHPO	State Historic Preservation Officer
SY	Second Year
TCP	Traditional Cultural Property
THPO	Tribal Historic Preservation Officer
TY	Third Year
U.S.	United States
USC	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WTP	Willingness to Pay

8.2 GLOSSARY

100th Meridian: A line of longitude in the United States that represents the boundary between the moist east and the arid west.

Advance Notice of Proposed Rulemaking: An Advance Notice of Proposed Rulemaking (ANPR) is a document that an agency may choose to issue before it is ready to issue a Notice of Proposed Rulemaking. The ANPR is used by an agency as a vehicle for obtaining public participation in the formulation of a regulatory change before the agency has done significant research or investigation on its own.

Advanced Conservation Practices: Scientifically supportable measures approved by the Service that represent the best available techniques to reduce eagle disturbance and ongoing mortalities to a level where remaining take is unavoidable.

Affected Environment: The components of the physical, biological, and social environment that will be affected by a proposed action or alternative.

American Indian Religious Freedom Act: A United States federal law enacted to protect and preserve the traditional religious rights and cultural practices of American Indians, Eskimos, Aleuts, and Native Hawaiians. These rights include, but are not limited to, access to sacred sites, freedom to worship through ceremonial and traditional rights, and use and possession of objects considered sacred.

Anthropogenic Mortality: Death that is primarily caused or influenced by human activity.

Bald and Golden Eagle Protection Act (Eagle Act): The Bald and Golden Eagle Protection Act (BGEPA) prohibits anyone from "taking" bald and golden eagles, including their parts, nests, or eggs, unless authorized by the U.S. Fish and Wildlife Service.

Bird Conservation Regions: Bird Conservation Regions (BCRs) are ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues.

Climate Change: Climate change is a change in the statistical distribution of weather patterns when that change lasts for an extended period of time. Climate change may refer to a change in average weather conditions or in the time variation of weather around longer-term average conditions (i.e., more or fewer extreme weather events).

Code of Federal Regulations: The Code of Federal Regulations (CFR) contains the general and permanent rules and regulations published in the Federal Register by the executive departments and agencies of the federal government of the United States. The CFR is divided into 50 titles that represent broad areas subject to federal regulation.

Compensatory mitigation: Compensatory mitigation refers to conservation measures designed to compensate for detrimental impacts to eagles.

Council on Environmental Quality: The Council on Environmental Quality (CEQ) is a division of the Executive Office of the President that coordinates federal environmental efforts in the United States and works closely with agencies and other White House offices in the development of environmental and energy policies and initiatives.

Cumulative Effects Analysis: An analysis of the effects on the environment resulting from the incremental impacts of a proposed action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other action.

Duration Rule: A 2013 regulation that extended the maximum permit tenure for programmatic eagle nonpurposeful take permit regulations from five to 30 years, among other provisions. The provisions extending permit tenure were vacated following a 2015 district court decision.

Eagle Management Unit: A geographically-bounded region within which permitted take is regulated to meet the management goal of maintaining stable or increasing breeding populations of bald or golden eagles.

Endangered Species Act: The Endangered Species Act (ESA) of 1973 provides for the protection and conservation of species that are endangered or threatened throughout all or a significant portion of their range, and the conservation of the ecosystems on which they depend.

Environmental Impact Statement: The detailed written statement that is required by section 102(2)(C) of NEPA for a proposed major federal action significantly affecting the quality of the human environment.

Estimated Take: The number of eagles estimated to have been taken, usually based on observed take corrected to account for carcass detection and scavenging rates. Comparable to observed levels of take in the Eagle Rule.

Executive Order: A presidential policy directive that implements or interprets a federal statute, a constitutional provision, or a treaty.

Falconry: The hunting of wild quarry in its natural state and habitat by means of a trained bird of prey.

Fecundity: The actual reproductive rate of an organism or population.

Federal Register: The Federal Register is the official journal of the federal government of the United States that contains government agency rules, proposed rules, and public notices.

Flyway: A flyway is a flight path used in bird migration.

Incidental Take: Take that is caused by, but not the purpose of, an activity.

Local Area Population: Local eagle population; the Service developed guidance on upper limits of take at more local scales to manage cumulative impacts to local populations.

Migratory Bird Treaty Act: The Migratory Bird Treaty Act (MBTA) makes it unlawful to pursue, hunt, take, capture, kill, possess, sell, purchase, barter, import, export, or transport any migratory bird, or any part, nest, or egg or any such bird, unless authorized under a regulation promulgated by the Secretary of the Interior.

Mitigation: Defined by 40 CFR 1508.20 as "Avoiding the impact altogether by not taking a certain action or parts of an Action; minimizing impacts by limiting the degree or magnitude of the action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected Environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and compensating for the impact by replacing or providing substitute resources or environments.''

Natal Dispersal: Natal dispersal refers to the movement between hatching location and first breeding or potential breeding location.

National Eagle Repository (NER): Established by the Service as a central clearinghouse to collect and distribute eagle parts. Eagles, eagle parts, and eagle feathers for Native American religious purposes can be requested by members of federally-recognized tribes from the NER.

National Environmental Policy Act: The National Environmental Policy Act (NEPA) is an environmental law that requires federal agencies to analyze the effects of their actions on the environment and established the Council on Environmental Quality.

National Historic Preservation Act: The National Historic Preservation Act (NHPA) is legislation intended to preserve historical and archaeological sites in the United States of America.

No-Net-Loss: No-net-loss means actions that either reduce another ongoing form of mortality to a level equal to or greater than the unavoidable mortality, or lead to an increase in carrying capacity that allows the eagle population to grow by an equal or greater amount.

Nonpurposeful (Incidental) Take: Nonpurposeful take of eagles occurs where the take is incidental to an otherwise lawful activity.

Notice of Availability: A Notice of Availability (NOA) is a formal notice, published in the Federal Register that announces the issuance and public availability of a draft or final EIS.

Notice of Intent: A Notice of Intent (NOI) is a formal announcement of intent to prepare an EIS as defined in CEQ NEPA regulations (40 CFR 1508.22).

Observed Take: The number of eagles for which there is direct visual or physical evidence of take.

Offsetting Compensatory Mitigation: Compensatory measures that are required to essentially "replace" the number of eagles taken under a permit to achieve "no-net-loss."

Offsetting Mitigation: See definition for "Offsetting Compensatory Mitigation" (these terms are used interchangeably in this PEIS).

Phenology: The study of periodic plant and animal life cycle events and how these are influenced by seasonal and annual variations in climate as well as habitat factors.

Predictive Distribution: The distribution of unobserved observations (prediction) conditional on observed data.

Programmatic Environmental Impact Statement: A programmatic environmental document that evaluates the effects of broad agency proposals, programs, policies, or planning-level decisions.

Programmatic Permits: Authorized recurring take that is unavoidable even after implementation of Advanced Conservation Practices.

Programmatic Take: Programmatic take was defined as take that is recurring, that is not caused solely by indirect effects, and that occurs over the long-term or in a location or locations that cannot be specifically identified.

Promulgate: Put a law or regulation into effect by official publication (in the Federal Register in the case of federal regulations).

Public Scoping: As part of the preparation of an EIS, NEPA requires that there be an early and open process for determining the scope of the issues to be addressed in the EIS. This process is commonly known as public scoping.

Record of Decision: A concise public document that records a federal agency's decision concerning a proposed action for which the agency has prepared an EIS.

Section 7 Consultation: Section 7(a)(1) of the ESA charges federal agencies to aid in the conservation of listed species, and Section 7(a)(2) requires the agencies, through consultation with the Service, to ensure that their activities are not likely to jeopardize the continued existence of listed species or adversely modify designated critical habitats.

Standard Permits: Permits that authorize individual instances of take that cannot practicably be avoided.

Take: Take of an eagle includes the following broad range of actions: pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb. We also use the word "take" to enumerate the quantity of eagles removed, either under a permit or by unpermitted human actions. In this latter context, in some cases we further specify whether the take is observed or estimated, and we define these terms separately in the Glossary.

Tiering: Refers to the coverage of general matters in broader programmatic EIS documents with subsequent narrower statements or environmental analyses (ultimately site-specific statements), which analyze site-specific agency actions that incorporate by reference the general discussions in the PEIS. This process limits the site-specific analysis to any impacts of the individual agency actions that were not covered by the broader programmatic analysis.

Tribal Cultural Property: An historic property of religious and cultural importance under the NHPA. For the purpose of this PEIS, a landform or landscape known for eagle habitation—a ridgeline, canyon, lakeshore, river valley, mesa, mountain, etc.—may be considered by tribes as suitable for designation as a property of religious or cultural importance.

Appendix A. State Status and NatureServe Conservation Status Rank for Bald Eagles and Golden Eagles

Table A-1. State Status and NatureServe Conservation Status Rank for Bald and Golden Eagles.

State	Bald Eagle		Golden Eagle	
	State Status [1]	NatureServe Status [2]	State Status [1]	NatureServe Status [2]
Alabama	T	S4B	No Special Status	SNRN
Alaska	No Special Status	S5	No Special Status	S4B, S3N
Arizona	SSC	S2S3B, S4N	No Special Status	S4
Arkansas	No Special Status	S2B, S4N	No Special Status	S3N
California	E	S2	No Special Status	S3
Colorado	SSC	S1B, S3N	No Special Status	S3S4B, S4N
Connecticut	T	S1B, S3N	No Special Status	SNA
Delaware	No Special Status	S2B, S3N	No Special Status	SNA
Florida	No Special Status	S3	No Special Status	SNA
Georgia	T	S2	No Special Status	S1
Idaho	T	S3B, S4N	No Special Status	S4B, S4N
Illinois	No Special Status	S2B, S3N	No Special Status	SNA
Indiana	SSC	S2	No Special Status	S1N
Iowa	SSC	S3B, S3N	No Special Status	SNA
Kansas	No Special Status	S2B, S4N	SINC	S1B, S2N
Kentucky	T	S2B, S2S3N	No Special Status	SXB, S2N
Louisiana	E	S3	No Special Status	S1N
Maine	No Special Status	S4B, S4N	E	S1B, S1N
Maryland	No Special Status	S3B	No Special Status	S1N
Massachusetts	T	S2B, S3N	No Special Status	S1N
Michigan	No Special Status	S4	No Special Status	SNRN
Minnesota	No Special Status	S3B, S3N	No Special Status	SNRN, SNRM
Mississippi	No Special Status	S2B, S2N	No Special Status	S1N
Missouri	No Special Status	S3	No Special Status	SNRN
Montana	SSS	S3	SSC	S3
Nebraska	No Special Status	S3	No Special Status	S3
Nevada	At-risk	S1B, S3N	Watch List	S4

New Hampshire	T	S2	E	SHB
New Jersey	E	S1B, S1N	No Special Status	S4N
New Mexico	T	S1B, S4N	SGCN	S3B, S4N
New York	T	S2S3B, S2N	E (extirpated)	SHB, S1N
North Carolina	T	S3B, S3N	No Special Status	SXB
North Dakota	No Special Status	S1	No Special Status	S3
Ohio	No Special Status	S2	No Special Status	SNA
Oklahoma	No Special Status	S1S3	No Special Status	S2
Oregon	No Special Status	S4B, S4N	No Special Status	S3S4
Pennsylvania	Recovered	S2B	No Special Status	SNA
Rhode Island	No Special Status	S1B, S1N	No Special Status	S1B, S1N
South Carolina	T	S2	No Special Status	S2
South Dakota	No Special Status	S1B, S2N	No Special Status	S3S4B, S3N
Tennessee	DNM	S3	T	S1
Texas	T	S3B, S3N	No Special Status	S3B
Utah	SSC	S2B, S4N	SGCN	S4
Vermont	E	S1B, S4N	No Special Status	SNA
Virginia	No Special Status	S3S4B, S3S4N	No Special Status	SHB, S1N
Washington	State Sensitive	S4B, S4N	State Candidate	S3
West Virginia	No Special Status	S2B, S3N	No Special Status	S3N
Wisconsin	No Special Status	S4B, S4N	No Special Status	S2N
Wyoming	SGCN	S3B, S5N	Potential Concern	S4B, S4N

Note: [1] E = Endangered; T = Threatened; SSC = Species of Special Concern; SSS = Special Status Species; DNM = Deemed in Need of Management; SGCN = Species of Greatest Conservation Need; SINC = Species in Need of Conservation. [2] National (N) and Subnational (S) Conservation Status Ranks.

Table A-2. Glossary of National (N) and Subnational (S) Conservation Status Ranks.

Status	Definition
NX **SX**	**Presumed Extirpated**—Species or community is believed to be extirpated from the nation or state/province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
NH **SH**	**Possibly Extirpated** (Historical)—Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20–40 years. A species or community could become NH or SH without such a 20–40 year delay if the only known occurrences in a nation or state/province were destroyed or if it had been extensively and unsuccessfully looked for. The NH or SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences.
N1 **S1**	**Critically Imperiled**—Critically imperiled in the nation or state/province because of extreme rarity (often five or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.
N2 **S2**	**Imperiled**—Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.
N3 **S3**	**Vulnerable**—Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
N4 **S4**	**Apparently Secure**—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
N5 **S5**	**Secure**—Common, widespread, and abundant in the nation or state/province.
NNR **SNR**	**Unranked**—Nation or state/province conservation status not yet assessed.
NU **SU**	**Unrankable**—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
NNA **SNA**	**Not Applicable**—A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
N#N# **S#S#**	**Range Rank** —A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).
Not Provided	Species is known to occur in this nation or state/province. Contact the relevant natural heritage program for assigned conservation status.

Table A-3. Breeding Status Qualifiers.

Qualifier	Definition
B	**Breeding**—Conservation status refers to the breeding population of the species in the nation or state/province.
N	**Nonbreeding**—Conservation status refers to the non-breeding population of the species in the nation or state/province.
M	**Migrant**—Migrant species occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. Conservation status refers to the aggregating transient population of the species in the nation or state/province.

Appendix B. COMMENTS RECEIVED ON THE DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT AND RESPONSES

Adaptive Management and Risk Management

Comment: The Service is overly risk averse in how it manages uncertainty in the eagle incidental take program for wind facilities, and this penalizes those who seek permits and is a disincentive to compliance.

