U.S. Fish and Wildlife Service

DRAFT ENVIRONMENTAL ASSESSMENT
Proposal to Permit Take as Provided Under the Bald and Golden Eagle Protection Act

DIVISION OF MIGRATORY BIRD MANAGEMENT

DRAFT ENVIRONMENTAL ASSESSMENT

Proposal to Permit Take

Provided Under the Bald and Golden Eagle Protection Act

RESPONSIBLE AGENCY
Department of the Interior
U.S. Fish and Wildlife Service
1849 C Street, NW
Washington, D.C. 20240-0001

RESPONSIBLE OFFICIAL
H. Dale Hall, Director

FOR FURTHER INFORMATION CONTACT

Diana M. Whittington, Wildlife Biologist,
or George Allen, Chief,
Branch of Policy, Permits and Regulations
Division of Migratory Bird Management
4401 North Fairfax Drive, Mail Stop 4107
Arlington, Virginia 22203-1610
703-358-1714

July 2008

Summary

- The U.S. Fish and Wildlife Service has removed the bald eagle (*Haliaeetus leucocephalus*) from the list of threatened and endangered species under the Federal Endangered Species Act in all areas except the range of the Sonoran Desert bald eagle population, which remains protected as a threatened species. The Bald and Golden Eagle Protection Act (Eagle Act) remains as the primary law protecting bald eagles in other parts of its range and the golden eagle (*Aquila chrysaetos*).

- The Eagle Act authorizes the Secretary to permit take of eagles "necessary for the protection of … other interests in any particular locality." In addition, there may be instances where take of eagle nests is necessary to protect public safety and welfare.

- In this assessment we consider three alternatives for regulations establishing new take permits under the Eagle Act, and authorizing take of eagle nests where necessary to protect public safety and welfare.

- The assessment looks at potential impacts that could result from the implementation of the proposed regulation or alternatives to the proposed regulation within the context of other take already authorized or otherwise occurring.

- This assessment also summarizes the biological foundation for defining take thresholds for bald eagles and golden eagles. Under the preferred alternative, the Service would define thresholds for take by adapting a published model used in other recent raptor regulations. The thresholds would guide annual take limits to ensure that we maintain increasing or stable populations.

- The majority of authorized take would be non-lethal and would simply allow activities to disturb eagles in a way that would result in a loss or reduction of one year's productivity by a nesting pair.

- On-the-ground information and conditions would guide the actual amount of take authorized, which may be less than modeled, as long as the total does not exceed the modeled thresholds.

- Except for safety emergencies, the rule would give priority in permitting to Native American religious needs if requests for permits would likely approach the annual threshold.

- The Service's preferred alternative, number 3, would (1) authorize disturbance take of eagles; (2) authorize removal of eagle nests where necessary to protect public welfare; and (3) provide for permits for take resulting in mortality in some limited circumstances. It would authorize take permits for both bald eagles and golden eagles.

- Alternative 3 is also the environmentally-preferred alternative. It is expected to have the least adverse impact on the human environment, with negligible effects on the natural and physical environment and the least adverse impact along with the most beneficial impacts to the socioeconomic environment.

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Chapter 1: Purpose and Need for the Action

1.1. Introduction

This Draft Environmental Assessment (DEA) has been prepared to analyze the U.S. Fish and Wildlife Service's (Service) proposal to create a permit or permits under the Bald and Golden Eagle Protection Act (16 U.S.C. 668–668d) (Eagle Act) allowing the take of bald eagles and golden eagles when necessary to protect interests in particular localities. This DEA is an analysis of potential impacts that could result from the implementation of the proposed regulation or alternatives to the proposed regulation within the context of other take already authorized or otherwise occurring. It is to assist us in ensuring compliance with the National Environmental Policy Act of 1969 (42 U.S.C. 4321–4370d) (NEPA), and in making a determination as to whether any "significant" impacts could result from the analyzed actions. "Significance" under NEPA is defined by regulation at 40 CFR 1508.27, and requires short-term and long-term consideration of both the context of a proposal and its intensity, whether the impacts are beneficial or adverse. An EA provides evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a statement of "Finding of No Significant Impact" (FONSI). If the decision maker determines that this project has "significant" impacts following the analysis in the EA, then an EIS would be prepared for the project. If not, a FONSI would be signed for the EA approving the alternative selected and a Set of Findings may be prepared.

As with any NEPA process, if all components have undergone equal analysis, the final proposal may include all or some components of a single alternative. Or, it may include a combination of components from more than a single alternative.

1.1.1 Background

In 2007, the Service removed the bald eagle from the list of threatened and endangered species under the Endangered Species Act (16 U.S.C. 1531–1544) (ESA) (72 FR 37345, July 9, 2007). However, on March 6, 2008, the federal district court for the District of Arizona enjoined removal from ESA protection of the discrete population of "Desert bald eagles" of "the Sonoran Desert region of the American southwest" pending resolution of a 90-day petition to list a distinct population segment of bald eagles in that region. 2008 U.S. Dist. LEXIS 17517 at 42 (D. Ariz. 2008). Therefore, the bald eagle remains protected under the ESA in the Sonoran Desert region as a threatened species pending the outcome of this case. The Bald and Golden Eagle Protection Act remains as the primary law protecting bald eagles outside the range of the Sonoran Desert population in the U.S. and golden eagles throughout their U.S. range. The Eagle Act would also become the primary law protecting bald eagles within the range of the Sonoran Desert population should the Service delist that population in the future. The Eagle Act prohibits take of bald eagles and golden eagles and provides a

statutory definition of “take,” which includes activities that “disturb” eagles. Bald eagles and golden eagles are also protected under the Migratory Bird Treaty Act (MBTA), as amended (16 U.S.C. 703–711; 40 Stat. 755).

To provide a consistent framework in which to implement the Eagle Act after bald eagle delisting, on June 5, 2007 (72 FR 31131), the Service clarified our regulations implementing the Bald and Golden Eagle Protection Act. The modifications to implementing regulations for the Eagle Act established a regulatory definition of “disturb”, a term specifically prohibited as “take” by the Eagle Act. As per the regulatory definition, disturb means

> *to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, injury to an eagle; a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.*

As stated, the regulatory definition of “disturb” also applies to golden eagles.

Also on June 5, 2007, (72 FR 31156), the Service issued a Notice of Availability of the final version of the National Bald Eagle Management Guidelines (Guidelines). These guidelines provide a roadmap for landowners and project proponents seeking to avoid violating the Eagle Act while conducting activities near eagles. For example, the guidelines recommend buffers around nests to screen nesting bald eagles from noise and visual distractions caused by human activities. The clarifications and the guidelines are intended to give landowners and others guidance so that actions they undertake are consistent with the Bald and Golden Eagle Protection Act.

When Congress enacted the Eagle Act in 1940 (16 U.S.C. 668–668c), it intended the Act to be the primary vehicle protecting eagles from extinction, and as such it provided a broad prohibition in its definition of “take” by defining it to include pursue, shoot, shoot at, wound, kill, capture, trap, collect, molest or disturb. Congress later added “Poison” to the definition (Pub. Law No. 92▪535 [86 Stat. 1064)], Oct. 23, 1972).

However, the Eagle Act also delegates to the Secretary the ability to permit take of the eagle “necessary for the protection of “other interests in any particular locality” after determining the take is “compatible with the preservation of the bald eagle or golden eagle”. In addition, there may be instances where take of eagle nests is necessary to eliminate a hazard to human or eagle safety. Most populations of the bald eagle have recovered sufficiently to be removed from the ESA list, while supporting take during recovery. Therefore, we can logically assume populations can both continue to sustain limited take and continue to improve.

1.2 Current Proposal

The Service proposed new regulations to amend the current regulations at 50 CFR 22.26 and 22.27 as follows: to (1) establish an eagle take permit under the Eagle Act; (2) authorize take of eagle nests where necessary to protect public welfare, defined as: "society's well-being in matters of health, safety, and order"; (3) authorize take resulting in mortality (TRM)[1] under limited circumstances; and (4) establish new programmatic permits under the Eagle Act for disturbance, airfield eagle hazards, nest removal from power lines, and TRM (72 FR 31142, June 5, 2007). The take permit provisions would primarily authorize disturbance. However, the regulations analyzed in this document would also provide for authorization of other types of take of eagles under limited circumstances.

For example, take might be authorized for a utility that does all of the following:

- establishes a mortality baseline through estimates or a sampling scheme;
- employs the best available techniques and mutually-approved standard practices for minimizing eagle mortalities;
- undertakes a system-wide risk analysis and retrofits a significant portion of hazardous locations within a reasonable time frame;
- implements an effective monitoring program and reports eagle mortality to the Service,
- uses only avian-safe practices on all new infrastructure; and
- demonstrates it has eliminated eagle mortality except that which is unavoidable.

To prevent collisions, utilities might also need to ensure transmission lines, distribution lines and towers located in known eagle concentration areas, foraging areas, or nesting areas, have visual markers on the wires. Because even best practices cannot ensure that eagles would not be killed by electrocution or collision with power lines, the regulation could authorize this type of unavoidable take by a utility that has met all the requirements above. This is an example, only. The specific requirements listed above may not be applicable should the Service issue such a permit in the future, but the standards to be met would be comparable.

1.3 Purpose and Need for Action

The purpose of this regulatory proposal is to: (1) provide authorization for take of bald eagles and golden eagles "necessary for the protection of "other interests in any particular locality" as provided for in the Eagle Act (16 U.S.C. 668–668c), and ensure it is compatible with the preservation of the eagles, as mandated by

[1] TRM in this document refers to non-purposeful take that would result in mortality, despite all efforts to avoid it. We distinguish this from intentional lethal take permitted under 50 CFR 22.22 for Native American religious purposes.

the Eagle Act; (2) develop a management system that would simplify complex, long-term eagle management issues by allowing programmatic approaches; (3) provide a consistent approach to permitting between Service Regional offices; and (4) to make take authorization available for removal of eagle nests where necessary to protect public welfare. For purposes of this action, "compatible with the preservation of the bald eagle and the golden eagle" means maintaining bald eagle and golden eagle populations with no discernible population declines, nationally or regionally, and not to exclude preservation of locally-important, smaller populations within a region.