Response: The Service intends to maintain its policy of disproportionately sharing risk to avoid underestimating eagle take at individual wind facilities. The Service believes this is appropriate because the consequences of underestimating eagle take are far greater than the consequences of overestimating take, and not just because of unintended consequences on eagle populations. For example, if eagle take at the individual permit level was consistently underestimated, many permittees would exceed their permitted take limits, necessitating permit amendments, additional costly and unplanned after-the-fact compensatory mitigation actions, and possible enforcement action with associated fines. For bald eagles with positive EMU take thresholds, consistently underestimating take could lead to permitted take exceeding the EMU take limit. This in turn would necessitate retroactively requiring permittees that initially had no compensatory mitigation requirements to implement mitigation after-the-fact. Finally, if LAP take limits were unexpectedly exceeded, NEPA compliance for permits overlapping the affected LAP would have to be reviewed. Although these consequences are most likely if there is a systematic bias in the fatality estimates themselves, even with an unbiased estimator some of these consequences could be expected with 50% of permits if the Service were to use the median fatality rate as the take limit for individual permits. In contrast, if permitted take is set at a higher percentile of the fatality prediction, the primary consequences are that the permittee is likely to exceed actual compensatory mitigation requirements over the first five years of operation (if compensatory mitigation is required). Additionally, the Service would likely routinely debit some take from the EMU and LAP take limits unnecessarily, thereby underestimating available take when considering new permit requests. Both of these issues are at least partially remedied when initial take estimates for projects are adjusted with project-specific fatality data after the first five years of operation. At that time, permittees receive credit towards future take for any excess compensatory mitigation they have achieved, and the debits from the EMU and LAP take limits are re-calibrated to reflect the updated expectations for future take. These actions are comparatively simple to implement, and do not have the same kind of far-reaching consequences as with underestimates.

Climate Change

Comment: The PEIS does not sufficiently evaluate the potential impacts of climate change on local eagle populations. A recent report by the Audubon Society noted that climate change has the significant potential to displace certain species from areas within their historic range. Particularly for bald and golden eagles, the report forecasts a substantial shift in the species range away from the U.S. Southwest. Indeed, the Service's own evaluation of bald eagle populations reflects lower productivity of bald eagles in the Southwest. How will the LAP take limits account for shifting populations as a result of climate change impacts? As proposed, the result of the LAP take limits would preclude wind energy projects in areas of the country that eagles may abandon, and encourage additional wind energy in areas where eagles are moving (i.e. encourage development in areas with a higher LAP).

Response: Analysis of climate change impacts for eagle territory retention and productivity is difficult at best with what we know today. However, the Service's proposed monitoring program for eagles will provide data over time that should contribute to an understanding of the effects of climate change on eagle populations, and that new information will be taken into account in the status reassessments schedule to occur every six years.

Cultural Resources

Comment: Wind energy projects directly facilitated by the proposed rule have the very real potential to limit access to and ceremonial use of Indian sacred sites and/or impact the physical integrity of such sites under E.O. 13007, Indian Sacred Sites (61 Fed. Reg. 26771, May 29, 1996) through habitat destruction and the loss of live eagles and/or eagle nests that are paramount to the integrity of such sacred sites. These impacts can, in tum, directly impact both the spiritual and physical health of tribal members, and such impacts may separately or cumulatively violate tribal or federal laws relative to the protection of these rights, including the American Indian Religious Freedom Act ("AIRFA") (42 USC 1996), the Religious Freedom Restoration Act of 1993 ("RFRA") (42 USC 2000bb et seq.), and Section 106 of the NHPA, among other laws and requirements. While these concerns are generally discussed in the Draft PEIS, the document fails to address how these concerns and the religious freedoms of tribal people will be adequately protected under the proposed rule.

Response: We understand and appreciate tribal concerns that permitted projects have the potential to directly and indirectly impact eagles at and near Indian sacred sites. We will comply with federal and tribal laws, including the National Historic Preservation Act, which requires federal agencies to consult with tribes to determine whether they have concerns about historic properties of religious and cultural significance in areas of federal undertakings, which may include eagle habitat of spiritual and cultural importance to a tribe.

Issuing a permit to a third party is a federal undertaking that triggers this requirement. The Service's goal though permitting is to work with project proponents, federal agencies, tribes, and local communities to avoid and reduce the potential of permitted projects to take eagles. By issuing permits, these benefits can be realized, whereas, when projects continue to proliferate with no permits and hence no oversight, little to nothing is done to protect eagles and tribal access to sacred sites.

Comment: The Draft PEIS relies heavily on the use of the National Eagle Repository to fulfill the religious, traditional, and cultural need for eagle parts and feathers of federally-recognized tribes. However, this approach substantially discounts or ignores the critical importance of the existence of living eagles in the natural world and the role that living eagles play for many tribes. Furthermore, the fact that a wind developer performs some type of mitigation does not change the fact that an eagle, existing in its homeland, is now dead. In this regard, the Service has failed to meaningfully analyze or explain how the issuance of new 30-year take permits, and the corresponding and likely widespread development of wind energy projects, will impact the fabric of countless natural ecosystems to which the continued health and vitality of eagles remains fundamental. This is particularly important for certain tribes who rely on the continued existence of healthy, living, and undisturbed eagles in relation to certain geographical areas as part of their tribal traditions, culture, and religion.

Response: We agree that the Draft PEIS was disproportionately focused on Native American religious use of eagles taken under permit from the wild and eagle parts and feathers from the National Eagle Repository, and did not contain enough discussion and analysis of the value most tribes place on the very existence of eagles as part of tribal cultural and spiritual well-being. We have revised the Cultural and Religious Use section (see *3.7* Cultural and Religious *Issues*) for this Final PEIS with the goal of providing a more balanced discussion. We also expect the preferred alternative to be the most protective of eagles and result in conserving more eagles across the landscape.

Comment: On July 2, 2008, prior to the Service's decision to delist the bald eagle under the Endangered Species Act, in an unprecedented action, numerous Western Apache leaders provided Service officials with significant details about the importance of living eagles to the traditions, religion, and culture of the Western Apache in the form of live testimony, which was later transcribed and provided to the Service, along with an Eagle Report. However, there is no discussion of this crucial information in the Draft PEIS or proposed rule. Additional information was also provided to the Service during this same period by the Salt River Pima-Maricopa Indian Community, which also was not discussed in the Draft PEIS or rule.

Response: We appreciate this comment and subsequently have obtained and reviewed the transcribed testimony provided by the Western Apache leaders. The contribution of Western Apache leaders helps our staff better understand the cultural and spiritual significance of eagles to the Western Apache. We believe the rule will promote the use of the best available science to maintain healthy eagle populations and minimize impacts to tribal cultural and spiritual traditions that depend on eagles.

Comment: The proposed rule and Draft PEIS also fail to adequately analyze or mitigate (assuming mitigation is even possible) for the adverse impact that these developments and corresponding eagle losses will have on certain tribal sacred sites or TCPs - impact which will occur if the particular eagles associated with such places are killed or disturbed.

Response: We acknowledge that replacement of specific known eagles removed under incidental take permits is impossible. Experience has shown, however, that the ability to obtain a permit has had very little effect on whether projects that take eagles are built and operated. Very few activities that take eagles have incidental take permits and as a result, they do not implement measures to avoid and minimize impacts to eagles and provide no compensatory mitigation at all. Moreover, our use of enforcement actions against such projects is limited by resources and is an inefficient means of preventing impacts to eagles nationwide. Under these permit regulations, we can and will require all practicable conservation measures and for golden eagles, and each permittee will provide compensatory mitigation at a ratio of 1.2 to 1. We understand that this approach does not ameliorate the loss of particular individual eagles, but we maintain that, with few exceptions, it is not the issuance of the permit that results in the loss of the eagle; rather, the permit is the tool to minimize and mitigate for those losses.

Comment: In the Draft PEIS the phrase “emotional and/or spiritual impacts” is used to refer to the possible impacts to humans which may result from the take of eagles, or the inability (in the case of Native Americans) to have access to eagles. We believe that falconers are being emotionally and spiritually impacted by the Service’s refusal to allow access to golden eagles for falconry. Being the practitioners of a 4000-plus year old art form, recognized by UNESCO treaty in 2010 as an Intangible Cultural Heritage of Mankind, we are deeply affected by not having access to one of the most iconic species of raptors found worldwide.

Response: While we appreciate the long history of falconry, we are skeptical of equating modern falconry to tribal cultural and spiritual beliefs and practices. Falconry is not a culture in the sense of tribal culture and it is not a religious belief. Falconers are not born into a group that shares fundamental beliefs, customs, and practices that pervade multiple aspects of day to day life. No doubt many falconers have some shared values (although those likely

vary), and while in some cases the shared attitudes may be expressed in emotions and spiritual feelings, that can be said of bird watchers, landscape painters, and dedicated fans of certain musical bands. At any rate, regulatory access to golden eagles by falconers is outside the scope of the regulations analyzed in this PEIS. We do identify one area where the actions analyzed in this PEIS probably converge with some falconers' interests: management of golden eagle populations to ensure they are preserved throughout their range. We hope that any detrimental impacts that falconers experience by not possessing golden eagles will be somewhat buffered by the implementation of management actions designed to avert potential population declines of this species. When the Service considers revisions to regulations for permits for falconry and depredation, the issue of falconer's access to golden eagles will be more germane.

Comment: Based upon the significance of eagles to Native American peoples and tribes, there needs to be tribal involvement throughout the eagle take permitting process and opportunities for tribal consultation and participation in the development and implementation of conservation and mitigation measures for eagle take permits

Response: When a permit has the potential to affect tribal rights and values, we will ensure that the potentially affected tribe has the opportunity to consult with the Service, including about conservation measures and mitigation.

Comment: The O'Otham word for eagle, ba 'ag, is mentioned in O'Otham oral traditions and figures prominently in the creation narratives of the Four Southern Tribes (Gila River Indian Community; Salt River Pima-Maricopa Indian Community; Ak-Chin Community; and the Tohono O'Odham Nation), as well as O'Otham song culture. Respect for all living beings is constant in every part of Himdag (Our way of Life). Modern development that disrupts the spiritual balance of nature affects us as O'Otham people. The well-being of eagles is therefore intricately linked to the well-being of the Akimel O'Otham.

Response: For good or for worse, the Service cannot prevent modern development, but we can and do use the authority we have to minimize the effects of such development on wildlife. The eagle incidental take permit regulations incorporate the Service's overall approach to mitigating effect to wildlife. Avoidance is preferable, then minimization, but where impacts cannot be avoided and take exceeds sustainable levels, compensatory mitigation must address impacts that remain despite measures to reduce them. Although we cannot compel project proponents to avoid impacts to eagles outside of the limited nature of a specific enforcement action, we can and do provide guidance and often strong recommendations for avoidance, through alternative siting, operational modifications, or other means. Through guidance, we also promote measures to reduce impacts, but we can only require those

measures to be implemented under permits. The eagle permit regulations also contain numerous other provisions designed to ensure the preservation of both species of eagles for present and future generations. The provisions that strengthen protection of populations at more local scales were included in part to address the importance of eagles to tribes and local communities.

Comment: We request that the Service consider authorizing appropriate tribal representatives to assume guardianship of and bury, with an appropriate cultural ceremony, eagle remains that are found on tribal lands. In addition, the Service should permit affected tribes to file an expedited application for repatriation of eagles taken from a flyway that encompasses their tribal land. If multiple tribes submit an application for repatriation of the eagles taken, the Service should work with the tribes to find a mutually acceptable solution for proper handling of the eagle remains. At a minimum, the Service should respect and adhere to cultural practices and considerations, to the extent permitted by law, when handling eagle remains. These practices include: avoidance of any unnecessary disturbance; avoidance of unnecessary handling of eagle remains; and avoidance of physically modifying eagle remains. We believe these practices should be incorporated into any protocol governing eagle take.

Response: Point appreciated, and noted. The Service attempts to be respectful of tribal traditions and practices when encountering eagles alive or dead in the field. Our intent is to treat eagles and eagle remains in a humane, gentle, and caring manner. To help the Service and our partners, including tribes, understand more about eagle ecology, population trends, and eagle fatality causes and rates, it is necessary to take samples from eagle remains for robust scientific inquiry. All eagle remains, unless contaminated to a level where exposure has potential to injure humans, are then released to the National Eagle Repository for expedited distribution to tribes.

Comment: Population management strategies and activities should be geographically tailored to provide for the cultural needs of affected Native American tribes as was written into the 1962 amendment of BGEPA.

Response: While the 1962 amendments to the Eagle Act added protections for the golden eagle, including the exception allowing authorization of take for the religious purposes of Indian tribes, they did not specify that management strategies or activities must be geographically tailored to meet the cultural needs of those tribes. There is some support for the importance of regional and local management of eagles in the context of federal management in the legislative history. The Department of the Interior's testimony, considered by both the House and Senate, noted the need for management of golden eagles at national, regional, and local levels, in part because of the inconsistent protection provided

at the state level. Assistant Secretary Briggs noted the "considerable movement of [golden eagles] between the States and geographical regions, which accounts for the national as well as state and local interest in the species." H.R. Rep. No. 87-1450, at 4 (Mar. 19, 1962); S. Rep. No. 87-1986 (Aug. 30, 1962). The Service proposes to codify management of eagles on both a regional and local scale for primarily biological reasons, but also for management purposes to support the interests of federally recognized tribes, regional tribal organizations, and state wildlife agencies. The Service proposes in this regulatory amendment to improve local management of eagle populations in two ways. First, by amending the regulatory definition for the preservation standard to require "persistence of local populations throughout the geographic range of each species." Second, by potentially requiring compensatory mitigation when authorizing take in excess of 5% of the local area population.

Cumulative Effects

Comment: The Status Report does not distinguish amongst the different types of collisions experienced by golden eagles so it is difficult to understand how collisions with utility wires impact eagles. In addition, it is important to make distinctions between collisions with higher voltage transmission lines versus distribution and sub-transmission voltages in which a collision is often combined with electrocution. Please clarify this information.

Response: It was not possible to assign all of the collision deaths to a line type or even a specific agent (line, vehicle, object) because the data collected in the field and the necropsy results were inconclusive as to what was collided with, and more than one agent was possible. However, given the information available, collisions with utility lines (mostly electric distribution lines) were associated with two and possible four of the seven collision mortalities documented among satellite-tagged golden eagles in the Status Report (USFWS, 2016). Additionally, at least one of the golden eagles determined to have died from electrocution had also collided with an electric line of unknown type.

Comment: "Injury or mortality by collisions with utility wires is also well documented in Canada and the U.S. (Rioux et al., 2013 , Loss et al., 2014a)." Neither article cited mentions eagles in regards to collision mortality with utility wires. Rioux et al. (2013) summarizes relative frequency of avian mortalities due to collisions with transmission lines in Canada by avian Order from nine studies. Neither the Order Accipitriformes (containing eagles) nor either species of eagle is referenced. Similarly, Loss et al., (2013) states, "The 19 species with the highest counts-and 36 of the 42 species recorded-are waterbirds. All land birds, including raptors, were counted 16 or fewer total times as collision casualties." In addition, the Loss et al. (2014) study has inherent design flaws that overestimate their mortality numbers. They sampled studies in which electrocution and collision rates were assessed, but did not

consider that these studies were conducted in areas with high mortality rates to begin with and are not a representative random sample of all power lines. Further, they extrapolated mortality rates from this data to all power lines in the U.S., representing a worst case scenario, without considering factors that have a major influence on electrocution and collision risk, such as habitat, urban areas, prey availability, bird use, existing avian protection devices, avian safe designs.

Response: We modified the referenced part of the Cumulative Impacts section (see *4.1.8* Power *Lines* and *4.2.5 Power* Lines) in the PEIS to address these concerns.

Comment: Actual data from utilities can provide more accurate information on power line collisions, as collisions have decreased in areas with line marking. Additionally, Drewitt et al. (2008) cannot be found in the literature cited section of the Draft PEIS and Drewitt and Langston (2008) does not mention golden eagles in reference to collisions with power lines.

Response: Noted. We modified this section accordingly and corrected the Literature Cited.

Comment: The PEIS makes an unqualified remark, based on an unfaithful recitation of Pagel et al. (2013), that wind energy providers do not report eagle fatalities. The Pagel et al. (2013) paper suggests that much of the reporting of eagle fatalities during the study period came from incidental reporting, making fatality rate estimation more difficult than from the Service-preferred regular post-construction monitoring program. The wealth of data of wind-eagle interactions directly contradicts the conclusion made in the PEIS with respect to the reporting of eagle fatalities due to wind energy. Thus, the statement is without merit and inappropriate for inclusion in the PEIS.

Response: The statement in the PEIS is, “The exact number of bald and golden eagle killed annually at wind facilities is unknown because many facilities are not monitored to determine take rates, and most of those that do, do not or have not provided information to the USFWS.” We believe this statement is accurate, but will change the word “most” to “many” because we cannot be certain of the relative magnitude of the information that has not been provided to us or not collected at all.

Comment: In describing the effects of anticoagulant rodenticides on raptors, the Service omits its own experience with brodifacoum on Rat Island, Alaska. The Service should incorporate a description of this experience into the review because it provides important information regarding the degree to which this rodenticide can impact bald eagles.

Response: We added a sentence to the PEIS as requested.

Comment: The Service also relies on Pagel et al. (2013) to establish the rate at which bald eagle deaths occur at industrial wind energy facilities (Draft PEIS page 173). The original source, Pagel et al. (2013) includes one bald eagle death at an industrial wind energy facility in Maryland. [This commenter] requests that the Service clarify the type of facility the death occurred at; specifically, was it producing electricity commercially and what type of entity owned and operated it?

Response: The Pagel et al. (2013) paper actually reported six bald eagle fatalities at wind facilities. The single fatality in Maryland occurred at a small, non-industrial turbine at a National Wildlife Refuge. The other four fatalities occurred at large, commercial wind facilities. Neither Pagel et al. (2013) nor the Service used this information to estimate the rate of bald eagle fatalities at wind facilities

Comment: The Service should provide evidence to support the assertion made in Pagel et al. (2013) and repeated in the Draft PEIS at page 173 that most wind facilities do not report eagle fatalities to the Service.

Response: Reporting of fatalities at wind facilities from the first commercial wind facilities to the present day is voluntary. Without permit coverage, facilities are not bound by any regulation to provide this information to the Service. We have no reason to doubt that the peer-reviewed statement in Pagel et al. (2013) is accurate, and have referenced it in this PEIS accordingly.

Comment: APLIC does not agree with the statements that power lines fragment habitat for golden eagles and their prey. Rabbits and ground squirrels are the majority of golden eagle prey, and they can easily pass under power lines; there are no research studies implicating power lines with fragmentation of rabbits and ground squirrels. There is also no documentation that power lines fragment golden eagle habitat, rather existing studies have shown that power lines can provide benefits to golden eagles in terms of alternate nesting sites. APLIC cautions the Service against including power line habitat fragmentation as a threat to golden eagles, and potentially using this as a mechanism to seek mitigation for perceived habitat fragmentation impacts. Power line rights-of-way are often managed for weed and fire suppression, and often provide improved habitat through the implementation of BMPs and habitat restoration compared to other land uses and development.

Response: Utility corridors, similar to roads, gas/oil lines, and dike corridors, among others, contribute to habitat fragmentation, as summarized by Forman (1995). Utility corridors can provide perch and nest structures in habitat where these features were historically lacking or

different, and thereby can influence perching and hunting behavior and prey utilization. The specific beneficial or negative impacts of habitat fragmentation by utility corridors on eagle territories are speculative and in need of research, but are a concern due to the increasing extent of construction of above ground utility lines throughout the United States.

Comment: The impact of communication towers in bald and golden eagle mortality should be considered in the cumulative effects section of the PEIS. In Florida, for example, a large percent of bald eagle nests are located on communication towers in spite of the availability of their preferred nesting trees. Mortality comes mainly from eaglets becoming entangled with the wires on platforms that hold the antennas or from collision with the structure and guy wires once they fledge. Take is likely underrepresented due to carcass concealment in heavy vegetation, scavenger removal of carcasses before detection, and deliberate failure to report mortalities.

Response: We agree that the comparative productivity and survival of eagles nesting on cell phone and other communication towers warrants more study. Overall, however, we note that the single study that has compared these demographic values for bald eagles in urban (where some nests were on cell phone towers) versus exurban areas in Florida found no differences (Millsap et al. 2004).

Eagle Management Units

Comment: Many commenters expressed concern that flyways are too large and ill-defined to serve as workable EMUs.

Response: The Service does not dismiss concerns about the large size of the flyway EMUs. However, this was a major consideration underlying the decision to incorporate the LAP analysis into the rule, to ensure that finer-scale population information is considered and factored into permitting decisions.

Comment: EMUs should not be flyways but instead be states or logical combinations of states (e.g.,Service regions). A state-based EMU configuration is more compatible with state fish and wildlife agency plans to conserve eagles.

Response: The flyways are logical combinations of states, designed to facilitate inter-state coordination on bird conservation issues. The majority of state agency comments we received on the proposed rule supported the use of flyway EMUs.

Comment: Proposed EMU(s) for golden eagles should be revised for any region(s)/population(s) that have large proportions of resident eagles. Evidence suggests that golden eagle populations in certain Bird Conservation Regions (BCRs) may or may not exhibit migratory behavior common to most migratory birds, and may not use flyways. For example, golden eagles occurring within the Mojave and Sonoran Ecoregion (BCR 33), are believed to be a resident population that responds to seasonal changes in ambient temperature and food supply by occupying higher or lower elevation habitats within the subregion. This has been documented in a study of golden eagle nesting and movements in the Mojave Desert subregion of BCR 33, where golden eagles occupied higher elevation territories during the months of May, June, July and August. In contrast, they occupied the lower elevation territories during the months of November through January, with the duration of these movements ranging from two to 10 days.

Response: Movements of golden eagles are more complex than described by this commenter. A draft manuscript by Service scientists and colleagues that is presently in review shows that many golden eagles from the Chihuahuan and Sonoran deserts do undertake latitudinal migration, and spend the summer in the interior west outside of the BCRs where they breed (or were hatched). Moreover, even if golden eagles from the Mojave Desert are resident all year, that ecoregion certainly supports migrants from more northern and perhaps more southern latitudes as well. The Service continues to believe that the flyway configuration is a workable approach and we retain it in the final rule. However, we will continue to collect and analyze data on eagle movements, population genetics, and isotope signatures, and if, based on analyses of these data in the future, another EMU configuration has more scientific support, the Service will adopt that configuration as part of an updated status assessment.

Comment: In the PEIS, the Service emphasizes using an adaptive management framework for the eagle incidental take permits, so that when better information becomes available it is incorporated into the management model. We strongly advocate including bald and golden eagle genomic research which accurately identifies the natal origin of individuals and genetically defined population boundaries as those data become available.

Response: We agree with this commenter that as genetic and isotope analyses progress the Service will use the results to evaluate, and if warranted, reconsider the configuration of EMUs accordingly.

Comment: The Service is proposing EMUs that are much too large for an effective monitoring and management approach. Sampling and analyses occurring over such a broad area will tend to miss important subpopulation declines, and put small local populations at risk. In

addition, a flyway-based monitoring system would not take into consideration the conservation program needs and goals of state and regional wildlife agencies.

Response: The flyway EMUs are deliberately coupled with the LAP evaluation requirement to ensure local eagle populations are not extirpated by incidental take permitting activities. The Service notes that most flyways (which represent collective state views) supported moving to the flyway EMU alternative.

Comment: Preliminary data on golden eagles tracked with satellite telemetry indicate that the flyway level of EMUs may not capture movement patterns of resident golden eagles as well as finer-scale landscape mapping systems. Thus, setting take limits for golden eagles at the proposed flyway level may not adequately reflect regional golden eagle use and is potentially the wrong scale for effective management of golden eagle populations on a nationwide basis.

Response: The referenced study was intended to be completed and included in USFWS (2016), however the work was not able to be completed in time. In its place the Service conducted an analysis of dead-recoveries using the banding data, and those results are reported in USFWS (2016). Neither analysis is ideal because the distribution of deployed bands and satellite tags has not been random. The banding data have the advantage of much larger sample sizes, the satellite-tag data the advantage of a much more precise tracking of a smaller number of individuals. In addition, the two data sets provide slightly different kinds of evidence. The banding data suggest golden eagles are more likely to be hatched and die in the same flyway than in the same 2009 EMU, whereas the draft satellite-tag analysis seems to suggest golden eagles are more likely to spend time in the same 2009 EMU than outside it. For the purposes of this rule, the EMUs should be the configuration that best captures the risk of incidental mortality. The banding data may be of greater relevance to that objective, and thus we have decided to adopt the flyways as EMUs. However, we acknowledge that further analysis of satellite-tagging data, genetic data, and isotopic evidence may reveal that another configuration is superior, and the Service will consider all such new information in future re-assessments of eagle status.

Local Area Populations

Comment: The connection between setting take limits at the LAP level and managing populations at the EMU level is unclear at best. The Service's proposal for determining the eagle population within a given LAP is arbitrary. The Service fails to explain how this reflects the eagle population in a given local area any more accurately than using the EMU as the basis for population management, or how regulating the hypothetical eagle population

within a LAP relates to ensuring the "persistence of local populations" in a given EMU. Accordingly, the Service should eliminate the LAP concept from the rule.

Response: Biologically, recent data from satellite tracking studies show that while both bald and golden eagles range widely, there is high philopatry to natal, wintering, and migration stopover areas. Thus, local impacts can have far-reaching effects on eagle populations. Local populations of eagles also are of great cultural and social importance. The Service received many comments from states, tribes, local governments, and environmental organizations in support of including the persistence of local eagle populations in the management objective for eagles. The Service disagrees that the metrics used to define LAPs are arbitrary. The LAP population size estimate is based on eagle density estimates, and those density estimates are biologically based and derived from actual eagle count data at the finest scale consistently available. As to the LAP area, it is based on the natal dispersal distance of each eagle species, and as such represents the most applicable area over which the effect of an incidental take permit should be measured. The Service believes that preservation of local eagle populations accomplishes both important biological and cultural objectives, and that the EMU-scale analysis alone is not sufficient to evaluate and account for local and cumulative effects of an incidental eagle take permit.

Comment: We urge the Service to work with local eagle experts and project proponents to determine the appropriate LAP in each case rather than a strict radius of interest, due to wide variation across both species range in local seasonal densities.

Response: We agree with the concept of continuing to improve and adapt the process by which eagle take is managed to incorporate better scientific information as it becomes available. However, for now we believe the process by which we propose to define the LAP does represent a logical interpretation of the best available science as described in Appendix A5 of USFWS (2016), and is a practical, workable approach.

Comment: We urge the Service to take a more comprehensive and pro-active approach in attempting to quantify non-permitted anthropogenic mortality to ensure that the 5% take limit is not exceeded.

Response: Although we agree having better information on unpermitted eagle take would be beneficial, there is only so much that can be done to gather this information, and then only so much that can be done scientifically with it, given the necessarily anecdotal nature of most of the information that exists on unpermitted eagle take. However, the Service's proposal makes it very clear that we do intend to consider available information on unpermitted take as part of the LAP assessment. While the automatic trigger for additional analysis that could lead to a negative permit finding is a permitted take rate in excess of 5%

of the estimated LAP, a high unpermitted take rate could also trigger the need for additional analysis and/or a negative finding with respect to permit issuance. For golden eagles we have identified that an unpermitted take rate in excess of 10% could be considered high. However, because unpermitted take is incompletely known and the degree of knowledge varies greatly from place to place, there will be few if any locations where unpermitted take can be accurately estimated. This means that in most cases the actual unpermitted take will be greater than what is indicated by the available data. The Service will necessarily rely on best judgment to decide whether unpermitted take in any particular LAP is in excess of levels that would allow for additional take without risking extirpation of the LAP. Where data show that unauthorized take exceeds 10% of the LAP, if the incidental take permit is issued, the Service may require additional analysis and possibly compensatory mitigation even if the EMU take threshold has not been exceeded. As a step in the direction that this commenter suggests, the Service has compiled and will continue to compile all available information from eagle necropsy reports, Office of Law Enforcement investigations, Special Purpose Use Permit reports, and other sources into a national database that will be queried by Service biologists using a spatial GIS tool as part of each LAP analysis. Additionally, we are implementing internal protocols that ensure more of this information is routinely captured and made easily accessible for eagle incidental take permit application reviews.

Population Objectives

Comment: Using 2009 as the minimum baseline population for implementing the eagle preservation standard and the goal for maintaining stable populations is arbitrary. Because a baseline is necessary to gauge the effects of this action, we ask for an ecological justification for adopting the population level in 2009 (versus other dates) as the baseline against which population performance, take, and mitigation would be based.

Comment: Using 2009 as the baseline and identifying appropriate take levels in terms of sustaining those numbers for the next 100 years is arbitrary. While it may be understandable to rely on those numbers in the interim, the Service must commit to completing a conservation plan for both species and identifying baseline population targets and science-based management goals for bald and golden eagle populations that will ensure the preservation of the species long-term.

Comment: Adopting a baseline of only 30,600 nesting territories for bald eagles and an estimated 40,467 individual golden eagles in 2014 establishes an artificially low reference point from which to compare future monitoring results. Stable populations from an artificially low baseline or declining trends are unacceptable, and the agency should incorporate a more robust population baseline from earlier monitoring data in order to appropriately set and incorporate recovery goals into the permitting guidelines that last well beyond the projected 100-year timeline.

Response: The use of 2009 as the baseline for the Service's management objective is not arbitrary; rather, it is consistent with the determination made with the adoption of the initial nonpurposeful take permits in 2009 (USFWS 2009). We do not doubt that at times in the history of the North American continent populations of both species were probably larger or perhaps smaller than today, but that is not a compelling reason to set a different and likely unattainable population objective. Our recent analyses (USFWS, 2016) indicate there is a high probability that meeting the objectives the Service proposed for both species will ensure healthy populations at the EMU level for the foreseeable future. Moreover, the commitment to collect and consider new population information regularly as part of the adaptive management process ensures that there will be opportunities to adjust the objectives, take rates, and take limits on a recurring basis. Finally, we point out that the Service's population objective is to ensure eagle populations remain as large as *or larger* than 2009 estimates; the Service is not striving to constrain eagle populations to 2009 levels.