Under the Eagle Act as it has been applied to golden eagles, the Service relies on prosecutorial discretion and voluntary cooperation between the Service and other agencies and private entities to regulate take of eagles in the absence of an available permit for non-purposeful take. The resulting case-by-case enforcement and reliance on voluntary measures to eliminate and reduce take during otherwise-legal activities has made it difficult for the Service to ensure that such take is compatible with the preservation of eagles. The Service needs to provide a uniform legal framework for allowing take of eagles during the conduct of otherwise-legal and permitted activities. Creation of a permit or permits that can be consistently administered by all Service Regions would fulfill that need and improve the protection of eagles. The permit or permits created must be both feasible to implement and enforceable, and provide for the conservation of both species.

1.4 Authorities

The principal Federal authority for the actions analyzed in this DEA is the Eagle Act (16 U.S.C. 668–668d). The Service is the Federal agency with primary statutory authority for the management of bald eagles and golden eagles in the United States. Regulations implementing the Eagle Act are in Subparts C & D of Part 22 of Title 50 of the Code of Federal Regulations.

Compliance with Federal Statutes, Regulations, and Orders Relevant to the Alternatives Considered

The proposal is in compliance with the following federal statues, regulations and Executive Orders:

National Environmental Policy Act of 1969, as amended (NEPA) (42 U.S.C. 4321 *et seq*.).

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 DEA in compliance with NEPA (Pub Law No. 91-190, 42 U.S.C. 4231, *et seq*.); the President's Council for Environmental Quality (CEQ) Regulations, 40 CFR 1500–1508; and the Department of the Interior's Departmental Manual (DM) for NEPA compliance, Fish and Wildlife Service (516 DM 6, 30 AM 2-3, 550 FW 1-3, 505 FW 1-5).

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

Endangered Species Act of 1973, as amended (ESA) (16 U.S.C. 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)). Action agencies must implement section 7 consultations with the Service 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)). In addition to the Sonoran Desert population of bald eagles, there may be other listed species present when permitted take of eagles would occur. When deemed necessary, each Regional Permit Office may help coordinate intra-Service section 7 consultations.

Migratory Bird Treaty Act, as amended (MBTA) (16 U.S.C. 703–711; 40 Stat. 755).

The MBTA provides the Service with the regulatory authority to protect species of birds that migrate outside the United States. Individuals of species that do not migrate outside of the United States are also protected with the exception of several introduced, non-native species, including mute swans (*Cygnus olor*), house sparrows (*Passer domesticus*), European starlings (*Sturnus vulgaris*), Eurasian collared-doves (*Streptopelia decaocto*), and rock doves (*Columba livia*). For eagle take, a separate authorization under the MBTA is not required. Many impacts authorized under the ESA that would require Eagle Act authorization would not "take" eagles under the MBTA because that statute does not contain a prohibition against disturbance (without injury) of the birds it protects. Therefore, activities that disturb an eagle would not require MBTA authorization unless the activity also results in injury or some other impact

prohibited by the MBTA. Even where MBTA take would occur, a separate MBTA authorization in addition to the 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.

National Historic Preservation Act of 1966, as amended (NHPA) (16 U.S.C 470 *et seq*.).

The NHPA requires Federal agencies to: 1) evaluate the effects of any Federal undertaking on cultural resources; 2) consult with the State Historic Preservation Office (SHPO) regarding the value and management of specific cultural, archaeological and historical resources; and 3) consult with appropriate American Indian Tribes to determine whether they have concerns for traditional cultural resources in areas of these Federal undertakings.

Some American Indian Tribes and tribal members may consider eagle nests sacred sites provided for in the American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996) (*see* below) or Traditional Cultural Properties (TCPs) under the National Historic Preservation Act (16 U.S.C 470). Sacred sites are not limited to currently-recognized Indian lands, and they occur across the entire aboriginal settlement area. In addition, some tribes may consider all eagles and eagle nests as Traditional Cultural Properties or sacred sites. A search of the database of places on the National Historic Register yielded eleven sites that may be associated with eagle habitat and that are likely to be considered TCPs (Appendix A). For other possible TCPs, the rigorous evaluation process for listing on the National Historic Register has not been completed. A lack of formal status does not lessen the need to consider them; instead, it emphasizes the need for close coordination at the project planning stage.

Because an eagle or eagle nest can be considered a contributing feature or element of a TCP, issuance of the proposed permits for eagles could constitute an undertaking that requires compliance with Section 106 of the National Historic Preservation Act. When deemed necessary, each Regional Permit Office may help coordinate NHPA consultations through the Regional Historic Preservation Officer.

American Indian Religious Freedom Act (AIRFA) (42 U.S.C. 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 would be construed in conjunction with the Service's trust responsibility to federally recognized Tribes. This trust responsibility confers certain exemptions and privileges upon federally-recognized Tribes as sovereign entities not conferred upon other groups. The Service, in proposing this regulation, has

incorporated these principles into the proposal. To address the possibility that demand exceeds our scientifically-based take thresholds, the regulation contains permit-issuance criteria to ensure that requests by Native Americans to take eagles from the wild, where the take is necessary to meet the religious purposes of the Tribe, would be given first priority over all other take except, as necessary, to alleviate safety emergencies.

Religious Freedom Restoration Act of 1993 (RFRA) (42 U.S.C. 2000bb).

RFRA is aimed at preventing laws that substantially burden a person's free exercise of his or her religion. In keeping with our commitments under RFRA and AIRFA, the Service would place the highest priority upon Native American religious use when allocating permits.

Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) (25 U.S.C. 3001 *et seq*.)

NAGPRA applies to federal agencies and institutions that receive federal funding. NAGPRA requires federal agencies and institutions that receive federal funding to return Native American cultural items and human remains to their respective peoples. Cultural items include funerary objects, sacred objects and objects of cultural patrimony. NAGPRA requires federal agencies to protect Native American burial sites and minimize the effect of federal activities and undertakings upon these sites. If a proposed permit for eagles is located in the vicinity of a Native American burial site, the issuance of proposed permits for eagles would require tribal consultation and coordination.

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 would coordinate with the Regional Historic Preservation Officer and Regional Tribal Liaison to ensure implementation of the proposal is in compliance with the Order.

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

This Executive Order 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 United States 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 Tribal

Liaison, conducts government-to-government consultation with the tribes in their Region, and would do so on permits under this proposal.

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

This Executive Order 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 proposal, through its standards for incorporation of avoidance and minimization measures, is consistent with the goals of this Executive Order. The local Ecological Services and Regional Offices would review any mitigation proposals to ensure they do not adversely affect populations of other migratory bird species.

Secretarial Order 3270, Adaptive Management (AM)

This Order from the Secretary of the Interior states that Bureaus should incorporate the operational components identified in the report, Adaptive Management: The U.S. Department of the Interior Technical Guide. These components are: the AM definition; the conditions under which AM should be considered; and the process for implementing and evaluating AM effectiveness. The proposal would be consistent with the Order.

Tribal and State Statutes

As of the writing of this document, 17 states consider the bald eagle endangered, and another considers it threatened under State statutes (See Appendix B). The Nez Perce and the Mille Lacs Band of the Ojibwe consider the bald eagle endangered. Three States consider the golden eagle endangered, and a single State protects it as a threatened species. The Navajo Nation and the Mille Lacs Band of the Ojibwe list the golden eagle as endangered. Nothing in the proposed regulation would prohibit individual Tribes or States from considering either eagle species as threatened or endangered according to their statutes. Nor would the proposed regulation prohibit Tribes or States 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 would determine, upon application, whether there is a valid justification for the permit. In addition, the permit would 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 would coordinate and consult with their respective Tribes and States on a case-by-case basis.

1.5 Scope of Analysis

The DEA considers alternatives for permits to take bald eagles and golden eagles "for the protection of … other interests in any particular locality" and where necessary to protect public welfare, defined in the proposed regulation as: "society's well-being in matters of health, safety, and order." The document also provides evidence and analysis sufficient to determine whether an EIS is required.

This assessment evaluates the effects of various alternatives for permits to take eagles under the Eagle Act. Different permits have potentially different effects on bald eagles and golden eagles, and on societal aspects of the human environment. The potentially-affected human environment includes bald eagle and golden eagle populations, safety, the economy, cultural values, and Native American religious and cultural practices. Since neither eagle addressed in this document occurs naturally in the state of Hawai`i, Hawai`i has been eliminated from the scope of analysis. In general, the analysis is either national or Service Regional in scale.

1.5.1 Scoping and Public Participation

The proposed permit regulation was made available to the public for a 90-day comment period (72 FR 31141, June 5, 2007). The Service received approximately 21,500 comments. About 21,400 of the comments were essentially identical, but we summarized their substantive input. Thirty-four individual respondents provided additional substantive input that would be helpful in crafting final regulations, and have helped during the development of the DEA. The 34 individual respondents consisted of: 1 Federal agency, 3 Tribes, 6 State natural resources agencies, 3 Flyway Committees comprised of representative from State departments of natural resources, 1 State department of transportation, 5 environmental organizations, 4 industry associations, 3 law firms/consultants on behalf of developers, 2 power companies, 1 federal reclamation project, 1 airport, 3 rail transportation companies (commenting together), and 3 private citizens. We have incorporated and responded to the majority of comments addressing our proposal in the preamble to the amended proposed regulation the Service will publish. In addition, the Affected Environment (Chapter 3) and Environmental Consequences (Chapter 4) portions of the DEA reflect a number of the comments.

1.5.2 Related NEPA Documents

The Service has finalized two other NEPA documents analyzing the impacts from proposed regulations to take raptors. The Service published the Final Environmental Assessment for Take of Nestling American Peregrine Falcons in the Contiguous United States and Alaska for Use in Falconry in March 2004

(http://www.fws.gov/southwest/es/arizona/Documents/SpeciesDocs/AmericanPeregrineFalcon/Final_EA_Peregrine.pdf). We finalized the Environmental Assessment for Take of Raptors from the Wild under the Falconry Regulations and the Raptor Propagation Regulations in June 2007 (http://www.fws.gov/migratorybirds/issues/falconry/Final%20Regulations%20EA.pdf). For permitting disturbance under the Eagle Act, the Service would use the same modeling approach for determining take used in those NEPA documents.

1.5.3 Issues Discussed in Detail

The Service has used comments on the proposed regulation to help us develop this document. Some of the major topics on which comments focused, and which the DEA discusses, include the following.

- How populations would be delineated for management purposes.
- How the Service would be able to detect the threshold population declines.
- Whether the issuance criteria "where take cannot practicably be avoided" is appropriate.
- Whether "other interests in a particular locality" should be applied as a "catch-all" category.
- How permits would be prioritized if limited in quantity.
- The kinds of mitigation that would be required or effective.
- State coordination and relationship to State guidelines.