Population Monitoring

Comment: The Service's population monitoring should be done every four years rather than every six years as proposed in the PEIS.

Comment: The rule should be reviewed every 3-5 years to assure congruence with the eagle population forecasts in this report.

Comment: The Draft PEIS goes on to say that "as budgets continue to tighten, the certainty of funding for large-scale survey efforts diminishes". It is concerning and unclear how the Service will be able to adjust the appropriate level of take if funding to support this monitoring is not guaranteed and committed.

Response: The schedule of monitoring outlined in the PEIS balances available dedicated eagle funding with the technical and logistical demands of eagle monitoring. Under this schedule, eagle monitoring will be conducted annually (not once every four years as implied by the first comment), but the three major eagle surveys (golden eagle summer, golden eagle winter, bald eagle summer) will be conducted in rotation once every three years, with reassessments and updates of status every six years (using two replicates of monitoring data for each eagle species).

Comment: A flyway based EMU would not allow for the kind of detailed monitoring that will be necessary to confirm stable or increasing local populations. It would not be sufficient to determine if affected local populations are persisting in the face of cumulative anthropogenic sources of mortality.

Response: Population monitoring and permit-level take monitoring will be the same regardless of the EMU configuration.

Comment: The Service's current monitoring methods for golden eagles are geographically limited, coarse, not validated, and are not likely to produce reliable information. Continued use of these surveys to assess take limits is inappropriate because the western aerial-transect golden eagle survey was designed to only have a modest probability of detecting trends over fairly long time intervals, and for golden eagles the survey is limited to only four Western BCRs.

Response: This comment misrepresents the data the Service is using to estimate population size for golden eagles in the western U.S., as explained in the Status Report (USFWS, 2016) and summarized in the Draft PEIS. The comment regarding the power of the golden eagle survey to detect trends is based on only one of the data sets used by the Service to estimate summer golden eagle populations in the western U.S. The Service combines the referenced aerial transect summer golden eagle survey data with Breeding Bird Survey data in a scientifically peer-reviewed and published modeling framework, and the resulting composite estimates are more precise than those from either method alone. This approach yields population size and trend estimates for the entire contiguous western U.S., not just for four BCRs. The Service acknowledges the survey estimates include considerable uncertainty, but because the estimates are developed in a Bayesian framework the variance is appropriately captured and propagated through the modeling process, which allows the Service to explicitly decide how to address the full uncertainty in management decisions. As discussed in the responses to other comments, the Service treats that uncertainty in a way that minimizes chances of underestimating effects of permitted activities on eagles.

Comment: The Service's population size estimates for both bald and golden eagles are inaccurate and would have benefitted by including data from state fish and wildlife agencies. A clear example is the bald eagle population estimate in the Southwest. The differences between the 2007 and 2009 model estimates indicate an implausible 29.8% population increase in two years. The 2009 model estimate was not validated with state data. The Service's use of state's data in this situation would have remedied these misrepresentations

Response: Contrary to the assertions in this comment, the Service did consult with state fish and wildlife agencies with respect to data used to estimate bald eagle populations. In fact, the Service's bald eagle population size estimates for the Southwest in 2007 and in 2009 are based entirely on data provided or published by the state fish and wildlife agencies in Oklahoma, Texas, New Mexico, and Arizona. The sizable increase between the time of delisting (the ca 2007 estimates in USFWS [2009a]) and the 2009 estimates reported in

USFWS (2016) are the result of better, updated data that was provided by state fish and wildlife agencies in Oklahoma and Texas. Thus, the Service did use state data, and those data account for the large increase in estimated population size. This is consistent with the Service's observation in USFWS (2016) that better data and improved estimation procedures, as well as actual population growth, both contribute to apparent increases in bald eagle numbers between 2007 and 2009.

Comment: Many states have decades of monitoring data and monitoring protocols in place for future monitoring. The Service should work closely with the state fish and wildlife agencies to build upon current monitoring efforts to develop regional monitoring plans that accurately estimate populations and demographic rates necessary for evaluation of future take limits. The protocols being considered should be provided in the revised PEIS to ensure adequate review by the state fish and wildlife agencies.

Comment: Eagle permits should be based on as much specific and detailed population estimates as possible. Public agencies (cities, counties) often have the best local data sets for eagle populations.

Response: As noted in response to another comment, state data (which often includes data from local agencies) were used extensively by the Service to estimate bald eagle populations, and we gratefully acknowledge that collaboration. For golden eagles, the state and local government data we are aware of consist of nest monitoring, telemetry, and migration count data. Although these data sets have important uses in eagle conservation, and the Service has used them in collaboration with the states for other purposes, they are not well suited to development of total population size estimates, which are required by the Service for management of golden eagle take. Because the Service has direct, scientifically credible estimates of golden eagle population size for most of the western U.S., we believe these are the best data to use for establishing take rates and assessing population status. We do recognize that credible data on population size for both species of eagle are lacking for the state of Alaska, and we respond elsewhere to specific comments on this issue. With respect to the Service's survey protocols, they are described in Appendices A3 and A4 of the Status Report (USFWS, 2016) and citations therein, which were referenced in the PEIS.

Comment: Many state fish and wildlife agencies are disappointed that the Service did not include them to a greater degree in the development of this rule, and that state data were not used to a greater degree.

Response: The Service has included the state fish and wildlife agencies, via the Flyway Nongame Technical Sections, in its technical discussions regarding eagle management for several years. Each flyway has had representation on regular conference calls of the

Service's Eagle Technical Assessment Team (ETAT). The Service has been forthcoming on these calls and at Flyway Council Nongame Technical Section Committee meetings about its plans for revision of these regulations and the approach it planned to take with respect to population estimation and take-rate estimation. In the future, the Service will try and do a better job of making sure states are aware of this opportunity, but we also encourage state fish and wildlife agencies to take better advantage of these regular calls to make the Service aware of state data sets they believe should be considered in eagle management. This would allow the states and the Service to engage in more fruitful discussion of the advantages and disadvantages of the different data sets and how they might be used to inform the Service's rulemaking process.

Comment: The Service uses BBS trend estimates as part of its dual frame analysis for bald eagles. The BBS does not effectively sample bald eagle populations and produces unreliable trend estimates for the species as it does for most other raptors, compared to trends from migration counts.

Comment: The Service should consider the Raptor Population Index migration monitoring data in its analysis of golden eagle trends. Data from the Raptor Population Index provide more robust estimates of trend than BBS, and therefore constitute the best available science upon which the Service should base its management decisions.

Response: The Service does not use BBS data to inform the dual frame survey for bald eagles (please see Appendix A3 in USFWS, 2016). With respect to the BBS, however, we believe that the statement that trends from migration counts better reflect trends in actual population size than BBS indices is questionable. For golden eagles, the Service has shown there is a strong correspondence between trends in the BBS indices and summer aerial transect survey estimates of total population size in the interior west. These sources are not in agreement with the trends from migration count data. The Service on several occasions requested raw and site-specific analyzed data on golden eagle migration counts from the Raptor Population Index while it was preparing its golden eagle status assessment (Millsap et al. 2013). The Service was never provided with the requested data. However, the Service did conduct an analysis of the published summary data that was available on trends in golden eagle migration counts in the western U.S., and we concluded that changes in migration behavior were likely influencing count trends (see the detailed discussion in Millsap et al. [2013]). As such, we believe the population size estimates from the Service's composite hierarchical model provide better information (including fully accounting for uncertainty) on golden eagle trends and population size than do migration counts, and we use the composite estimates where they are available.

Comment: The Service should continue monitoring golden eagles on a BCR scale.

Response: The Service does intend to continue to monitor eagles and our monitoring program for golden eagles will allow us to estimate trends and numbers on both the BCR and flyway scales.

Population Size and Status—Bald Eagle

Comment: The assumption that the bald eagle population is "healthy" and has "occupied all suitable habitat" across its range is not supported. In some areas within its range, the Bald Eagle population is still recovering from population declines in the mid-20th century, whereas in other areas populations are increasing above and beyond anticipated levels. In areas or regions where the Bald Eagle population has not sufficiently recovered (e.g., the Southwest), the goal for those populations should be to maintain population growth until the population size stabilizes. If the proposed regulation is implemented in that region, population growth will likely be impacted by issuance of take permits.

Response: The Service disagrees with the assertion that adoption of the conservative take rates will lead to population declines for bald eagles. Service estimates using established migratory bird models for estimating sustainable take rates suggest the proposed take rates will support continued population growth, although populations will likely stabilize at lower levels than would be the case without the authorized take. With respect to the Southwest, the Service has proposed adoption of a more conservative take rate there than models indicated was necessary, to ensure the capacity for further population growth in that EMU.

Comment: Use of the 2009 population size to establish a take threshold for a population undergoing dramatic growth is unreasonable and overly conservative. A 5.3% annual rate of increase produces a population doubling time of 13.2 years, thus the actual bald eagle population is much larger than estimated by the Service in the PEIS using 2009 data. Accordingly, the Service's take limits for bald eagles should be much larger than reported in the PEIS.

Response: The Service does not disagree that bald eagle populations have certainly increased since 2009, but the Service is not willing at this time to use the trend estimate to adjust population size during the period between monitoring events. The monitoring plan described by the Service in the PEIS will provide updates to the 2009 estimate in 2018 and again in 2021, and these will be used to revise the overall population size estimate no later than 2022. Given that approved requests for bald eagle incidental take permits have only amounted to approximately 6% of the annual take limit of 1,100 that has been in place since

2009, the Service does not believe this approach will constrain legitimate needs for incidental take of bald eagles.

Comment: The definition of the "Southwest" has changed from Service Region 2, to the Pacific Flyway south of the 40th parallel. Therefore, the should ensure the same geographical areas are being considered when referring to the predicted change in the bald eagle population since the 2009 rule. As depicted in the proposed rule, models estimate an increase of occupied bald eagle nests from 51 in 2007 to 176 in 2009 for the Southwest. However, Arizona's statewide population census data indicate an increase from 48 occupied nests in 2007 to 50 in 2009. With an increase in breeding areas in Arizona of only two, this information suggests the rest of the Southwest (New Mexico, and Texas and Oklahoma west of the 100th parallel) experienced an increase from 3 breeding areas to 123 breeding areas in two years. Clearly, there is either a discrepancy in the model, or inappropriate comparisons of geographical areas were made.

Response: The Service has presented information on bald and golden eagle populations at both scales under consideration in the Draft PEIS—2009 EMUs and flyways—and we have not confused population estimates between these two configurations. With respect to the Southwest under the 2009 EMU configuration, the commenter is correct that the Service's status report and PEIS show an increase from 51 occupied breeding areas in 2007 (using data from the time of delisting in 2007 and before) to 176 in 2009 (USFWS, 2016). However, in USFWS (2016) the Service very clearly states that nationwide, the changes in the estimated number of occupied bald eagle breeding areas between the 2009 Environmental Assessment (2009 EA) and 2016 are the result of both population growth and better estimates in 2016. In the particular case of the Southwest EMU, the increase is almost entirely due to better information provided by state fish and wildlife agencies on numbers of occupied bald eagle breeding areas in Oklahoma and Texas in 2009, states for which the Service did not have verifiable information at the time the 2009 EA was prepared, and which were therefore were excluded from that earlier estimate. So the explanation is not, as the commenter suggests, either a discrepancy in the model or an inappropriate comparison of geographical areas, but rather the inclusion of better data provided by state fish and wildlife agencies subsequent to the 2009 EA, which was then used to update the earlier population estimates.

Comment: We are concerned that equating "preservation" of the species with "stability" of the breeding population could be insufficiently protective in the case of low abundance populations of bald eagles such as those existing in the Southwest. Therefore, it is critical that the Service manage eagle populations in the Southwest very conservatively. To be clear, we oppose any permitted take of the Sonoran Desert bald eagle given its cultural and historical importance to SRPMIC, as well as the depressed condition of that species.

Response: The Service agrees with the general concept proposed by this commenter and has proposed a more conservative take limit for bald eagles in the Southwest than is biologically indicated under either take-rate alternative. However, the Service disagrees that no take should be allowed, and based on the biological data and our scientific analyses we have allowed for a very modest level of take in this EMU. Elsewhere in response to other comments, we show how the LAP take limit will ensure take of bald eagles within the Sonoran Desert region is limited to only a few individuals per year.

Comment: The Service should review the recent peer-reviewed work on bald eagle population demographics and estimation based on analyses of mid-winter survey data. Given that the trend estimates are lower than the Service's, their peer-reviewed work warrants review as new information by the Service.

Comment: There are a multitude of problems with both the liberal and conservative take rates in the new Service proposal, mainly that the population trajectory for bald eagles in the Status Report is not corroborated by other peer-reviewed and recent journal articles on population trajectory of the bald eagle in the U.S. For example, a recent study shows trend estimates from 1986-2010 of 3.9 and 1.1% in the northeast and southwest U.S., respectively, and decreases in 13 southern and southwestern states, the latter averaging negative 2.2%.

Response: The referenced study (Eakle et al., 2015) is based on midwinter counts of bald eagles, which are affected by a number of factors. Among them are the propensity to migrate and annual variation in the number of migrant bald eagles from northern breeding areas, prey availability, weather, and environmental conditions on the wintering grounds. Several recent studies have demonstrated that changes in migratory behavior are occurring with some raptors, possibly in association with climate change. A common feature in some of these studies has been detection of declines, or higher rates of decline, in winter counts of a species at the southern limits of its winter range. This could occur if fewer individuals left northern breeding areas, or if those that did leave migrated shorter distances than they did historically. Regardless of the reason for this pattern, wintering bald eagle count data are affected by many more environmental variables than are breeding count data, which is why the Service relies on the latter for its population size estimates. We also disagree that our results stand in contrast to those from other published studies. The Service's assessment of trends in breeding bald eagle numbers is corroborated by, and is consistent with, published trends in the Breeding Bird Survey (BBS), a nationwide, standardized sampling of breeding birds across North America. The annual rate of change in the BBS index for bald eagles for the period 2003–2013 is 12.43% (95% credible interval = 10.29–14.89) with all BBS regions showing either a stable or increasing trend.

Comment: The Service must commit to obtain or generate the information on sources of mortality for bald eagles to better inform management of this species.

Response: The Service cannot commit to actions it may not have the budget or resources to complete. We have prioritized our efforts to date on gathering data on mortality of golden eagles because the available information suggests such take may be limiting golden eagle populations, potentially causing declines, while bald eagles continue to increase. We agree with this commenter that unbiased information on causes of mortality for bald eagles would be helpful and is desirable, but we cannot commit to gathering it in the same way we and collaborators have done for golden eagles.

Population Size and Status—General

Comment: Population estimates and trends for golden eagles are based on USFWS (2016); this document provides only a cursory treatment of the methods used and the detail provided is insufficient to judge the scientific validity of the approaches used. For example, this commenter believes the use of the western aerial transect summer golden eagle survey in conjunction with BBS data described in Millsap et al. (2013) to claim golden eagle "stability" is invalid. USFWS (2016) used a 2011-14 update to the Millsap et al. (2013) approach but without much detail (e.g., Millsap et al. 2013 discussed an apparent decline in juvenile eagle numbers in some BCRs, but no mention in USFWS, 2016).

Comment: Given the importance of ensuring that population estimates are accurate, defensible, and use the most recent information available, we ask the Service to review and revise their models to ensure population estimates reflect the best available data, and to use data from the states to achieve that end. Ultimately, overestimates may lead to potentially more take than the population can withstand, while underestimates may create more regulatory burden than is warranted.

Response: The Service believes it has used the best data available to estimate population size and trends for both bald and golden eagles. With respect to golden eagles, the Service's survey and analysis protocols provide credible estimates of population size and trend while properly accounting for uncertainty, and as such represent the best data for setting population objectives and managing take of golden eagles. We note that the aerial transect component of the model has been peer-reviewed and published twice in credible scientific journals (Good et al., 2007; Nielson et al., 2014), and the composite aerial transect/BBS golden eagle model has also been published in a credible peer-reviewed journal (Millsap et al., 2013). Given the extensive publication record and details therein regarding use of the approach taken in USFWS (2016), as well as the details provided in Appendix A4 of USFWS (2016) on the specific update used for the PEIS, we are unsure what additional information reviewers could want in order to understand the Service's approach for this species.

Parenthetically, we note that there was no mention in Millsap et al. (2013) of a declining trend for juvenile golden eagles; in fact, that paper goes into some detail as to why the authors decided not to separately evaluate population trends for juveniles.

For bald eagles, the Service's dual-frame aerial survey is the most comprehensive recent dataset available for this species; however, that survey approach has not been through the same level of peer review as the golden eagle survey, and it provides only indices to total population size that must be adjusted using demographic estimates. We acknowledge there is greater uncertainty with respect to the bald eagle estimates, but as we noted in USFWS (2016), the assumptions that were necessary for the adjustment (e.g., assuming all individuals > 3 years old are associated with nesting territories) likely lead to underestimation of total population size and are therefore conservative—consistent with the Service's overall approach to risk management. As to the use of state data, as noted in response to other comments, state data were used extensively by the Service to estimate bald eagle populations in the dual-frame survey, and we gratefully acknowledge that collaboration. For golden eagles, the state and local government data we are aware of consist of nest monitoring, telemetry, and migration count data. Although these data sets have important uses in eagle conservation, and the Service has used them for other purposes, they are not well suited to development of total population size estimates, which are required by the Service for management of golden eagle take.

Comment: The PEIS does not address why bald eagle populations have continued to grow, but golden eagles have not and whether eagle habitat is the controlling factor.

Response: The PEIS states that bald eagle growth is likely the result of continued recovery from the effects of DDT and related pesticides, whereas the possible decline of golden eagles is likely the result of high levels of anthropogenic mortality. These findings are outlined in more detail in the status report that was released simultaneously with the Draft PEIS and proposed rule (USFWS, 2016).

Comment: The Draft PEIS lacked discussion of bald eagle versus golden eagle struggles—in some areas bald eagles are known to harass and even kill golden eagles. The Service should weigh in on management priorities when both species of eagles occupy the same area. It would seem that golden eagles should be the preference given the smaller numbers and population trending.

Response: The Service is aware of no data indicating that interspecific competition or aggression is a limiting factor for either species of eagle at this time.

Comment: The PEIS says that the Service and partners are working on genetic and isotope methods that will allow the Service to identify the proportion of eagle mortality at a permitted facility that is composed of eagles from the LAP versus migrants or dispersers from elsewhere. These tools are available now at UCLA Center for Tropical Research and could be implemented on feathers from eagles that collide with wind turbines to provide this data.

Response: Unfortunately, this is not the case. One of the partners consulting on the referenced project with the Service was involved in the referenced work at UCLA. Although the approach developed by UCLA has proven feasible for some other birds, there are additional technical challenges for eagles that make application of the existing technology difficult and unproven. The Service, New Mexico State University, USGS, Oklahoma State University, Purdue University, the University of Maryland Center for Environmental Science, and others are actively involved in developing an assignment test that we hope will allow accurate assignment of eagles based on feathers and tissue samples to general natal area. The statement in the Draft PEIS is correct.

Comment: We do not see the value in combining population information from Alaska with the coterminous U.S. to set take limits for all these areas as populations in Alaska do not necessarily affect populations within the coterminous states. Instead, it would be most appropriate to set take limits for the coterminous U.S. using population estimates from the coterminous U.S. and approach the Alaskan population of eagles separately.

Response: For bald eagles, there will be a separate Alaskan EMU, as proposed in the Draft PEIS (the northern portion of the Pacific Flyway). For golden eagles, a substantial proportion of the population migrates to the coterminous U.S. in winter, where much of the annual mortality occurs (see McIntyre, 2012; USFWS, 2016). Thus, managing the Alaskan golden eagle population as a connected part of the coterminous U.S. makes biological sense. However, we do treat golden eagles in Alaska separately to some extent and will continue to estimate population size, and thus LAP golden eagle density, separately for Alaska.

Comment: We recognize that the Service proposes to survey bald and golden eagle populations during two intervals within each six-year period, but suggest that this may not be sufficient to observe and remedy declines in some LAPs that result from an approved take that proves to be excessive. We propose that the Service partner with agencies and other conservation groups, when possible, to more frequently survey eagle populations in LAPs in which take permits have been issued, at least during the early “trial” years following the implementation of the new rule.

Response: This is a reasonable suggestion and one the Service will consider as part of its adaptive management process for eagle take permits where states and other local entities are willing to undertake such surveys. We note that take under permits within each LAP, take will be monitored under specified terms and conditions, and that take will be tracked using spatial GIS tools the Service has developed to manage take at the EMU and LAP scales.

Population Size and Status—Golden Eagle

Comment: The Service's conclusion that the western U.S. golden eagle population may be declining is poorly supported and inconsistent with Service publications. For instance, Millsap et al. (2013) stated, "[o]ur results clarify that Golden Eagles are not declining widely in the western U.S." This paper cites an overall population change (across all 12 Bird Conservation Regions (BCRs) assessed from 1968 through 2010) as +0.4% per year, "suggesting a stable population." The pre-2010 trend varies on the basis of adding post-2010 data to the Millsap et al. (2013) model, but remains well within the 95% credible interval, which is probably more a signal of uncertainty in the data than evidence for a slight increase (Millsap et al. (2013)) or decrease (2016 Status Report). The evidence thus appears to indicate that the western U.S. golden eagle population is stable, without robust evidence of an increase or decline.

Comment: The Status Report documents that the summer rate of change for the western population of golden eagles with the composite model has an annual rate of change of 1.0, indicating a stable population. It also documents that the annual rate of change using the demographic model is 0.998, indicating a slow rate of population decline. Although neither model is considered the "better" choice, depending on where this is referred to in the rule and PEIS, the golden eagle population is often described as declining. This language should be changed to stable or potentially declining if both models are being referenced.

Comment: Throughout the Proposed Rule, using the Status Report as a reference, uneven emphasis is given to the matrix demographic data forecasting population model that shows a slight decline in golden eagle populations but little to no recognition is accorded to the time series composite model that uses actual golden eagle count data from late summer aerial transects over multiple years. This composite model study shows golden eagle populations have been stable for the last 40 years. The final rule should provide more even treatment of anthropogenic causes of eagle mortality as well as the two eagle population studies models evaluated in the Status Report.

Response: The Service used four lines of evidence in its assessment of golden eagle status. First, the Service used the hierarchical composite model estimates referred in these comments. Second, results of a demographic population projection model utilizing updated estimates of vital rates, as mentioned in the second comment. Third, a potential take limit model that

estimated sustainable take rates. And forth, an analysis of banding data and satellite telemetry data that estimated current survival rates and rates of ongoing take. These are all summarized in USFWS (2016). From that document, with respect to the count and demographic data, Service scientists stated, "…taking into account the uncertainty, the available data for golden eagles are somewhat equivocal, with count data suggesting a stable population but with demographic data forecasting a slight decline." With respect to the potential take limit and cause-of-death data, Service scientists stated "Sustainable take under these conditions is close to 2,000 individuals…however, available information suggests ongoing levels of human-caused mortality likely exceed this value, perhaps considerably. Thus, the data from satellite tags lends further support to the suggestion from the demographic models that current survival rates may be leading to a decline in population size." The Service has adopted a conservative approach to eagle management in the face of uncertainty, and interprets these data collectively as evidence for concern. We have adjusted language in the PEIS to reflect this uncertainty.

Comment: The Service's estimate of 5,000 golden eagles in the Eastern U.S. is indefensibly biased too high toward a maximum.

Comment: We are concerned about the demographic assumptions regarding golden eagles in the eastern U.S. which were necessary in the PEIS due to a lack of basic biological data.

Comment: Contrary to PEIS assertions, there are not 5,122 golden eagles living in the eastern U.S.; this species is a rare winter resident and, to the best of my knowledge, there has not been a single reported case of a golden eagle nesting East of the Mississippi River for decades. The eastern North America population is probably limited to just a few hundred pairs living in eastern Canada.

Comment: While golden eagle take issues in the eastern U.S. are likely minor in comparison to issues of the western U.S., little to no quantification of the population size, habitat use, productivity, mortality rate, or mortality sources is available in the eastern U.S. upon which to base decisions regarding expected take or reasonable mitigation actions.

Response: The Service used two recent peer-reviewed papers published in credible scientific journals as the source for the estimate of the size of the wintering population of golden eagles in the eastern U S. We worked directly with the senior author of one of those papers to refine our estimates for the conservative alternative, as explained in the Status Report (USFWS, 2016). In the final rule we use the 20^{th} quantile of the overall population size probability distribution, 4,002 individuals, as our size estimate, not the median of 5,122 or a point higher on the distribution as implied by the first comment. As the Status Report states, this number represents an estimate of the size of the wintering golden eagle population in the eastern U.S.; golden eagles historically nested rarely in the eastern U.S., but are not

typically present there in summer now. Thus, our estimate for the eastern U.S. is different than our estimates for the western U.S. in that in the east our estimate reflects the size of the wintering population. We acknowledge that this estimate is coarse, but we also note that the sustainable take rate the Service will apply to this population is zero, so any authorized take will be offset in a 1.2:1 ratio. And, based on ongoing satellite-telemetry work with golden eagles in the eastern U.S. by USGS, states, Canadian Provinces, academic and nongovernmental cooperators, and the Service, we do have information on survival rates and causes of mortality on which to base compensatory mitigation efforts for this golden eagle EMU.

Comment: The range map for golden eagles in the Draft PEIS is obsolete. A map depicting our current state of knowledge would show migration routes and wintering down the Appalachian chain. Given that this region is an important area for wind energy development, it is crucial to include the most recent research into calculations.

Response: The range map used shows the winter range of golden eagles extending far southward through the Appalachian Plateau in the eastern U.S. However, we have augmented the caption to this figure to call attention to the point raised by this commenter.

Comment: The assumption that all of Alaska's eagles winter in the conterminous U.S. is false. Researchers in Alaska have documented that a substantial portion of Alaska's eagles (approximately 25%; Alaska Department of Fish and Game data) winter in Canada and thus are missed by the Service's mid-winter surveys.

Response: The Service is aware that not all golden eagles in Alaska are migratory to the extent that they reach the contiguous U.S. in winter. The Service made it clear in the Status Report that the estimate of population size for golden eagles in Alaska was derived from counts of the migratory portion of Alaska and western Canada's golden eagles that winter in the western U.S.; the main point being that the estimate was conservative. The Service has adopted a policy of using conservative values to represent population size where there is uncertainty, and that is what the Service proposed with respect to its population size estimates for both bald and golden eagles in Alaska. However, in response to this comment, the Service has increased its population size estimate for golden eagles in Alaska by 25%, to account for the proportion of Alaskan golden eagles that winter in Alaska and Canada according to the Alaska Department of Fish and Game. Based on the methods used in the proposed rule and the decision to adopt estimates under the conservative alternative, the PEIS will be revised to show an estimate of Golden Eagles in Alaska of 3,180 individuals.

Comment: The PEIS should provide more information as to the specific location of the declines in golden eagle populations and how they relate to the existing or proposed Eagle Management Units (EMUs).

Response: The Service's quantitative information on regional trends in golden eagles is presented in Appendix A4 of the Status Report (USFWS, 2016). The information on survival, productivity, and causes-of-death that suggested declines were pooled over larger areas than the EMUs, because or initial analyses showed that the demographic rates did not appear to vary substantially for golden eagles across EMUs.

Comment: The Draft PEIS has not appropriately analyzed the need for additional "net benefit" mitigation for GOEA. The proposed rule misstates a base understanding of the 2009 rule. The 2016 summary of the 2009 rule (rule, p. 7) claims in 2009 that new unauthorized take of golden eagles must be at least equally offset by compensatory mitigation. The 2009 rule does not state or conclude that. The 2009 rule indicates that compensatory mitigation would be used to offset at less than 1:1 in robust populations and at 1:1 in areas where new take could not be absorbed (2009 rule p. 46842). As such, the analysis and need for a "net benefit" has not been analyzed appropriately in the 2009 or 2016 proposed rule. Additionally, the Draft PEIS and proposed rule erroneously assume that permitted incidental take results in population reductions. Because the take is offset, as currently occurs for golden eagles, take is fully mitigated by offsetting compensatory mitigation; therefore, by definition, there would be no population decline. Moreover, the Service does not appropriately consider conservative measures already incorporated either purposefully (use of the 80th quantile of the fatality estimate distribution for permitting) or implicitly (failure to account for operating time of turbines in estimating fatality rates, failure to give full credit for the life of power pole retrofits by assuming all retrofits only last 10 years) in its estimates of impacts of wind projects on eagles.

Response: The draft PEIS and referenced Status Report provides evidence that the status of the golden eagle in the western United States is worse than indicated in our 2009 assessment. Whether the status has actually changed is unclear because more and better data are available now than was the case in 2009. Regardless, the information available to the Service in 2016 shows the level of existing unpermitted golden eagle take likely exceeds the species' sustainable take rate. Conservative measures incorporated into the fatality prediction model only reduce the likelihood the added mortality authorized under future permits will not be underestimated, it does nothing to reduce the already excessive amount of mortality that is ongoing. This is particularly true given the Service's commitment to adjust fatality estimates at permitted projects based on project-specific data after 5 years, and to provide credit to permittees for any excess mitigation that was accomplished during those first five years. In order to meet the management objective of maintaining stable golden eagle populations,

the Service must reduce the rate of ongoing unpermitted mortality. The Service plans to accomplish this by: (1) requiring permittees to mitigate their take at a greater than 1:1 ratio, thereby directly reducing ongoing take through the permits we issue, and (2) by increasing efforts to prosecute those responsible for the excessive illegal take, or have those parties enter into settlement agreements. Settlement agreements provide restitution for past take and commit the operators to seek incidental take permits, thereby ensuring future take will be minimized, and, for golden eagles, offset through mitigation.