In addition, the DEA identifies resources that may either be affected by or may affect the alternatives. These include: (1) presently-occurring eagle mortality factors; (2) human safety concerns; and (3) cumulative impacts to eagle habitat from human-generated and other environmental factors.

1.6 Decisions to be Made

- Whether to authorize take permits for both bald eagles and golden eagles.
- Whether to implement take permits for both bald eagles and golden eagles.
- Whether to authorize and implement take permits for removal of both bald and golden eagle nests when necessary to protect the public welfare.
- Whether to set thresholds for take employing a theoretical ecological model consistent with that used in other recent raptor regulations.
- Whether to authorize "disturbance" take only, or to authorize TRM under specific circumstances, and if so, under what circumstances.
- Whether the Service should authorize a permit for only one "disturbance" at a time, or authorize provisions for a programmatic approach.
- Whether, as our final preferred alternative, to adopt all of one proposal or components of more than one alternative.
- Whether, under NEPA, a Finding of No Significant Impact can be reached.

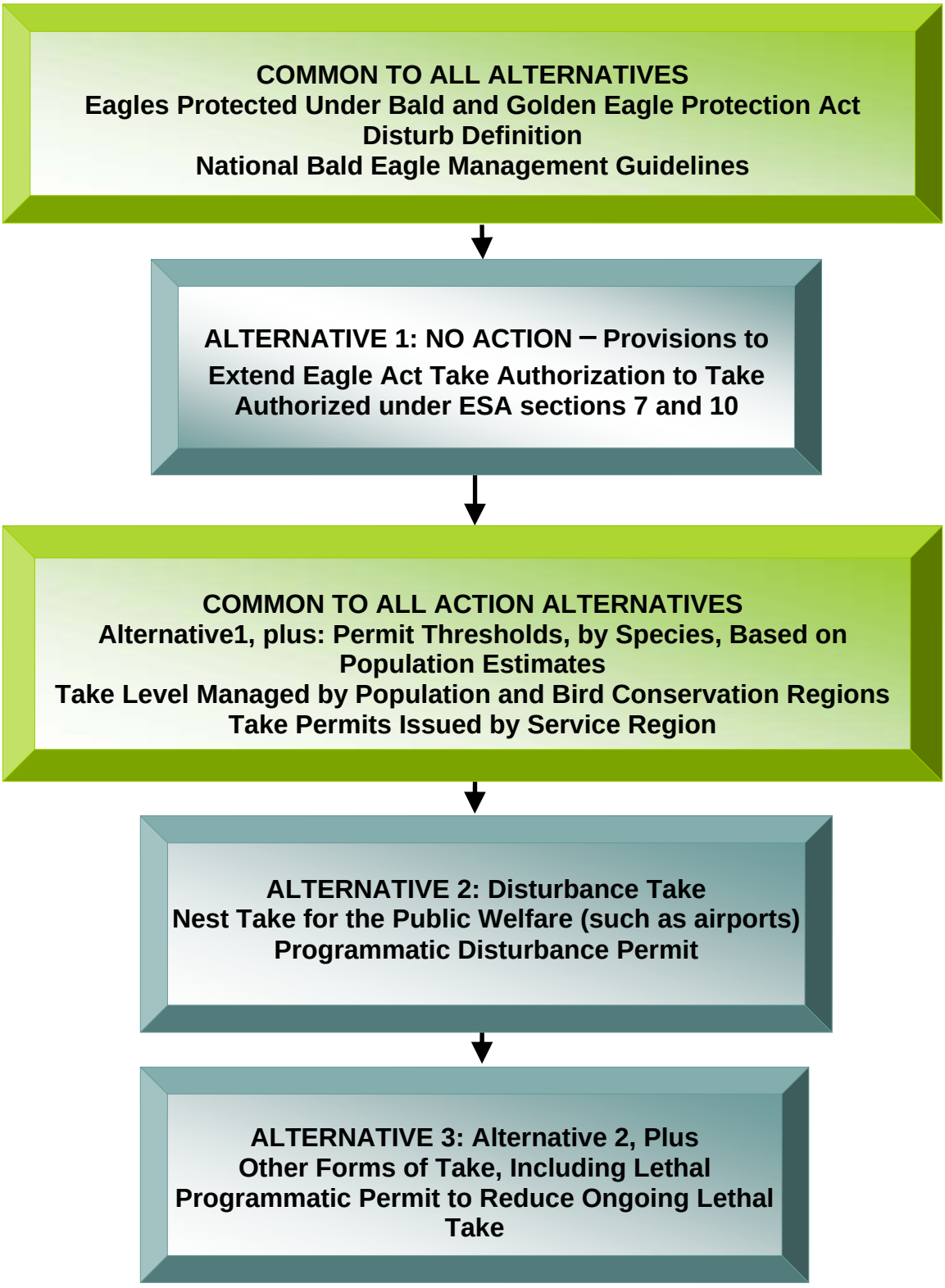

Figure 1 Outline of Alternatives

CHAPTER 2: ALTERNATIVES

2.1 Introduction

This chapter considers three alternatives that provide a reasonable range of options for a regulation permitting take of bald eagles and golden eagles that would occur while carrying out otherwise-legal activities. The alternatives provide different approaches to questions regarding the proposed take permit, such as the following:

- Whether the Service should allow a permit system with allocation based on prioritization.
- Whether the Service should only allow "disturbance" take.
- Whether the Service should allow TRM under certain circumstances, and if so, under what circumstances.
- If the Service would permit only for one "disturbance" at a time.
- Whether the Service would establish provisions for a programmatic approach.

The DEA presents the biological foundations for setting permit thresholds for bald eagles and golden eagles, and outlines a proposal for permit management according to populations, Bird Conservation Regions (BCRs), and Service Regions. The document also discusses whether and how to establish programmatic approaches to permitting, summarizes key aspects of the alternatives, and states the Service's preferred alternative.

The DEA has presented the alternatives in an order from the simplest to the most complex (Figure 1). In some cases, the alternatives are additive. For example, Alternative 3 includes all of the components common to all alternatives, Alternative 2, plus additional proposals, including TRM.

2.2 Management Common to All Alternatives

The Service would continue the current management and permitting of bald eagles and golden eagles under the Eagle Act, including the finalized definition of disturb, and the National Bald Eagle Management Guidelines (USFWS 2007a), recognizing that the Guidelines are voluntary rather than regulatory.

2.2.1 Steps When Determining Potential for Take

By employing the Guidelines, State-specific guidance, and other appropriate avoidance and minimization measures, landowners and project proponents should be able to avoid eagle disturbance under the Eagle Act most of the time. In most parts of the country, the Service anticipates issuing relatively few permits for take associated with activities by proponents that have used the Guidelines because the majority of such activities would not take eagles. We routinely encourage project proponents to work with the Service during the early planning

phases of their projects. If, after coordination with the Service, it is determined that avoiding disturbance is not practicable, acquisition of a permit may be needed to comply with the Eagle Act.

Disturbance may also result from human activity that occurs after the initial activities. In general, however, the Service would not issue permits for routine activities where take is not likely to occur. New uses or uses that are greater in scope or intensity from pre-existing conditions (such as increased hiking, driving, or residential development) may raise the likelihood of eagle disturbance, and as such, could require authorization for take under these proposed regulations. When evaluating the take that may result from an activity for which a permit is sought (such as residential development), the Service would consider the effects of the preliminary activity (construction) as well as the effects of the foreseeable ongoing future uses (such as activities associated with human habitation).

The Service would not limit its consideration of the impacts and threshold distances to the footprint of the initial activity if it is reasonably foreseeable that the activity would lead to adverse, secondary prohibited impacts to bald eagles and golden eagles. We consider the direct, indirect, and cumulative impacts of each activity. For example, when evaluating the effects of expanding a campground, in addition to considering the distance of the expansion from important eagle-use areas, the Service would consider the effects of increased pedestrian and motor traffic to and from the expanded campground. In many cases, the potential for take could be greater as a result of the activities that follow the initial project. For example, the installation of a boat ramp 152 meters (500 feet) from an important bald eagle foraging area nest may not disturb eagles during the construction phase, but the ensuing high levels of boat traffic through the area during peak feeding times is also likely to cause disturbance. Trail construction 122 meters (400 feet) from a nest is generally unlikely to take bald eagles, but would likely take golden eagles, and if the trail would be open to off-road vehicle use during the nesting season, the Service would need to consider the impacts of the vehicular activity as part of the impacts of the trail construction. The Service would evaluate permit applications for whether they had evaluated both direct and indirect impacts of the proposal, and addressed impacts through mitigation measures.

2.3 Alternative 1– No Action: Permit Existing and Future Take Authorized Under ESA:

As part of the rulemaking in which the Service initially proposed eagle take permit regulations (72 FR 31141, June 5, 2007), the Service proposed to extend Eagle Act authorizations to persons previously granted authorization to take bald eagles under the Endangered Species Act. The Service has finalized those provisions in a separate final rulemaking, published on May 20, 2008 (see 73 FR 29075). The new regulations include the following:

A new section at 50 CFR 22.28 (Eagle Take) providing for expedited permits for take of bald eagles exempted through section 7 incidental take statements;

New provisions at 50 CFR 22.11 extending Eagle Act take to HCPs that cover ESA section 10 incidental take of bald eagles and golden eagles.

The regulations extend Eagle Act authorization to persons authorized to take eagles under the ESA, provided the take occurs in compliance with the terms of the ESA authorization. Specifically, the regulations include revisions to 50 CFR 22.11 to provide Eagle Act authorization to persons with ESA section 10 permits that cover the bald eagle or golden eagle for take of eagles that occurs according to the terms and conditions of the ESA permit, as long as the permittee fully complies with the terms and conditions of the ESA permit. The new provision at 50 CFR 22.11 also applies to take covered under future ESA section 10 permits, if, at some future time, either eagle species should become listed under the ESA. The regulations also establish an expedited process to issue Eagle Act permits for take that is in compliance with previously-granted ESA section 7 incidental take statements.

Alternative 1 includes the existing “incidental” take authorizations as well as the current management of bald eagles and golden eagles under the Eagle Act, including the finalized definition of disturb, and the National Bald Eagle Management Guidelines ("Management Common to All Alternatives"). Required by NEPA, the “No Action” alternative, along with the conditions in the Affected Environment, serve in this document as the reference for comparing the action alternatives.