There are three other points made by this commenter that are incorrect. First, the Service does use predicted operating time in its model to predict fatalities if operating times can be determined. Second, the Service's Resource Equivalency Analysis (REA) does not assume a fixed life of 10 years for power pole retrofits, although 10 years is the default and what is used in the example in the Service's Eagle Conservation Plan Guidance (ECPG). Rather, as stated in the ECPG and the REA, this value can be adjusted if methods with demonstrably longer life are used, and credit for the retrofits is calculated accordingly. Finally, this comment implies that the Service believes permitted take is responsible for the declining status of the golden eagle, and that is not the case. The Service recognizes, and states in many places in the PEIS and in the Status Report, that the issue is with unpermitted take. Although the Service does intend to help reduce unpermitted take through mitigation under permits, the Service is also investing considerable time and resources seeking to reduce ongoing illegal take using

Comment: The Eastern U.S., specifically the central Appalachians, provides winter habitat for a significant percentage of the eastern golden eagle population, which is not increasing like bald eagles and should be managed differently.

Response: We agree that golden eagles in the eastern U.S. warrant more careful consideration than bald eagles given their different status, and that is why the proposed take limit for golden eagles is zero. Any take that is authorized will have to be offset at a 1.2:1 ratio.

Comment: On page 79 of the PEIS, golden eagle productivity is reported as 0.55, but 0.54 in USFWS, 2016 (these seemingly minor rounding errors compound quickly in life tables).

Response: The Status Report reported a mean productivity for golden eagles of 0.55 and a median of 0.54 per occupied nesting territory (see Appendix A2, page 40 in USFWS, 2016). Regardless, we used direct samples from the predictive distributions for fecundity as inputs for the demographic projection matrix. Thus there is no reason to be concerned that minor rounding errors may have impacted the projection matrix results.

Comment: It is unclear why USFWS (2016) and the PEIS rely on band returns for annual eagle survival estimates without an adjustment for band recovery probability with eagle age.

Response: Although the final set of models evaluated did not include an age effect on recovery probability except in the global model, exploratory analyses conducted before we selected the final set of models suggested differences in band recovery probability with age had little effect on the annual survival rate estimates. However, in response to this comment we re-ran our golden eagle survival models to take a closer look and did find the model that allowed recovery probability to differ between first-year and older eagles had more support than the constant recovery probability model used in USFWS (2016). However, as we found in our exploratory analyses, allowing for this age difference in band recovery probability did not appreciably affect the survival rate estimates: annual first-year survival for the model that allowed for a first-year band recovery effect was 0.7065 (95% confidence limits = 0.6645–0.7448), and the estimates with the model with a constant band recovery probability was 0.7041 (95% confidence limits = 0.6620–0.7426). The difference in estimates for other age classes was even less pronounced. We thank this commenter for calling our attention to this issue, but our re-analysis of survival accounting for the age difference in band recovery rates does not change our conclusions regarding the effects of mortality on golden eagles.

Comment: It is unclear why USFWS (2016) did not compare age-specific survival estimates from both the banding and tagging data, but rather used one data source for annual survival (bands) and the other for quantifying human sources of mortality (tagging).

Response: The Service and partners have been engaged in a meta-analysis of golden eagle survival data for two years. For the PEIS analysis, the Service envisioned using a multi-state modeling framework to combine estimates of recovery rate and annual survival from satellite tags and bands. However, the analysis has proven far more complex than originally planned. First, for some types of satellite tags, tag life has been problematic and tag loss rates preclude obtaining reasonable estimates. For satellite tags with reasonable performance, survival estimates for subadult and adult golden eagles are very similar to estimates from individuals wearing only bands, however estimates for juveniles are approximately 20% lower with satellite tags compared to bands. This suggests the possibility of a tag-effect on survival of juvenile golden eagles. Consequently, the Service is conducting further analyses to investigate that alternative versus possible age-specific differences in recovery probability between bands and satellite tags, which we presume is what this commenter is suggesting. Faced with the possibility that satellite tags are having an effect on survival and the complexities of estimating recovery probability for satellite tags with highly variable rates of performance, the Service elected to use only banding data to compute direct estimates of survival for use in demographic models for the PEIS. The Service and partners are continuing to work on the meta-analysis described above, and we intend to

publish those findings with our collaborators as soon as the work is completed. We will use the results of that analysis, which hopefully will include joint estimates of survival based on satellite tags and bands, in the next update of our status assessment for golden eagles.

Comment: The Service makes the general claim that satellite-tagging data is unbiased. This is untrue.

Response: The Service made this claim with respect to cause-of-death data from satellite-tagged eagles in comparison to cause-of-death data from opportunistically found eagle carcasses, a claim supported by literature. However, we acknowledge the commenter is correct in that no data set is truly unbiased. We should have characterized the mortality data set for satellite-tagged eagles as being far less biased than bands or opportunistically found eagle remains for this purpose, rather than unbiased. We will correct this in the final PEIS.

Comment: An upward bias in eagle productivity data (due to lower detectability of early season nest failures or occupancy without egg laying) and upward bias in first-year eagle survival due to both tagging bias described above and lower first-year band detectability combine to compound concern over the golden eagle population trajectory that USFWS (2016) already suggests is declining.

Response: The Service shares this commenter's concern about the true first-year golden eagle survival rate, as discussed above, and we acknowledge that productivity estimates may be biased high due to a failure in many of the included data sets to adequately account for early nest failures. Of the two issues, the bias in survival is more likely to have demographic consequences, thus the Service is placing a high priority on finalizing analyses that will hopefully provide more insight into this vexing issue. However, even if the situation for golden eagles is direr than the Service concluded in the Draft PEIS, the management approach in the preferred alternative—a zero harvest rate with compensatory mitigation at a greater than 1:1 replacement ratio—is as protective is possible, considering the difficulties the Service faces in trying to enforce and prosecute the proliferation of activities that are illegally taking golden eagles. We believe the final preferred alternative correctly balances the inherent difficulties in providing a permitting framework that encourages new and existing non-compliant project operators to apply for and obtain a permit.

Comment: The Service references anthropogenic sources of mortality as responsible for almost 60% of golden eagle mortalities. Elsewhere the Service references a rate of anthropogenic mortality of 10%. These discrepancies should be reconciled.

Response: The Service estimates that 56% of golden eagle mortality is from anthropogenic causes, which translates into approximately a 10% increase in the overall mortality rate (or a 10% decrease in annual survival) over what would be expected based on natural mortality alone. Overall, in the absence of anthropogenic mortality, annual golden eagle survival over all age classes would average about 88%, yet with the observed level of human-caused mortality, overall survival averaged just under 79%.

Comment: In the PEIS the Service tries to rectify the "somewhat at odds" results of the golden eagle composite model and population matrix by suggesting golden eagles may be somehow compensating for the high human-caused mortality suggested by tagging data. This is a reckless statement, especially when other alternative explanations are not even mentioned by the authors. Many possible alternative explanations for the discrepancy exist, including incorrect model assumptions or model forms, limited input data, inappropriate use of aerial transect data for estimating population trends on timescales the dataset was not designed for.

Response: The Service makes the observation that one possibility for the slightly different point estimates of the annual growth rate between the composite (survey) and projection matrix (demographic) models is that golden eagles may be exhibiting greater capacity to adjust vital rates than we have assumed in the projection matrix model. We do not understand how that is reckless when it is a distinct and reasonably likely possibility, particularly when we go on to interpret the results in the most conservative manner, setting the take rate at zero and concluding that "…available information suggests ongoing levels of human-caused mortality likely exceed (the sustainable take limit), perhaps considerably." As to the commenter's point that this reflects poor performance in the composite model, the differences in the estimates of the annual growth rate from the composite and demographic model are actually remarkably similar (1.0 versus 0.998), an unlikely outcome if the composite model was performing poorly, particularly considering the very different data inputs for each model.

Comment: The Service should consider developing and implementing a strategy to ensure the sustainability of the golden eagle population in the event of a future population decline. Falconers are in a unique position to participate in any compensatory mitigation or species survival plan projects. Our community is capable of establishing and maintaining a healthy and genetically diverse captive population of golden eagles because falconers are capable of conducting the entire range of activities and operations necessary for participating in a species survival plan. Obtaining specimens from the wild, maintaining them in good condition, rehabilitation, training, conditioning for release, and release of golden eagles into

the wild that are capable of survival to become successful members of an adult breeding population.

Response: The Service is emphasizing actions in this rule that we believe will ensure wild golden eagle populations remain healthy and do not require captive propagation and release. However, the Service has not overlooked its commitment to consider captive propagation regulations for eagles, and we hope to resume work on those regulations in the coming year.

Science and Peer-review

Comment: The Service states that the Status Report provides the scientific foundation for the revised rule, and if so, it must be open for public comment.

Comment: It is unclear whether the Status Report (USFWS, 2016) was peer-reviewed. If it was, then the Service should have stated that outside review by qualified, unaffiliated biologists with appropriate background in population modeling and assessment had done a review and found the methodology to be appropriate and the conclusions supported.

Response: The status report (USFWS, 2016) was available for download and comment along with the PEIS and proposed rule. Moreover, the PEIS directly incorporated pertinent data and findings from the status report, and the Draft PEIS was certainly open for public review and comment after publication of the Notice of Availability in the Federal Register. Service scientists have adhered to a policy of diligently preparing scientific papers and publishing them in peer-reviewed journals as the preferred means of peer review of eagle science products, and several of the key science products have been published, or they have been peer-reviewed under the Service's contracts for such services. However, in February 2015 the Service proposed a schedule for finalization of the revision to these regulations with a shortened timeline. Service scientists observed at the time that such a timeline would preclude the opportunity for advance peer review of the remaining science products, and recommended adoption of a timeline that would allow for such review. However, given the importance and time-sensitivity of this rule, the Service concluded the best course of action was to finalize the rule according to the proposed schedule and then prioritize peer review of the remaining science products afterwards. That peer-review plan is available for review at http://www.fws.gov/birds/management/managed-species/eagle-management.php. Because the rule commits the Service to a regular schedule of updates to the parts of the regulation that tier from the science products, the Service will incorporate any revisions to the science based on the peer review process at the first scheduled update (or sooner if warranted).

Take Models

Comment: The Service's estimated levels of "sustainable take" are purely theoretical and based on untested models.

Response: The Service fully acknowledges that its estimates of eagle population size, demographic rates, sustainable take rates, and, for wind, its model-based estimates of fatality rates include substantial uncertainty. The Service has adopted two key principles for addressing this uncertainty: (1) use of formal adaptive management; and (2) being risk-averse with respect to estimating impacts on eagles. Adaptive management is discussed in other comment responses. With regard to managing risk, the population size, sustainable take rate, and model-based eagle fatality estimates at wind projects are all based on scientifically peer-reviewed models that are designed to allow for the quantification of uncertainty, primarily by providing estimates in the form of probability distributions. This allows the Service to explicitly describe its risk tolerance (e.g., being protective of eagles or protective of interests that might take eagles) for each aspect of the permitting process. The Service has decided to manage the uncertainty at every level using values for decision-making that shift the risk in an 80:20 ratio towards being protective of eagles. Thus, the actual eagle population size in each EMU and the true sustainable take rate are both highly likely to be larger than the values used by the Service, so that when they are multiplied together to get the take limit, that value is even less likely to exceed the actual sustainable take limit for the EMU. Similarly, the eagle fatality estimates for individual wind projects are unlikely to underestimate the actual take rates, and as a result, authorized take over all wind projects is unlikely to exceed the EMU take limits. Improvements in the precision of all of these estimates through adaptive management should decrease uncertainty and thus shrink the magnitude of the difference between the median fatality rate and the permitted take limit over time.

Comment: The Draft PEIS fails to adequately disclose the scientific justification for the take rates for bald eagles.

Comment: We recommend that the Final PEIS include further explanation of how the proposed take levels in the preferred alternative meet the Service's new proposed goal of "maintaining increasing populations in all eagle management units and persistence of local populations throughout the geographic range of each species."

Comment: The bald eagle is not a duck, and allowing the killing of bald eagles in the same way we allow the killing of ducks is a huge disservice to the bald eagle as our National Symbol and to the people of our Nation.

Response: Although the potential biological removal model the Service used to estimate sustainable take rates for eagles is usually applied to game species, the same demographic principles apply whether mortality is in the form of recreational harvest or from incidental

take. Therefore, while we acknowledge that eagles are not ducks, we disagree that the same biological principles and approaches that have been successful in managing duck hunting do not apply to managing eagle mortality. The Status Report (USFWS, 2016) contains a detailed explanation of the potential take rate model the Service used to arrive at its conclusions regarding sustainable take rates. However, in summary, the Service used estimated age-specific survival rates and productivity information to determine the current and theoretical maximum rate of population growth for bald eagles, using established scientific methods for such calculations. From the maximum rate of population growth, it is possible to extrapolate to estimate the rate of growth necessary to meet or remain at the population objective using established scientifically peer-reviewed models; the difference between the necessary and maximum potential rate of growth is the sustainable take rate. In the case of golden eagles, the Service was able to estimate the current rate of unauthorized take, and adjust survival rates accordingly to determine the true maximum potential rate of population growth. For bald eagles we did not have an estimate of the current take rate, and so our survival estimates include current take, thus our estimates of the potential growth rate for bald eagles are likely lower than the true potential growth rate, and our estimates of the sustainable take rate are actually estimates of the residual sustainable take rate after accounting for the unknown amount of ongoing take. It is important to note that the Service's current models estimate the sustainable take rate at the level of the total population, assuming the actual take will occur across age classes in proportion to their relative abundance. This differs from the take rates set in the 2009 Eagle Rule, which were expressed as a proportion of annual production. Anyone interested in further details should read the Status Report (USFWS, 2016).

Comment: Setting a gross take level of 4,200 individuals on a national-scale is premature. Until the effects of permitted taking have been observed directly there is no justification for increasing the level of risk tolerance in reliance on modeling alone. Although further study and direct observation may improve confidence and permit higher risk tolerance in the future, at this time it is premature to favor more expansive levels of permitted take and permitting decisions over having a high level of confidence in the impacts on breeding populations and other potential effects of permitted take. Further, a low level of risk tolerance is mandated when other important considerations, such as the symbolic importance of bald eagles, to mitigate the unforeseeable consequences of harm to such symbolism and to the perceptions of the American citizens.