2.4 Management Common to Both Action Alternatives: Thresholds for Permits, Management by Population Regions for Bald Eagles, by Bird Conservation Regions for Golden Eagles

Management of eagles under all the action alternatives would include the “Management Common to All Alternatives”, the authorizations in Alternative 1, plus the conditions outlined in this section. This section discusses how the Service would revise some regulations by establishing permit thresholds, and how the Service would establish a management framework. It discusses the biological and geographical foundations for permit thresholds and permit management.

Definitions and Interpretations Used in This Document and Proposal

For the purposes of this action, in the associated “disturb” permit regulations, the Service would define “mitigation” as per the Service Mitigation Policy (46 FR 7644, Jan. 23, 1981), and the President’s Council on Environmental Quality (40 CFR 1508.20 (a–e)), to sequentially include the following:

- 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 operation during the lifetime of the action;
- Compensating for the impact by replacing or providing substitute resources or environments.

The Service has proposed both new and modified definitions under 50 CFR 22.3. The Service would remove the definition of "golden eagle nest"; amend the regulatory definition of "take" as applied to bald eagle and golden eagle nests; clarify existing law by adding the term "destroy"; and add new definitions for "eagle nest" and for "important eagle use area."

The proposed definition of "eagle nest" is: "a readily identifiable structure built, maintained, or used by bald eagles or golden eagles for breeding purposes."

The proposed definition of "important eagle-use area" is: "an eagle nest, foraging area, or communal roost site that eagles rely on for breeding, sheltering, or feeding, and the landscape features surrounding such nest, foraging area, or roost site that are essential for the continued viability of the site for breeding, feeding, or sheltering eagles."

The Service has developed or included the following definitions in response to requests and recommendations for clarification of terms as used in the proposed rule and/or DEA.

Eagle Terms (DEA only):

Adult — an individual eagle capable of breeding.

Breeder — an adult eagle that defends a breeding territory.

Cohort — for purposes of the models used in the DEA, eagles of the same species born in the same year.

Fledgling — a juvenile eagle that has taken the first flight from the nest but is not yet independent.

Floater — an adult or subadult eagle without a breeding territory.

Juvenile — an individual eagle less than 1 year old.

Lambda (λ) — the annual rate of change in population size. The population is increasing if lambda is greater than (>) 1, is constant if lambda = 1, and is decreasing if lambda is less than (<) 1.

Nestling — an individual eagle between the time of hatching and the time it takes the first flight from the nest.

Productivity — the mean number of individuals fledged per occupied nest annually.

Subadult — an individual eagle greater than 1 year old, but typically not able to breed.

Vital rates ─ factors such as productivity, survival of juveniles, and annual survival of adults that influence population change.

Use Area Terms (To be defined by regulation except where noted):

Communal roost site ─ an area where eagles repeatedly in the course of a season gather and shelter overnight, and sometimes during the day in the event of inclement weather.

Foraging area ─ an area where eagles regularly feed during one or more seasons.

Inactive nest ─ a bald eagle or golden eagle nest that is not currently being used by eagles as determined by the absence of any adult, egg, or dependent young at the nest for 10 consecutive days. An inactive nest may become active again and remains protected under the Eagle Act.

Territory ─ a defended area that contains, or historically contained, 1 or more nests within the home range of a mated pair of eagles, and where no more than 1 pair breeds at time.

Not all foraging areas and communal roost sites are important enough such that interfering with eagles at the site would cause disturbance (resulting in injury or nest abandonment.) Whether eagles rely on a particular foraging area or communal roost site to that degree would depend on a variety of circumstances, most obviously, the availability of alternate sites for feeding or sheltering.

Permit and Permit Evaluation Terms (To be defined by regulation except where noted):

Advanced Conservation Practices ─ scientifically supportable measures representing the best available techniques designed to reduce disturbance and ongoing mortalities to a level where remaining take is unavoidable.

Cumulative effects ─ the incremental environmental impact or effect of the proposed action, together with impacts of past, present, and reasonably foreseeable future actions.

Disturb ─ to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

Indirect effects ─ effects that are caused by an action and which may occur later in time or be located beyond the initial impacts of the action, but are still reasonably foreseeable.

Necessary for Public Welfare ─ needed in order to provide the public with access to water, food, medicine, transport, or other essential human needs, or to prevent injury, disease or other threats to public health and safety.

Practicable ─ capable of being done after taking into consideration, relative to the magnitude of the impacts to eagles, (1) the cost of a remedy comparative with proponent resources; (2) existing technology; and (3) logistics in light of overall project purposes.

Techniques (DEA only) — within the context of Advanced Conservation Practices, includes both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned.

A question submitted on the original proposed regulation asked whether "other interests in a particular locality" should be applied as a "catch-all" category. Our interpretation of this phrase is that it is inclusive, in order to allow flexibility. As a practical example, "other interests in a particular locality" may apply to interstate transmission and transportation corridors as well as small communities and individuals. It may also apply to holders of economic, recreational, or other social interests in a particular locality who do not necessarily reside at that locality. For example, holders of mineral leases, rights-of-way, or vacation homes may not reside in the same State as the particular locality, but they have interests there. In addition, it is often the case that American Indian Tribes and individual tribal members have an interest in a particular locality because of its aboriginal cultural, spiritual, religious or traditional values, but the locality is outside currently-recognized Indian lands.

2.4.1 Modify Existing Certification of Compliance Language

All of the Service's migratory bird and eagle-related permits contain the standard condition that the Federal authorization is not valid unless the activity complies with all other applicable laws, including State and local laws. Permits issued under this regulation would include that condition and clarify that the activity must also be in accordance with "tribal" laws (if applicable). The application would therefore ask the applicant to state whether he or she has obtained the State, local, or tribal authorizations necessary to conduct the activity. This permit condition does not override or supersede the right of States or Tribes to withhold authorization for take of eagles.

2.4.2 Eagle Management and Permit Administration Regions

The Service used available data for each species of eagle to identify appropriate regional population scales for management purposes, with the goal of ensuring the Service's permit program does not cause declines in eagle populations at a regional or national scale.

Bald Eagle

For bald eagles, we obtained locations of all known contemporary nest sites from State fish and wildlife agencies. We also obtained U. S. Geological Service Bird Banding Laboratory band recovery data for all bald eagles banded as nestlings and recovered at five or more years of age at times of the year when they could have been breeding (during the nest building and incubation stages of the breeding cycle of the individual's natal population). We used natal populations (eagles within the median natal dispersal range of each other) in our evaluation in order to look at distribution across the landscape. Being able to see where natal populations appear sparser, rather than concentrated, allows us to

determine natural boundaries between regional eagle populations and thus reduces the risk that we would issue take permits in any one regional management area in a manner that is disproportionate to the population in the area.

Based on analysis of band recovery data for a subsample of states (AK, AZ, FL, MN, VA; 50 cases), we estimated the median natal dispersal distance for bald eagles to be 43 miles. We built a GIS database that incorporated all State nest locations, and then placed a 43 mile-radius buffer around each nest, effectively "linking" nests that were within the median natal dispersal distance of one another. We regarded aggregates of linked nests as components of the same regional population for management purposes. Gaps (or areas of sparse nest distribution) in the buffered nest database were used to delineate boundaries between regional management populations. The bald eagle management areas derived using this method include most bald eagle nests in the United States, although a few highly isolated nesting sites in Arizona, southern California, central Utah, southeastern Colorado, northeastern New Mexico, western Oklahoma, and eastern Texas were not clearly affiliated with any of the larger management areas. We considered Alaska's bald eagles as one population. However, although most nests have been located in southeastern Alaska, extensive surveys have also been conducted on Kodiak Island, the Kenai Peninsula, Alaska Peninsula, Prince William Sound and several mainland rivers. (USFWS 2008)(Figure 2, image from http://alaska.fws.gov/mbsp/mbm/landbirds/alaskabaldeagles/default.htm.).

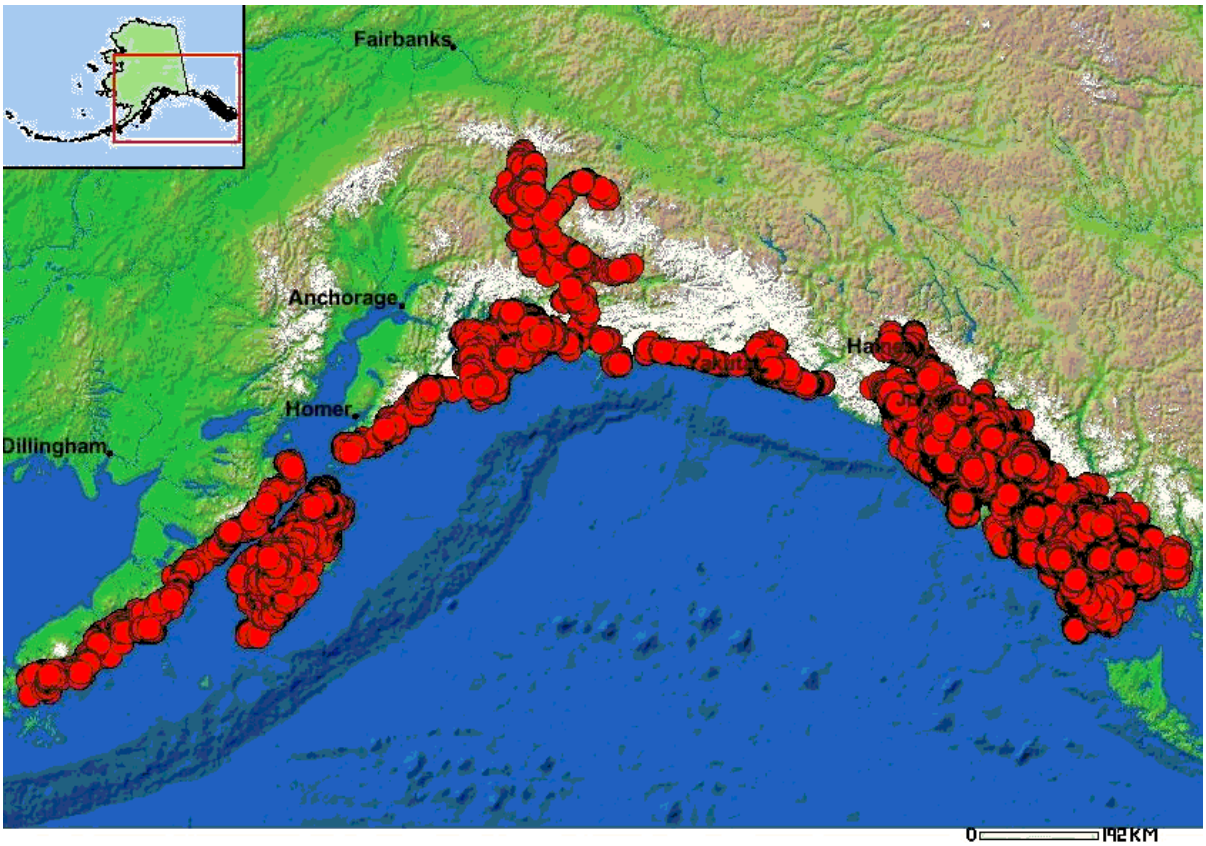

Figure 2 Surveyed bald eagle nests in Alaska.