Response: The methods the Service used to estimate sustainable take rates are peer-reviewed approaches that are currently used to set take rates for other migratory birds; see USFWS (2016) and responses to many other comments. With respect to the admonition that the Service needs to be cautious, we point out that the Service's selected alternative in the final

PEIS uses a very risk-averse point on the probability distribution for each estimated parameter in its models (the 20th or 80th quantile, depending on the parameter). This risk-averse standard is carried forward into the adaptive management process the Service uses at individual projects to estimate take, as described in Appendices A and D of the ECPG. Thus, the Service's proposal does already incorporate a low level of risk tolerance at all levels in the proposed permitting program.

We are also compelled to point out that the proposed take limit in the final PEIS of 7,522 bald eagles is not an objective, but a conservative expression of the amount of take we believe would be sustainable given our management objective and the current demographic state of bald eagle populations. The Service does not expect to issue permits to take anywhere near this number of bald eagles, just as it has never issued permits allowing take of anywhere near the 1,103 bald eagles currently allowed under the 2009 eagle take rule. Our decision to issue a permit will still be based on two fundamental determinations: (1) whether the take would be within the EMU and LAP take limits (or can be mitigated as such); and (2) whether all practicable means will be used to minimize and avoid the potential for take. Requirements to minimize and avoid the take that is authorized will ensure take is not frivolous and is, indeed, necessary during the course of an otherwise lawful activity.

Finally, it is important to keep in mind that history over the past several years has shown that an overwhelming majority of the activities that should seek eagle take permits will go forward regardless of whether the Service issues an incidental eagle take permit or not; this is despite the Service's prioritization of enforcement of the eagle take regulations and the risk that brings of prosecution for subsequent illegal eagle take. Thus, the main consequence of not issuing an eagle incidental take permit is that the opportunity for conservation benefits or learning that would accrue under such permits is lost. The Service's approach is an attempt to balance all of these facts in such a way that incentives for permits are high enough to encourage compliance, yet uncertainty is managed so that risk to eagles is minimized and, eventually, accounted for through the adaptive management process.

Take Management

Comment: In response to a FOIA request, the Service could produce records of only 25 deaths during the past three years. That figure grossly understates actual eagle mortalities. The Service cannot reach its goal of stable or increasing bald or golden eagle populations without access to accurate and complete mortality data.

Response: We disagree with the idea that the Service must account for every eagle fatality in order to understand the implications of anthropogenic take on eagle populations. Data at this scale are not and never will be available for any species of wildlife. The Service and partners have collected and are continuing to collect a large volume of data from banded

and satellite-tagged eagles that provide credible estimates of bald and golden eagle survival rates and the relative importance of various mortality factors for golden eagles. These data, the analyses used to interpret them, and the Service's technical conclusions are described in the Status Report that accompanied the Draft PEIS and proposed rule (USFWS, 2016). The Service has committed to continuing to collect these data, and to revising its assessments based on them, every six years.

Comment: We encourage the Service to develop specific eagle population size goals for each EMU and to subsequently use those targets to inform permit decisions within the EMUs.

Response: That is what Table 3-2 and Table 3-7. Estimated total golden eagle population size in 2014 at the median (*N*) and 20th quantile (N_{20th}) by potential EMU, from USFWS (2016). in the PEIS provide.

Comment: The proposed EMUs are weighted heavily towards breeding populations in the U.S. and fail to include populations of eagles in Canada and Mexico. There is no biological reason why these populations should be omitted from an analysis of eagles and permissible take levels. The final rule should use the best available science to establish take limits, which should include the Canada and Mexico populations.

Response: Basing EMU population size estimates and take limits on breeding populations is another purposefully conservative measure the Service has decided to implement to ensure EMU populations are buffered against overharvest. The Service has no authority to regulate take of eagles in Mexico and Canada, yet we know incidental take occurs there (based on deaths of satellite-tagged eagles in the case of golden eagles, and based on band returns for bald eagles). To include these populations in harvest take limits in the U. S. without knowing the extent of, and accounting for, ongoing incidental take in Canada and Mexico would be irresponsible. Moreover, for golden eagles, take limits would not be increased by including these populations (0% of a bigger number is still zero). The Service does agree with this comment to the degree that we believe it is important to understand the level of effect of incidental take on different geographic populations of eagles. Towards that end, the Service is investing considerable resources developing genetic and isotopic methods to determine the actual natal origins of eagles killed under incidental take permits, and those data may eventually allow the Service to estimate and account for the proportion of take that is of residents and migrants. Until that time, the Service will use the more conservative approach outlined in the PEIS.

Comment: We question how the Service will measure take in real-time and make necessary adjustments to take levels. It is assumed that undertaking such a real-time analysis will consume staff resources; thus, we would like to better understand how the Service plans to engage in this process.

Response: The Service has databases and a spatial GIS application that allow authorized take to be accounted for and debited at both the EMU- and LAP-scales. Data on authorized take will be updated at no less than two month intervals, and data on unpermitted take will be added as the Service receives information from the National Wildlife Health Laboratory, Office of Law Enforcement databases, and other sources that are incorporated into the system over time. As actual take levels are estimated from monitoring requirements associated with each permit, the authorized take levels will be adjusted to reflect updated take predictions under each permit. These updates will occur no less frequently than once each five years. With respect to changes in eagle population estimates, these will occur at six-year intervals based on the monitoring plan described in the PEIS. As described in response to other comments, the Service uses a risk-averse strategy in estimating take for each permit, thus we anticipate that underestimation of take will be a relatively rare occurrence (20% of the time). However, permits will include provisions specifying actions that will be taken if take does prove to be greater than anticipated, and these actions will be implemented per the terms and conditions on the permit. Therefore, if a project does cause higher take than projected, it will be accounted for after the initial 5-year period by requiring more offsetting compensatory mitigation and other adjustments to the permit terms and conditions.

Comment: Alarmingly, it appears that the Service does not actually know how many golden eagles wind turbines and associated infrastructure kill annually. This interjects tremendous uncertainty, and the PEIS is therefore not valid under NEPA.

Response: We refer this commenter to Tables 7, 8, and 9 in USFWS (2016), where the Service provides the data on what we do know about golden eagle mortality and we quantify our uncertainty in those estimates. Elsewhere in response to other comments and in the preamble to the rule we describe in detail the Service's approach to managing the risk to eagles given this uncertainty. NEPA does not require perfect knowledge, and we believe our approach—to quantify the effects of the proposed action on eagles and our uncertainty in those effects using the best available scientifically supported information, and then to disclose how we deal with that uncertainty in our decision-making—is what is required under NEPA.

Comment: All the primary anthropogenic mortalities with the possible exception of collisions are less of a factor than they were 30-50 years ago. There is less lead, much less

electrocution, less shooting, less poison, yet now these are the factors that are taking the blame. Look at the historic record, eagles were shot from the air, poisoned and electrocuted by the 100's, these were all reported they were known anthropogenic mortalities at a much greater scale than has been seen in the last 20 years. Yet the golden eagle population has persisted.

Response: The Service is unaware of any credible data to document trends in rates of various mortality factors over time. We can only assess verifiable data that is available to us, and those data are reported in USFWS (2016).

Comment: The anthropogenic mortality for eagles gets overestimated by 20% since the mathematical probability of the natural mortality remains for all individuals. The error gets magnified as it is used outside of the total.

Response: The Service makes no assumptions in our modeling regarding the additive or compensatory nature of anthropogenic mortality. We have simply presented the data in a straightforward manner. For example, if out of 100 eagles, 20 of them die from being shot and 10 die from starvation, the way it is presented in USFWS (2016) the survival rate is 70%, the mortality rate is 30%, and the proportion of mortalities attributable to human causes is 67%. Making inferences to the effect that some proportion of the eagles that were shot would have died of starvation and vice versa requires a better understanding of the role of starvation in population regulation. In the case of golden eagles, most starvation occurred early in the first year of life, as expected, and most anthropogenic mortality occurred among subadults and adults. Thus those individuals subjected to anthropogenic mortality factors had already successfully survived the period of greatest natural mortality.

Comment: If the Service actually believes any additional anthropogenic mortality cannot be sustained, how can they continue to issue a permit for the take of 40 nestlings annually to the Zuni tribe?

Response: The permit referenced by this commenter is actually issued to the Hopi, not the Zuni tribe. Region 2 of the Service has fully analyzed the effects of this permit in an Environmental Assessment that was completed in April 2013 (http://www.fws.gov/southwest/migratorybirds/docs/Revised%20Final_EA%204_24_2013%20complete.pdf). That document found the actual take, which averages around 23 annually, is biologically sustainable under the Service's management objective for golden eagles. It is also important to recognize that the Hopi and other Native American tribal take of golden eagles predates all other forms of recorded anthropogenic mortality and is a protected activity under the Religious Freedom Restoration Act. The Service assigned priority over all but emergency take of eagles to Indian religious take in the 2009 Eagle Rule, thus the Service

has an obligation to reduce other forms of more recently instituted anthropogenic take before it impacts the Hopi by reducing their take. It is also important to note that the Hopi's religious use of eagles has occurred for centuries and is part of the 2009 baseline.

Comment: Based on the abundant evidence before the Alaska Department of Fish and Game—including the Service's own population estimates—of a robust and stable bald eagle population in Alaska that is likely at carrying capacity, the state strongly recommends that the Service reconsider the rationale behind the proposed 0.8% (or 500-eagle) allowable take rate/limit. We request that the Service change the level of allowable take in Alaska to at least 6 %, consistent with the proposed level for most of the conterminous U.S. This level of take would not put the Alaska bald eagle EMU at risk of depletion given that this population is likely at or near carrying capacity.

Comment: Sustainable take of Bald Eagles in Alaska (0.8%) appears arbitrary and is inconsistent with the Service's population estimate (70,544). The 0.8% take-rate estimate is an order of magnitude smaller than any other estimate of sustainable take. Considering that one-half of the bald eagle population in the U.S is in Alaska, it is appropriate to reconsider the take limit there.

Response: The Service appreciates the state's concern regarding apparent disparities in methods used to calculate annual bald eagle take thresholds among EMUs. Under the preferred proposed alternative, the conservative take limit would be set at "6% of populations for Bald Eagles in most EMUs, with lower rates proposed in the Southwest (3.8%) and Alaska (0.8%)." Under this scenario, the proposed level of take for Alaska would remain the same at 555 eagles per year. Since 2010, the Service has authorized an average take of 27 bald eagles per year in Alaska. This represents only 5% of the annual, allowable take in the EMU. Consequently, the bald eagle take limit of 555 birds per year has in no way limited development or other activities in Alaska. In certain circumstances (i.e., territory loss without replacement), take is debited from the threshold in perpetuity rather than credited back to the threshold the following year. This situation is typically limited to airports where human safety requires removal of a territory to minimize risks of collision with aircraft. Since 2010, the Service has authorized a total take of 90 bald eagles for this purpose. Because most airports have been permitted, we do not anticipate many more of these permits to be issued in the future. Consequently, the authorized bald eagle take limit in Alaska is still at 465 individuals per year.

The relative conservative approach to calculating Alaska's bald eagle take threshold was proposed for two reasons. First, in contrast to other states, Alaska does not conduct standardized monitoring survey for purposes of developing statistically rigorous population estimates. This creates greater uncertainty in Alaska's population estimates compared to other EMUs. Second, in contrast to other EMUs, Alaska's bald eagle habitats are, in most

regions, near or at carrying capacity. Consequently, when take involving habitat loss (e.g., nests, foraging areas, important roost sites) occurs, displaced breeders are unlikely to rejoin the breeding population. In this respect, EMUs with less robust population sizes are more resilient to take including habitat than Alaska. Despite greater uncertainty in Alaska's bald eagle population size estimate, and its comparative lack of resilience to habitat loss, we agree that data in general suggests the population appears robust and relatively stable compared to other EMUs. Consequently, the Service agrees to revise the take limit for bald eagles in Alaska from 0.8% (555 individuals) to 6% (3,776 individuals). As noted above, this revision is purely for purposes of being consistent with the sustainable take rates the Service is establishing for most of the other EMUs (except for the Southwest EMU); the Service does not expect requests for bald eagle take permits in Alaska to approach the proposed take rate of 0.8%, much less the 6% take rate being established in this rulemaking, given that the average annual permitted take rate for bald eagles in Alaska has been 27 eagles.

Comment: The proposed changes in take limits for bald eagles would allow up to 126,000 eagles to be killed over the increased period of 30 years. We consider this number to be completely unacceptable.

Response: To put the cumulative, potential 30-year take number from the proposed rule in perspective, the Service notes that the relevant population size from which this take would be applied is 3,765,240 individuals. In any case, the Service expects that actual take authorized under permits will not approach even 10% of the proposed take limits.

Other

Comment: Although poisonings, including lead, are a known mortality factor for golden eagles, the Draft PEIS is mute on potential options for eliminating poison within eagle range.

Response: Analyzing how to reduce eagle poisonings in the cumulative effects section would not be appropriate because that section analyzes the effects of the federal action along with other cumulative impacts. Since this federal action consists of establishing a management framework and revising permit regulations, options for eliminating poisoning are outside the scope of the analysis and proposed action. We understand the importance of reducing eagle poisoning, potentially through compensatory mitigation and/or other actions, and are working with partners to develop metrics and methods for lead abatement. We also would like to work with other agencies (e.g., the USEPA and USDA, APHIS, Wildlife Services) to reduce eagle mortality from rodenticides. However, such steps are not specifically part of the rulemaking and management framework that are the federal action being analyzed in this PEIS.

Comment: The Service must consider and solicit public comment on an alternative that would maximize BGEPA compliance through the most obvious and straightforward approach, i.e., by significantly increasing enforcement, both before and after projects are constructed in eagle habitat, and by imposing sufficient penalties to deter violations of the Act.

Response: We can increase enforcement efforts regardless of whether it was described and analyzed as part of our overall eagle management proposal. Additionally, increased enforcement is not a reasonable alternative because the agency cannot rely on getting a significant increase in its enforcement budget, which is what it would take to significantly increase enforcement efforts. Also, the maximum penalties are set by statute and the Service has no discretion to increase penalties beyond what is authorized under the Eagle Act and the Federal Civil Penalties Adjustment Act.