The Service acknowledges that this process was somewhat subjective, and that the regional management populations delineated are not, in most cases, genetically or even demographically isolated. However, we believe the approach does serve to identify biologically-based, regional populations at a scale meaningful for eagle conservation. The Service's goal in managing bald eagles at this scale is to ensure permitted take does not negatively affect the species' status in any regional management population.

The Service would manage bald eagles roughly by eagle populations within Service Regions (see Figure 3 for lower 48 states), referenced to the Continental populations, except that, due its relatively isolated demographics, we would manage the Sonoran Desert population of bald eagles according to its particular demographic parameters. (Table C.3 in appendix C). Permits would be administered by Service Regions in coordination with each other, especially where a management area lies in more than one Service Region. For example, the Southwest Region would closely coordinate with the Southeast Region regarding permitting of bald eagles in Texas and Oklahoma (see Figure 3). This management and administrative approach would be evaluated regularly, at least once every five years.

Golden Eagle

For golden eagles, available data on distribution are not as spatially precise. The Service has funded transect-based aerial surveys of golden eagles in the interior west periodically since 2003 (Goode et al. 2008). The goal of this survey is to provide statistically rigorous estimates of population size and juvenile to non-juvenile age-ratios in Bird Conservation Regions (BCRs) 9, 10, 16, and 17. In addition the Partners in Flight landbird conservation planning process generated population size estimates for golden eagles in other U.S. BCRs, though these estimates are not as statistically rigorous, nor have the estimates been replicated. Because the BCR-scale population estimates are the only range-wide estimates available for the golden eagle, we used a BCR-scale management approach for this species. In other words, we will manage take of golden eagles according to thresholds set at the BCR level. Because Service Regions are not administered according to BCR boundaries, we would administer permits by Service Regional Permit offices. In those instances when a BCR occurs in more than one Service Region (such as Great Basin BCR 9 in Service Regions 1, 6, and 8, see Figure 4), Service Regions would coordinate closely regarding permit issuance to ensure that the threshold for that BCR is not exceeded. Because there are no breeding populations in the eastern United States that can sustain take (Section 3.4.2), the Service would not authorize take for golden eagles east of approximately 100° west longitude (Figure 4) except for take of nests for public safety and welfare situations. In addition, for most States west of 100° west longitude, there is little reliable recent data for breeding golden eagles. For example, Breeding Bird Surveys in Kansas and Oklahoma, which intersect the proposed management region by only a small proportion, do not report sightings of golden eagles, although it occurs in both states. It is important to note that failure to detect does not necessarily mean absence, because both States individually note small numbers of breeding pairs (NatureServe 2008). In addition, many states have not had the resources to conduct monitoring of golden eagle populations, in some cases for up to 20 or more years. The Service would therefore base thresholds upon existing data and modeling until better data become available.