Comment: The Draft PEIS acknowledges that an "important category of actions for which eagle permits have been requested is wind energy development," and that "the proposed action could lead to additional deployment of wind energy." As a result, the Draft PEIS analyzes "the indirect impacts of the proposed action on climate change." But the Service may not limit its indirect impact analysis to the beneficial impacts of "avoid[ing] greenhouse gas emissions" through "wind energy development." To comply with NEPA, The Service must also analyze in the PEIS the negative environmental impacts of wind energy projects. 40 CFR 1502.16, 1508.8(b) ("Indirect effects may include growth inducing effects and . . . related effects on air and water and other natural systems, including ecosystems."). By failing to analyze the growth inducing impacts of the proposed rule, and the indirect effects that increased wind development will cause, the Draft PEIS violates NEPA. *Id.; City of Davis v. Coleman*, 521 F.2d 661, 676-677, 679-680 (9th Cir. 1975) (declaring that NEPA requires analysis of "secondary" industrial growth induced by the project and noting that "consideration of secondary impacts may often be more important than consideration of primary impacts")

Response: The PEIS states that any benefit would be minor at most and may not exist at all. The PEIS notes that any potential beneficial impacts of avoiding greenhouse gas emissions are likely to be minor at most and stem from the very small number, if any, of wind-energy facilities that may have been terminated because they could not obtain eagle permits under the current regulation (note that this also assumes that they would be able to obtain a permit under the amended regulation). The Summary on page xiii of the Draft PEIS also states that it is "unclear whether the proposed new regulations would actually increase wind energy development, or simply increase the number of such projects that operate with incidental take permits." Also, indirect effects must be later in time or farther removed in distance and it would be entirely speculative at this time to assess what the indirect effects

might be in this PEIS. As far as growth-inducing effects, wind-energy projects do not have secondary effects equivalent to the effects of a highway interchange, which was the underlying action in *City of Davis*. For wind energy projects those effects appear to be negligible.

Comment: Effectively, the Draft PEIS limits a project's ability to tier by stating that any significant impact to migratory birds would require individual review and the Service provides only vague metrics by which this would be determined. The PEIS should establish that impacts to non-eagle migratory birds have been demonstrated to not be significant in order to streamline the project.

Response: As the PEIS states, the effects on other migratory birds caused by the action analyzed by the PEIS—developing and issuing permits authorizing eagle take under the amended regulations—are not expected to be significant in most cases. The PEIS provides specific examples of circumstances in which Eagle Act permit authorization under the revised regulation could significantly affect migratory birds. The Service will determine on a case-by-case basis when issuing an eagle permit for a specific activity under this revised regulation may significantly affect migratory birds. If the Service concludes that the effect may be significant, the NEPA analysis for that project will contain additional analysis of that effect.

Comment: The Service intends that projects will be able to tier from the PEIS when conducting project-level NEPA analyses in most cases where the project: 1) will not take eagles at a rate that exceeds (individually or cumulatively) the take limit of the EMU (unless take is offset); 2) does not result in Service-authorized take (individually or cumulatively) in excess of 5% of the LAP; and 3) where the applicant agrees to use a Service-approved offsetting mitigation bank to accomplish any required offset for the authorized mortality." We believe this is unlikely to occur, at least in the near-term, for multiple reasons. The implementation of tiering requires the Service to develop a NEPA screening form and approve an offsetting mitigation bank. Also, projects must have used Service-approved protocols. Further, it seems that the NEPA review is subject to impacts from unpermitted take in the LAP, and that impacts to other resources outside of the issuance of the permit will be evaluated. Although the concept of NEPA tiering is laudable, it provides no real benefit in the short- and mid-term and only provides long-term benefit if the Service has the staff to dedicate to the needed analysis to make this work. We request that in the Final Rule, the tiering be modified to not include the LAP, to allow for use of power pole retrofits based on the Service's REA, and to allow for use of alternate survey protocols. These changes will allow for faster benefits of tiering referenced in the Draft PEIS. In addition, the Service should dedicate staff to prioritizing creation of the NEPA screening form to maximize the usefulness of this approach.

Response: The efficiencies gained by tiering from a PEIS should not be confused with the effects of falling under a categorical exclusion. We anticipate that many projects that will be able to tier from this PEIS will still require an environmental assessment, but it would be focused on effects not already analyzed in this PEIS. We understand why the commenter is concerned that the lack of approved offsetting mitigation banks could delay our ability to tier from the PEIS because of the language cited at the beginning of the comment. We have revised that language because it was artificially constraining. While approved third-party mitigation providers will be an important contributing factor for the ability to tier, we agree that the use of power pole retrofits has been sufficiently analyzed to allow for tiering. We do not agree that impacts from unpermitted take will result in many projects that otherwise would have been able to tier from the PEIS not being able to do so, and have addressed why this should not be a frequent occurrence in our responses to other comments. Contrary to the commenter's assertion that "impacts to other resources outside of the issuance of the permit will be evaluated" in the NEPA process for the permit, the scope of the analysis for permit issuance is confined to the effects of developing and issuing the permit, including effects of mitigation and other permit conditions. With regard to the commenter's specific recommendations, we question how the ability to tier would be facilitated by removing the programmatic analysis of cumulative impacts at the local scale. We have done the analysis showing that authorizing take up to 5% of the LAP will not result in extirpation of the LAP; why would we not use it to facilitate permitting for projects that meet those criteria (which we anticipate to include the majority of projects for which permits are being sought)? The use of the wide variety of survey protocols chosen by individual applicants has proved a significant challenge for the Service to be able to validate the impacts to eagles that are likely to occur. Use of Service-approved protocols that have been through public notice and comment and peer review, not only contributes to the ability to tier from this PEIS, it makes for a much more efficient permitting process by significantly reducing Service staff time that is now, at least in the case of wind projects, very disproportionately and unnecessarily spent on identifying project impacts. As noted above, we concur that we have done sufficient analysis of power pole retrofits to justify their use for tiering projects, and we hope to develop comparably reliable metrics for other types of compensatory mitigation soon. We share the commenter's view that development of a screening form should be a priority for the Service, and plan to do so without delay.

Comment: The EPA recommends that the Final PEIS address coordination with state law and discuss any potential conflicts with State law that are possible should State permits also be needed for a project. For example, the State of California is unable to authorize incidental take of species classified as "fully protected" when activities are proposed in areas inhabited by those species. We recommend the Final PEIS identify where the bald and golden eagles

are listed as threatened or endangered under State law and how the permits will be coordinated with State law.

Comment: Potential impacts to state wildlife agency programs and projects have not been identified within the EIS. The Service should disclose how this rule would be applied to the state's activities and the expectations for state incidental take coverage in carrying out conservation programs and trust responsibilities.

Response: We cannot predict future laws or regulations that may strengthen (or reduce) protections for bald and golden eagles and we do not have the resources to monitor every new change in laws and regulations at the state, tribal, and local level. We will continue to rely on our working relationships with state, tribal, and local wildlife agencies to coordinate management and protection of bald and golden eagle populations, and to resolve any conflicts that might arise with respect to eagles and eagle management and state wildlife agency operations. We do not enforce or interpret non-federal laws and will continue to rely on state, tribal, and local government entities to notify us of any potential violations for projects authorized under eagle incidental take permits. If we receive notice of a potential violation, we will work with the permittee and the relevant state, tribal, or local government entity with authority to enforce the applicable law or regulation to ensure the authorized project complies with the relevant law or regulation. This may require modification of permit conditions consistent with the permittee's responsibility to ensure compliance with those laws under 50 CFR 22.26(c)(11).

Comment: The Draft PEIS explains that the Service's Region 6 has adopted a "policy" of requiring all golden eagles trapped for depredation to be released. That policy is in direct violation of the Eagle Act, is without merit and has no biological validity. It represents a unilateral attempt to circumvent the public input process and is a de facto elimination of golden eagle falconry in the U.S. The Service's own biologists (G. Allen, B. Millsap) have authored papers repeatedly concluding that falconry has no impact on wild raptor populations. Several recent studies indicate that golden eagle populations are stable in many areas of Region 6 (particularly those without wind farms) and can in fact, sustain a non-lethal wild take for falconry. Moreover, the average number of sub-adult eagles captured for falconry in the recent past (six eagles) is a scientifically and statistically-insignificant figure.

Response: The summary in the Draft PEIS inaccurately stated current policy regarding disposition of eagles trapped for depredation. If regulatory criteria are met, the Service would authorize golden eagles removed to address depredation to be obtained for falconry purposes. As correctly stated in Draft PEIS, by law, only golden eagles taken because of depredations may be taken for purposes of falconry. The implementing regulations for depredation permits require that, before authorizing an eagle to be taken for depredation, the Service must find that the only way to abate the damage is to take some or all of the

offending birds. In order to comply with that regulation, by policy, the Service's Mountain-Prairie Regional Office (Region 6) first provides permits to haze and harass golden eagles, and then to trap and relocate golden eagles, in response to documented depredation. Consequently, the Draft PEIS refers to a policy of "releasing" depredating golden eagles. However, if these methods do not address the depredation, permits to take the offending eagles from the wild will be issued. In recent years, permits to haze and harass and to trap and relocate golden eagles have been issued. The Service has received no reports that these methods have been insufficient, or requests for additional authorization to address these instances of depredation by removing eagles from the wild. In fact, reports indicate no eagles have been trapped and released using these permits. If requests for permits for documented depredation result in permits to take golden eagles from the wild such that they would be available for falconry, the Service would limit the permits to the baseline of six golden eagles annually, as identified in the 2009 analysis.

Comment: The PEIS does not take a hard analytical look at using a permit tenure/term of greater than 5 years and less than 30 years. Specifically, the Draft PEIS needs to address why a permit tenure/term between 5 and 30 years is not analyzed and/or add an alternative that includes a permit tenure/term that is between 5 and 30 years.

Response: The 30-year period is the maximum term for which the permit can be issued. Permits valid for longer than 5 years can be of any duration between 5 years and 30 years. The alternatives in the PEIS that include a maximum permit duration of 30 years, including the preferred (selected) alternative, do not specifically analyze issuing only 30-year permits; rather they address longer-term permits that may be issued for up to 30 years.

Comment: This programmatic analysis does not supplant the Service's obligation to undergo a project-level NEPA analysis.

Response: Some level of project-specific NEPA review is required for every permit the Service issues, because issuance of a permit is a federal action. For some permits, the review is limited to a determination that the permit issuance can be categorically excluded because effects are negligible (e.g. taxidermy permits, museum exhibition permits), including some eagle incidental take permits that authorize disturbance. We anticipate that most long-term incidental take permits issued under these final regulations will require an environmental assessment for which, in the majority of cases, the analysis of the effects to eagles should already be covered by this PEIS. Among the exceptions would be most cases where the 5% LAP take limit is exceeded and whenever there exist extraordinary circumstances that require an exception to a categorical exclusion as defined under the NEPA. Because nearly all of the environmental impacts associated with issuance of an eagle permit relate to eagles,

specific permit NEPA analysis should be fairly circumscribed because most of the necessary analysis has already been done. The scope of the NEPA analysis for other effects would be limited to an analysis of the environmental effects of the issuance of an eagle permit and its associated effects, including the effects of mitigation measures.

Comment: APLIC is incorrectly referenced as a "standard." Additionally, the 2012 collision manual is referenced regarding electrocutions rather than the 2006 electrocution manual, entitled Suggested Practices for Avian Protection on Power Lines: the State of the Art in 2006.

Response: While APLIC guidelines are used by most utilities, thereby creating a standard for the industry, we have changed "standard" to "guideline" to be technically accurate as noted by the commenter. We have also corrected the citation in the final PEIS.

Appendix C. AGENCIES AND ORGANIZATIONS THAT PROVIDED COMMENTS

United States – State Agencies

Alaska Department of Fish and Game
Alaska Energy Authority
Arizona Game and Fish Department
Association of Fish and Wildlife Agencies
Atlantic Flyway Council
Central Flyway Council
Connecticut Department of Energy and Environmental Protection
Delaware Department of Natural Resources and Environmental Control
Delaware Division of Fish and Wildlife
Florida Fish and Wildlife Conservation Commission
Georgia Department of Natural Resources, Nongame Conservation Section
Michigan Department of Natural Resources
Mississippi Flyway Council
New Mexico Department of Game and Fish
New York State Department of Environmental Conservation, Division of Fish and Wildlife
North Carolina Wildlife Resources Commission
Oklahoma Department of Wildlife Conservation
Pacific Flyway Council
Utah Division of Wildlife Services
West Virginia Division of Natural Resources
Washington Department of Transportation
Wyoming Game and Fish Department

United States – Local Agencies

Boulevard Planning Group, County of San Diego, California
City of Sanibel, Florida
County of San Diego, California
East Bay Regional Park District
Lee County, Florida, Board of County Commissioners

United States – Federal Agencies

US Department of Agriculture, APHIS Wildlife Services
US Department of Energy

US Environmental Protection Agency, Office of Federal Activities, NEPA Compliance Division

Tribes

Cherokee Nation
Gila River Indian Community
Great Lakes Indian Fish and Wildlife Commission
Inter Tribal Association of Arizona
Iowa Tribe of Oklahoma
Osage Minerals Council
Osage Nation Energy Services, LLC
Salt River Pima-Maricopa Indian Community
San Carlos Apache Tribe
Sycuan Band of the Kumeyaay

Non-Governmental Organizations

Allegheny Highlands Alliance
American Bird Conservancy
American Eagle Foundation
American Falconry Conservancy
Animal Welfare Institute
American Wind Energy Association
Arizona Falconers Association
Arkansas Valley Audubon Society
Audubon Colorado Council
Audubon Missouri
Audubon Society of Greater Denver
Audubon, Sierra Club, Natural Resources Defense Council
Avian Power Line Interaction Committee
Backcountry Against Dumps
Bird Conservation Network
Concerned Citizens of Garden
Conservancy of Southwest Florida
Conservation Congress
Conservation Research Foundation
Cornell Raptor Program
Defenders of Wildlife
Delaware Otsego Audubon Society
Delmarva Ornithological Society
Eagle Conservation Association of Northwestern Pennsylvania
Eagle Nature Foundation

Eastern Long Island Audubon Society
Endangered Habitats League
Energy and Wildlife Action Coalition
Fort Collins Audubon Society
Friends of Blackwater
Friends of the Pocosin Lakes National Wildlife Refuge
Hawk Migration Association of North America
Hawkwatch International
Idaho Falconers Association
International Association for Falconry and the Conservation of Birds of Prey
International Eagle Austringer's Association
Kansas Hawking Club
Kettle Range Conservation Group
Loudoun Wildlife Conservancy
Maryland Ornithological Society
Montana Audubon Society
Montana Falconers Association
National Anti-Vivisection Society
National Audubon Society
National Congress of American Indians
National Wildlife Federation
Natural Resources Defense Council, Sierra Club, The Wilderness Society, The
Humane Society of the United States, Humane Society Wildlife Land Trust
New Medico Wildlife Center
New York State Ornithological Association, Inc.
North American Falconers' Association
North American Platform Against Windpower
Northwest Arkansas Audubon Society
Oklahoma Falconers Association
Olympic Peninsula Audubon Society
Oregon Falconers Association
Public Interest Coalition
Raptor Education Foundation
Roaring Fork Audubon Society
Rochester Birding Association
Rocky Mountain Bird Observatory
Rocky Mountain Chapter of the Sierra Club
Rocky Mountain Raptor Program
Sierra Club
Texas Hawking Association
The Urban Wildlands Group

The Wildlife Society
Tulsa Audubon Society
Virginia Bluebird Society
WildLand Defense
Wisconsin Falconers Association
World Bird Sanctuary
World Council for Nature
Wyoming Falconers Association