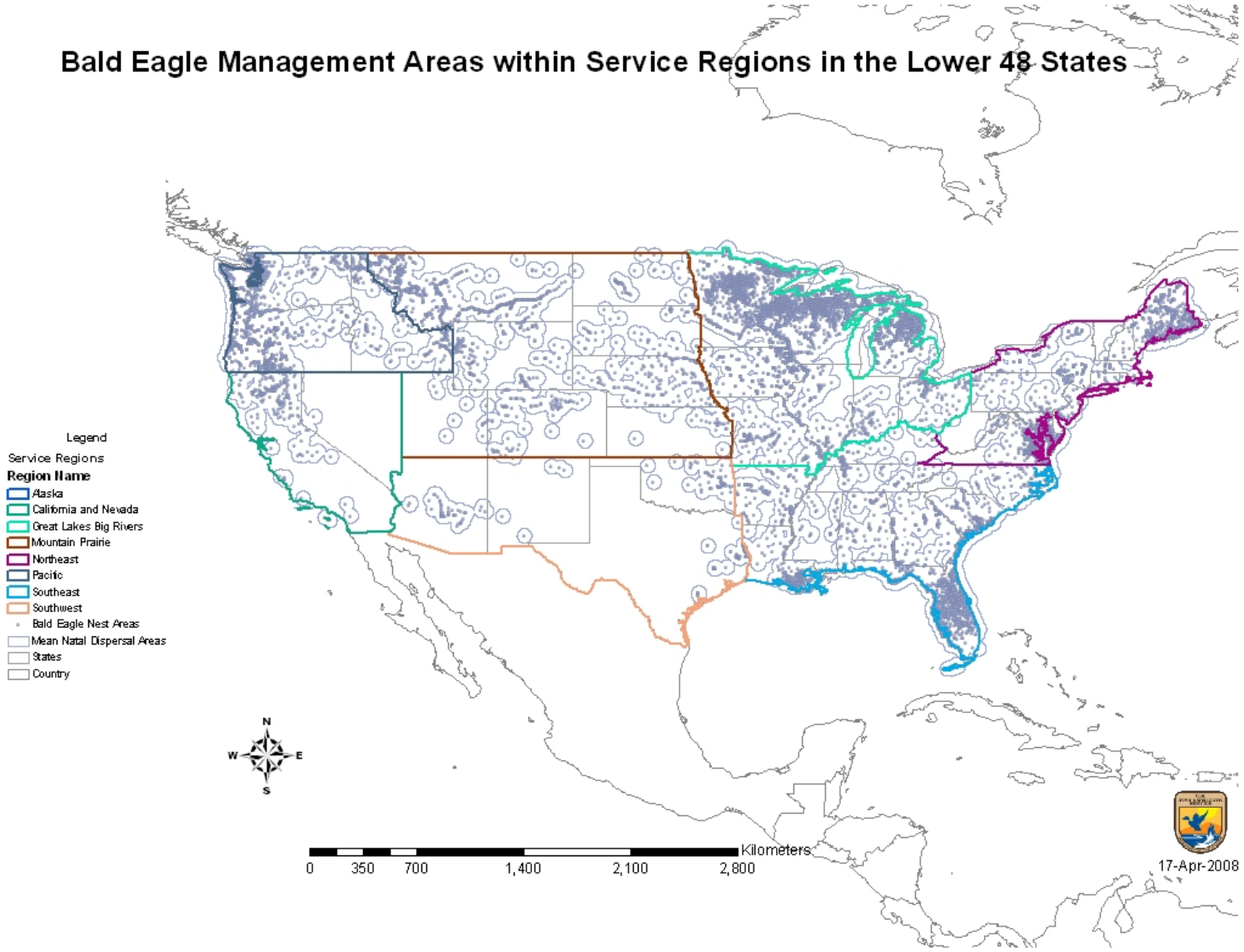

Figure 3 Bald eagle management areas

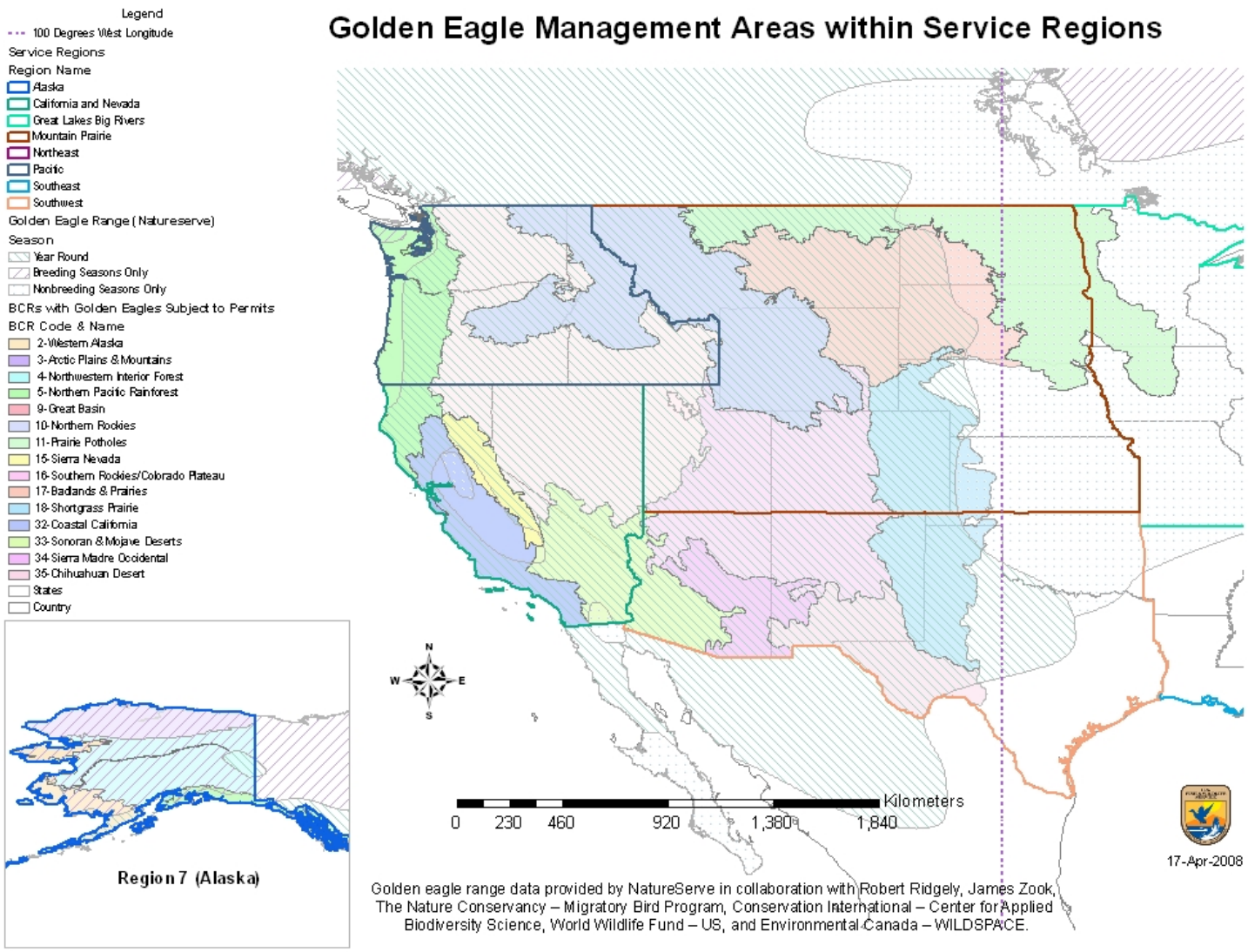

Figure 4 Golden eagle management areas

2.4.3. Permit Thresholds

The Service would base maximum levels of permitted take of bald eagles and golden eagles under both 50 CFR 22.26 and 22.27 on populations (see Appendices C and D for complete discussions of assumptions and methods). We would base take thresholds on regional and local populations for each species and estimates of their vital rates (see Millsap and Allen 2006), where there is information to substantiate different vital rates. Current, ongoing take from natural and unauthorized human causes contribute to the survival ratios used in the population models. The proposed thresholds would reflect acceptable take above that from natural and unauthorized take. Estimated take caused by currently permitted activities under the Eagle Act would, cumulative with the proposed permit, be subject to the proposed thresholds.

The thresholds proposed in this DEA would determine maximum annual take until new information warrants modification of the thresholds. The Service would base the limits on take upon:

- Models that use available data on population parameters such as juvenile, subadult, and adult survival.
- The number of nests and their occupancy as the information becomes available.
- Cumulative impacts of other permitted take of eagles.

However, because the proposed thresholds are estimates and based in part upon models, they do not take into account such things as cumulative impacts and site-specific conditions, factors which would become available during the permit evaluation stage. The on-the-ground information and conditions would guide the actual amount of take that is authorized, as long as the total does not exceed the modeled thresholds. In fact, the actual take authorized may be less than the predicted threshold. The Service Regions, in coordination with adjacent Regions, would make the final decisions regarding the actual amount of take allowed each year.

Biological Foundation for Take Thresholds

The Service originally proposed managing take of eagles using the outer negative range of the regional Population Trend criteria established by Partners in Flight (PIF)[2] to define a stable population (Panjabi etal. 2005)

[2] In the PIF species assessment, each species is assigned global scores for 6 factors, assessing largely independent aspects of vulnerability at the range-wide scale: Population Size (PS), Breeding Distribution (BD), Non-breeding Distribution (ND), Threats to Breeding (TB), Threats to Non-breeding (TN), and Population Trend (PT). Each of the scores reflects the degree of a species' vulnerability (i.e., risk of significant population decline or rangewide extinction) as a result of that factor, ranging from "1" for a low vulnerability to "5" for high vulnerability. Simplified scores for population trend on a continental scale (PT-c) evaluate trends in terms of % change over 30 years, or equivalent % annual change. A score of 1 means a ≥50% increase over 30 years with an equivalent % annual change of ≥1.36% (Large population increase). A score of 2 means a 15-49% increase, or <15% equivalent annual change (Possible or moderate population increase or population stable). A score of 3 means a Highly variable or Unknown change over 30 years, and an equivalent % annual change is not available (Uncertain population trend). A score of 4 means

(http://www.rmbo.org/pubs/downloads/Handbook2005.pdf). That would have allowed an annual decline of up to 0.54%. There are several reasons why the Service has decided not to use that approach. First, managing to allow for an annual decline, no matter how small, would have a long-term negative impact on eagle populations. Second, as noted in some comments on the proposal, the current monitoring proposal for the bald eagle and the limited monitoring for the golden eagle do not have the precision or accuracy to detect declines of that scale. Third, for golden eagles in particular, the Service requires key demographic, biological, and ecological information, particularly juvenile mortality rates and proportions of non-breeding adults to breeding adults. The original management scenario risked accepting declining populations as the norm, which is not compatible with the preservation of eagles. Finally, the Service wants to use consistent standards for management approaches for all raptors while taking into consideration species-specific natural history differences.

For the preceding reasons, the Service would use the same model for calculating take for eagles that we used in the recently-finalized falconry regulations. This DEA incorporates by reference the methodology presented in a peer-reviewed article (Millsap and Allen 2006, Appendix E) regarding the effects of falconry on wild populations of raptors in the United States, with the following exceptions: unlike the falconry regulations, the term "take" in the proposal does not always mean removal from the wild; we are using juvenile survival rates of 0.79 instead of 0.84 for golden eagles; and we are setting the thresholds at ½ Maximum Sustained Yield (MSY), without a 5% cap when MSY is 10% or greater, because most of the take of eagles in this proposal would not mean removal from the wild, and because Millsap and Allen (2006) did not evaluate take of bald eagles, which is addressed in this DEA. Millsap and Allen (2006) noted that the dynamics of most raptor populations make monitoring the short-term impact of take on them nearly impossible. However, it provided recommended strategies designed to account for uncertainties within the plan to manage take. Millsap and Allen (2006) also included an explanation of the deterministic model used to estimate how take likely affects raptor populations. Setting take allocations at ½ MSY would allow us to buffer the effects of the uncertainty inherent in using a deterministic model for populations with vital rates that may vary widely from one year to the next, particularly for the golden eagle. Increasing take rates further toward MSY would require us to implement robust population monitoring, a costly effort that would be extremely difficult logistically and financially.

The modeling would set the level of take the Service could permit that is compatible with the preservation of the eagle. The thresholds applied by the Service Regions would consider the cumulative effects of all permitted take, including other forms of lethal take permitted under regulation, against the

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a 15-49% decrease over 30 years with a <-0.54 to -2.28% equivalent annual change (Possible or moderate population decrease). Finally, a score of 5 means a ≥50% decrease over 30 years and an annual equivalent change of ≤-2.28% (Large population decrease). Under the PIF species assessment process, the PT-c score for bald eagles is 1, and the PT-c score is 3 for golden eagles.

backdrop of other causes of mortality and nest loss. There are inherent limits to the ability of monitoring to detect precise fluctuations in bald eagle and golden eagle numbers. Take is not always discovered or may occur later, so there may be uncertainty as to whether individual actions being permitted would in fact result in a "take" of eagles. To reduce and compensate for uncertainties, we intend to use multiple sources of the best available data, including but not limited to data from post-delisting monitoring by States, the Breeding Bird Survey, golden eagle data from the previously mentioned west-wide surveys (WEST data), and fall and winter migration counts and any other reliable data that may become available, to assess the status of eagle populations, adjust the model based upon updated parameter information, and adjust permitting criteria on a five-year basis as appropriate. As noted in the introductory paragraph to this section, thresholds proposed in this DEA would determine annual take until new information warrants a modification of thresholds. If data confirm populations at either national or regional scales are declining, the Service would re-establish lower take permit thresholds where appropriate. Conversely, if a population at one or the other scale is increasing, the Service may set take thresholds at a higher level. If we have inadequate data to run our modeling and no other means of assessing the status of the population where the take would occur, we may not be able to determine that the take is compatible with the preservation of the species, and if we determine that take is not compatible, we would not authorize it.

The Service would assess, at least every five years, overall population trends along with annual report data from permittees and other information to assess how likely future activities are to result in the loss of one or more eagles, a decrease in productivity of bald or golden eagles, and/or the permanent loss of a nest site, communal roost site, or important foraging area. The Service would also assess how such outcomes would likely affect population trends, taking into consideration the cumulative effects of other activities that take eagles and eagle mortalities due to other factors. This periodic assessment would provide additional information for: (1) establishing permit thresholds; (2) determining the efficacy and applicability of mitigation; (3) confirming or modifying permit information and issuance criteria; (4) confirming or modifying the recommendations provided in the Guidelines.

The impact to the population (the cumulative take under all permits used/allocated) would include the following: (a) disturbance associated with a temporary loss of productivity; (b) disturbance resulting in a permanent loss of a nest or abandonment of a territory (leading to the loss to the population of a breeding pair); (c) Native American religious take which has been for either nestlings or, when take occurs in the fall, fledglings, juveniles, or adults; and (d) other permitted take (see Appendix C for a more extensive discussion relative to methods for setting thresholds). Recommended thresholds for take that results in a temporary loss of productivity would incorporate the total permitted disturbance of eagles at communal night roosts and important foraging areas. The Service would recommend greater take be deducted from the annual allocation when there is a permanent loss of a foraging area or roost for which

there is no comparable alternate use area within an average home range distance of the applicable season. We would determine the amount of take incurred per location on a case-by-case basis by Service Region.

Accounting for Take

Because we would evaluate the effect of take on the basis of survival of juveniles rather than nest productivity, we would be able to set take in terms of individual eagles (see Appendix C for detailed discussion). For the standard bald eagle population: take affecting one individual = subtraction of one individual from the threshold; take resulting from disturbance at one nest on only one occasion = subtraction of 1.3 individuals from the threshold; one nest take resulting in the permanent abandonment of a territory = subtraction of 1.3 individuals from the threshold the first year and a reduction of eight individuals from the annual individual permit limit until data show the number of breeding pairs has returned to the original estimated, or until it can be demonstrated that the predicted loss has not occurred. For the standard golden eagle population: take affecting one individual = subtraction of one individual from the threshold; take resulting from disturbance at one nest on only one occasion = subtraction of 0.78 individuals from the threshold; one nest take resulting in the permanent abandonment of a territory = subtraction of 0.78 individuals from the threshold the first year, and a reduction of four individuals from the annual individual permit limit until data show the number of breeding pairs has returned to the original estimated, or until it can be demonstrated that the predicted loss has not occurred.

2.4.4 Mitigation

As noted in Section 2.2, Management Common to All, the Service would define “mitigation” to sequentially include: avoidance, minimization, rectification, reduction over time, and compensation for negative impacts to bald eagles and golden eagles. Prior to the submission of a permit application, potential applicants should consult with Ecological Services Field Offices to determine whether or not the proposed activity is consistent with eagle management guidelines. The Service would evaluate permit applications to determine whether, during the process of developing an activity, use of the eagle management documents and other methods for avoiding and minimizing the potential for take would be employed. Any requests for permits would need to cite these measures in their supporting documentation.

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 disturbance or TRM 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.

2.4.5 Relationship between Data Gathered and Setting Annual Thresholds

In its technical guide to adaptive management (AM) (Williams and others 2007), page 4, the Department of the Interior adopted as the operational definition of adaptive management the definition by the National Research Council:

> *Adaptive management (is a decision process that) promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a 'trial and error' process, but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social, and economic goals, increases scientific knowledge, and reduces tensions among stakeholders.*

AM is a structured approach to decision making that emphasizes accountability of decision outcomes, and is useful when there is uncertainty regarding the most appropriate strategy for managing natural resources. As set forth in Secretarial Order 3270, consideration of AM is warranted when: (1) there are consequential decisions to be made; (2) there is an opportunity to apply learning; (3) the objectives of management are clear; (4) the value of reducing uncertainty is high; (5) uncertainty can be expressed as a set of competing, testable models; and (6) an experimental design and monitoring system can be put in place with a reasonable expectation of reducing uncertainty. Rather than simply monitoring the status of the resource of interest, a key component of AM is also monitoring the impacts of the management strategies. Although statutory requirements constrain the ability of the Service to propose an active (experimental) AM, we believe the proposal is in keeping with a passive AM strategy. In a passive AM strategy, uncertainty is recognized, but the focus is on the achievement of management objectives. Monitoring is focused on the resource status and other factors that are useful for improved understanding through time (Williams and others 2007).

The proposed eagle take regulations are based on a number of assumptions and contain areas of uncertainty. Increasing our understanding of how disturbance actually affects eagles, and how loss of individuals and nests affects populations, would improve our ability to effectively conserve eagles with minimal impacts to eagles and socio-economic resources. The Service proposes to reduce uncertainty in the management of eagle take by requiring permittees to report back to us on the use of nests, roosts, or foraging areas by eagles for up to 3 years after the activity is completed (see draft forms in Appendix F).

Permittees for most disturbance permits would only be asked to provide minimal information to allow the Service to assess whether or not the activity likely caused disturbance. However, this information would contribute to an AM process that would enable us to evaluate and revise thresholds for permits and to adjust the Guidelines.

The Service would also use results of the final bald eagle post-delisting monitoring program to help re-evaluate the size and status of regional populations at least once every five years for a total of 20 years. These data would increase the accuracy of our estimates of regional population size and nest locations, and would also allow us to recalibrate thresholds for take of nests and individuals based on actual population trends. The bald eagle post delisting monitoring program would focus on nest-site occupancy. However, monitoring at nests is not sufficient to detect some types of population decline (Millsap and Allen 2006). The Service would use other eagle population data, as available, such as counts and age-ratio information from standardized migration count sites, to look for indications of population changes not detectable through any existing nest surveys.

For golden eagles, the Service would initially use data from available surveys such as that by WesternEcoSystems Technology, Inc. and information from the BBS. The Service also would use additional data, as available, such as counts and age ratio information from standardized migration count sites, and the long-term monitoring data from the Snake River Birds of Prey National Conservation Area.

For both species, we would evaluate persistent changes in migration counts or age ratios, at least once every five years, to determine if eagle take regulations might be a contributing factor, and if so what changes are warranted. The Service would adjust the permitting thresholds and allocations by using the best data available at the time of each decision. We would use the updated data to apply the population model for estimating the number of permits to allocate.

2.5 Alternative 2– Disturbance Permits, Nest Take for the Public Welfare, and Programmatic Disturbance

Alternative 2 discusses three regulatory proposals that would authorize the following:

- Disturbance take of eagles.
- Removal of eagle nests for reasons of "public welfare" defined as "society's well-being in matters of health, safety, and order."
- Permit-issuance criteria to ensure certain prioritized interests are provided take authorization in regions where permit applications exceed the number of permits that would be compatible with the preservation of eagles.
- Programmatic disturbance under a permit designed to avoid or minimize the ongoing, future risk of disturbance to eagles

2.5.1. Disturbance Take

The Service would add a new section at 50 CFR 22.26 (Eagle Take) to authorize disturbance take of bald eagles and golden eagles for the protection of

other interests in any particular locality, where such permits are consistent with the preservation of the bald eagle and golden eagle, and the take cannot practicably be avoided.

These permits would be limited to disturbance occurring at nests, communal roost sites, and important foraging areas, as opposed to take that results in mortality. They would require an initial determination that the permits would be compatible with the preservation of the bald eagle and golden eagle; that the take would be associated with, and not the purpose of, an otherwise lawful activity; and that it would occur even after impacts are minimized to the extent practicable by use of avoidance and minimization measures.

Short-term Disturbance

The Service would distinguish between levels of effects to the population in two separate evaluations of disturbance. A short-term disturbance reduces productivity in a given year, i.e., there is a decrease in recruitment the following year equivalent to the average number fledged per occupied territory. This assumes eagles in the territory become productive again after the activity ceases, which may not be as likely for golden eagles.

Permanent Abandonment of Territory, Important Communal Roost Site, or Important Foraging Area

Long-term disturbance may result in the permanent abandonment of a territory, important traditional communal roost site, or important foraging area. In terms of population effects, this permanent effect is the equivalent of, in perpetuity, annually authorizing disturbance at one location. For this reason, long-term disturbance would have larger impacts to the eagle population, and would result in a greater take being subtracted from the annual thresholds (Appendix C). Permit information requirements and issuance criteria would be applied in the same manner as those for short-term disturbance, and would apply if the Service's Migratory Birds Office, local Ecological Services Office or the Regional Permit Office determines that a disturbance would be associated with the permanent abandonment or loss of a nest or territory. However, the Service would also require compensatory mitigation in such cases.

2.5.2. Permitted Take of Nests for the Public Welfare

The Service would add a new section at 50 CFR 22.27 (Eagle Nest Take) to authorize removal of bald eagle and golden eagle nests for reasons of "public welfare" defined as "society's well-being in matters of health, safety, and order." This would include nests that pose an imminent hazard to human safety or to the welfare of eagles. The proposal would authorize removal and/or relocation of both active and inactive eagle nests in what we expect to be the rare case where genuine safety concerns necessitate the take. This permit would also be available to remove or relocate inactive nests in situations where the take is necessary to ensure public health and safety, but the presence of the nest does not create an immediate safety emergency. This permit would not authorize intentional, lethal take of eagles.

The Service anticipates that permits authorizing take of nests for the public welfare would be relatively few and would be subject to the thresholds and allocation process proposed in the management Common to Both Action Alternatives. Take of inactive nests that would pose a hazard to human safety or to the welfare of the eagles without emergency removal may not need to be included in the calculations for permit thresholds if the eagles would likely be lost anyway during the safety emergency. Because of the time constraints associated with take that would be for emergency situations, these would not be immediately subject to the allocation prioritization and all bona fide applications would be authorized. However, we would conduct an after-the-fact evaluation of emergency take authorizations. If data indicate there may be population effects from use of emergency take the Service would reconsider whether the allocation for the safety take should be deducted from the permit thresholds. An example would be if there were no other suitable nest locations or alternate nests for the breeding pair, and they subsequently emigrated without being replaced by another pair. If the Service determines it is necessary, we would estimate potential take from this source, based on historical numbers for the applicable Service Region to that date, and deduct the number from the available permits at the beginning of the year.

Current regulations at 50 CFR 22.25 allow the removal by permit of golden eagle nests if the nest interferes with resource development or recovery operations.

2.5.3. Allocation of Individual Permits

Although unlikely to occur in most parts of the range of either eagle species, the Service anticipates that in a handful of regions there could be more requests for permits than the number of permits available. However, we would still authorize all safety and emergency permits. In keeping with our commitments under RFRA and AIRFA, the Service's Regional Directors would each be responsible for developing and implementing a structured-allocation process in each Region if there is evidence that demand for take would exceed take thresholds for either species of eagle. This process would ensure that authorized take of birds necessary to meet the religious need of a Native American Tribe would not be denied due to other take being authorized for another purpose. Each Regional structured-allocation process would also need to ensure that permits are available in case of public safety emergencies. Service Regions would be responsible for any necessary NEPA compliance regarding additional decisions for implementation procedures. If more applications for permits are received than the Service can provide, applicants would need to reapply at a later date.

2.5.4. Permit for Programmatic Disturbance

Under this alternative, the Service would develop a programmatic disturbance permit at 50 CFR 22.26 that would be available to entities (industries, agencies, or authorities) at the private, federal, tribal, and State level undertaking activities that may result in a cumulative loss of bald eagle and golden eagles, eagle nests,

foraging areas, and roost sites with potential for local population-level effects. The Service would work with the entities to develop scientifically-supportable standard practices and criteria for choosing the best available techniques in projects and plans. Project design criteria would include requirements for applicants to reduce take and provisions to notify the Service when take occurs. These standard practices and plan specifications would then become permit conditions, in addition to monitoring and reporting requirements more comprehensive than those for permits allowing take of individual eagles. The Service would require that any mitigation or standard practices be designed to avoid or minimize the ongoing, future risk of disturbance to eagles. We expect most industry-wide or agency-wide standard practices for programmatic permits would be developed with the respective entities at the Service Washington Office level, in coordination with Service Regions. The permits would be issued by the Regions.

In cases where current industry practices are resulting in programmatic disturbance of eagles leading to the abandonment of important eagle-use areas and when the Service has limited permits based upon population models, compensatory mitigation may be a suitable standard practice, as long as the mitigation would provide long-term protection from disturbance for nest sites, foraging areas, or roost sites within the area defined by the programmatic permit. In addition, under certain situations (e.g., multiple transportation corridors within eagle-use areas) it may be advisable to develop geographically-based programmatic permits involving more than one industry or agency.

Several of the comments the Service received on the proposed regulation suggested that the approval process should give "substantial weight to findings of consistency with a State management plan where such plans are consistent with the Eagle Act's goal of preservation of the eagle." One commenter specifically cited the Maryland Chesapeake Bay Critical Area Program (MCBCAP). The Service considered this a potential example suitable for a programmatic disturbance permit. However, we found that the MCBCAP emphasizes habitat conservation measures (which are provided for under the ESA), but is limited in preventing disturbance of eagles (which is the focus of the Eagle Act).

This permit could also be available to entities actively engaged in habitat enhancement that would provide long-term benefits for eagles but would entail short-term negative impacts. An example of such an activity would be the shrub-steppe enhancement and renewal initiatives in the Great Basin ecosystem.

Depending upon site-specific conditions and the determination of the local Ecological Services Office and the Service Regional Permit Office, permitted take in programmatic permits that would lead to reductions in disturbance may not need to be subtracted from the calculated take thresholds. Programmatic permits for future activities may be subject to take thresholds and annual allocation process if it is determined that the predicted take would result in a cumulative loss to eagle population(s).

2.5.5. Combination Permits

Where appropriate, the Service would issue a single permit that combines authorizations provided under the various regulations. For example, an airport that meets the obligations of its Wildlife Hazard Management Plan, or comparable document, and adopts measures developed in cooperation with the Service to minimize the potential take of eagles, could be issued a programmatic permit under these proposed regulations (50 CFR 22.26). Based upon comments received on the proposal, the Service would extend the time period of such a permit to authorize take that occurs as the result of unavoidable collisions between eagles and planes. It would be valid for up to five years. A stipulation of the permit would likely be the requirement to haze eagles in the vicinity of airports, which could constitute disturbance (for example preventing eagles from re-nesting at a hazardous location). Because this hazing is intentional and the effects on the eagles purposeful, it does not meet the issuance criteria for the § 22.26 permit, which requires the taking to be associated with, but not the purpose of, the activity. Therefore, we would issue permits to remove nests or haze with the combined authority of both § 22.26 and § 22.23 (Depredating permits). The regulations at § 22.23 limited permit tenure to 90 days because the need for programmatic authorization was not contemplated at the time that regulation was developed. In order to have the ability to extend this type of authorization to "Advanced Conservation" programmatic permittees, we would amend the regulations at § 22.23 to allow all depredation permits to be valid for up to five years.

2.6 Alternative 3– Alternative 2 Plus TRM Option, Individual and Programmatic, (Preferred Alternative and Environmentally-Preferred Alternative)

Alternative 3 would encompass all of Alternative 2 and it would add permits for TRM for bald eagles and golden eagles where the take is associated with, but not the purpose of, the activity. The primary purposes for Alternative 3 are to reduce the ongoing occurrences of unauthorized and unregulated mortality contributing to eagle losses (currently affecting survival ratios in the population modeling) and to ensure that any authorized, programmatic TRM also include measures to reduce long-term risk of take. Alternative 3 would also authorize programmatic permits for airfields that could include TRM. Programmatic permits for new and expanded activities may be subject to take thresholds and the annual allocation process if it is determined that the predicted take, even where reduced to the point where it is unavoidable, would result in a cumulative loss to the eagle population. When there are no Service-approved measures to minimize take, we would issue no permits.

We would develop metrics for determining whether take is unavoidable and industry- or agency-wide standard practices for programmatic permits with the respective entities at the Service Washington Office level, in coordination with Service Regions. The permits would be issued by the Regions, and would include permit conditions to ensure all recoverable eagle carcasses, parts, and feathers are sent to the National Eagle Repository.

2.6.1. Permit for TRM on an Individual Basis

For standard, individual permits, the same issuance criteria would apply for disturbance and TRM, for example, take that cannot practicably be avoided. The Service anticipates these permits would be few, but historically, there has been a need to permit some unavoidable TRM of bald eagles. The sources of mortality could be related to such things as transportation, forest management, electric utilities, and home construction. In addition, if a safety-related nest take occurs while the nest is active, there may be a need for an additional permit to take eggs or juveniles if it is determined they cannot be successfully relocated. However, this would be a one-time individual permit and would not apply if the mortality is ongoing for the same location, entity, or system. Therefore, whenever possible, the Service would encourage development and use of programmatic permits.

2.6.1.1 Allocation of Individual Permits for TRM

Individual permits for TRM would be subject to the same allocation process as for individual disturbance permits. The consequence of TRM of individual eagles and the consequence of nest disturbance are the same - the loss of individuals from the population. In the case of TRM, the loss is of individual eagles and the consequences are easily calculated. As long as the rate of population growth is greater than 1, the loss of any individual eagle has the same demographic consequence to the population; even if the loss is of a breeding adult, surplus floating adults should be available as replacements. In the case of nest disturbance, the loss is the contribution to the annual cohort of juveniles from the affected nest. On average, that loss will equal the average productivity of breeding pairs in the impacted population, since that is the number of young that would have been produced in the absence of the authorized disturbing activity.

2.6.2. Permit for Programmatic Reduction and Minimization of TRM

Under this alternative, the Service would also develop a “Performance-Based” programmatic permit designed to reduce ongoing TRM of bald eagles and golden eagles associated with industries such as electric distribution via power lines, transportation, and wind-power development. The list of examples is not meant to be exhaustive because other industries, agencies, or authorities at the federal, tribal, and State level may also be contributing to ongoing eagle mortality. The Service Washington Office would work with the entities to develop scientifically-supportable standard practices and protection plans which, when implemented, will reduce the occurrence of mortality to that which the Service determines meets the “unavoidable” criterion. These standard practices and plans would then become permit conditions, in addition to monitoring and reporting requirements more stringent than those for permits for take of individual eagles. The take authorized through programmatic permits would require quantified estimates of mortality, and the estimate would be specified in the permit authorization. Any mitigation or standard practices must be designed to maintain increasing or stable populations. The Service would use the monitoring and reporting to determine effectiveness of the mitigation or standard practices.

Currently, the only industry example (of which the Service is aware) of standard practices that could, with reasonable modifications, be developed into conditions for a “Performance-Based” permit is that developed by the power-line industry and the Avian Powerline Interaction Committee (of which the Service is a member). As noted in Section 1.1.2 of the Introduction, suitable components of a permit for the power-line industry would include (but would not be limited to): establishment of a mortality baseline through estimates or a sampling scheme; employment of the best-available techniques and mutually-approved standard practices for minimizing eagle mortalities; undertaking a system-wide risk analysis and retrofitting a significant portion of hazardous locations within a reasonable time frame; implementation of an effective monitoring program; reporting eagle mortality to the Service; use of only eagle-friendly practices on all new infrastructure (60" spacing, raptor-safe poles and equipment); and a demonstration that the permittee has eliminated all avoidable eagle mortality. To prevent collisions, utilities would also need to ensure transmission lines, distribution lines, and towers that are located in known eagle concentration areas, foraging areas, or nesting areas, have visual markers on the wires.

Other industries or agencies interested in developing standards suitable as permit conditions, and which ensure any mortality meets the “unavoidable” criterion, would be encouraged to work with the Service to develop them. Once those permit types were developed, practitioners of the relevant industries could work to qualify for the programmatic permit. The key components for any permit in this category would need to meet the same high level of standards set for the power line industry as described above.

The coverage for programmatic take would be limited to those portions or programs of an industry, company, or geographic area that have fully implemented the advanced conservation practices and can demonstrate acceptable reduced mortality. Prior to completion of the risk analyses, the determination of acceptable reduced mortality would be based upon the percent reduction in mortality, supported by documentation of implementation of standard practices or use of best available technologies. Similar to the programmatic disturbance take permit, it may be advisable in some cases to develop geographically-based programmatic permits involving more than a single industry or agency.

The Service would encourage industry and non-governmental entities to work with us to conduct scientifically-sound risk analyses to predict with acceptable accuracy the per-unit probability of eagle mortality from specific industry practices and technologies under varying conditions and situations. We would use the per-unit mortality predictions, among other factors, to help set permit thresholds for programmatic TRM. Monitoring and reporting of actual take would be required as a part of the adaptive management process.

This permit would not be required for activities to proceed, nor, in the case of the electric power line utility industry, would it replace the current voluntary process for instituting an Avian Protection Plan, which would still remain an option, but cannot legally absolve the utility from liability. It would be a performance-based permit for those industry operators, or portions of their

programs that demonstrate their actions have reduced ongoing mortality or have contributed to population stability or improvements.

This permit would initially be for reduction of ongoing take that is currently unauthorized, and which is reflected in the survival ratios of population models. Therefore, TRM permitted in programmatic permits that would lead to reductions in mortality would not be subtracted from the calculated take thresholds. If the reductions in mortality (or other factors) contribute to population increases over a period of five years or greater, then we would re-evaluate the permit thresholds to determine whether modifications are warranted. Programmatic permits for new and expanded activities may be subject to take thresholds and the annual allocation process if it is determined that the predicted take, even where reduced to the point where it is unavoidable, would result in a cumulative loss to the eagle population.

2.7 Alternative Considered but Eliminated from Detailed Study

When the Service first proposed the regulation, we considered permitting take of bald eagles and golden eagles based upon (1) the populations in Alaska and (2) the total populations in the lower 48 states for both species. The Service is interpreting the "preservation of the eagle" to mean maintaining bald eagle and golden eagle populations with no discernible population declines, nationally or regionally. Therefore, an alternative that would allocate permits solely at the larger scale probably would not be compatible with the preservation of eagles and would be difficult to implement. In addition, the Service believes that management of either species of eagle solely at the scale of the lower 48 states would not be feasible to implement because our Permit Program is largely administered from the Service Regional Offices. It would also limit the ability of the Service to effectively coordinate with local entities such as Tribes and States. For all the preceding reasons, the Service eliminated this as an alternative.

CHAPTER 3: AFFECTED ENVIRONMENT

3.1 Introduction

The affected environment includes the environmental components (resources) that would be affected by the alternatives. It is important to note these resources may also affect the alternatives if the Service were to implement them. For example, large-scale changes in habitat supporting eagles may have population impacts that may require adjustment to the level of take compatible with the preservation of eagles. Although the chapter title includes the term "affected," this chapter does not present effects. Instead, the environment described is the reference point for the comparisons of impacts in Chapter 4, Environmental Consequences. The implementing regulations for NEPA (40 C.F.R. 1502.15) state that agencies shall avoid useless bulk in statements and shall concentrate effort and attention on the important issues. The proposed permit or permits would be national in scale; therefore the Service has identified those factors with the greatest importance at that scale, and has also concentrated on those issues identified in comments on the proposed rule.

3.2 General Information Regarding Raptor Population Biology

The Service considers the availability of nest sites and food as the limiting factors for raptor populations (Wilcove and others 1986, Watson and Langslow 1989). Raptors compensate for the loss of foraging and nesting habitat by abandoning established territories and/or attempting to utilize less productive or already-occupied territories (Nelson 1979, Newton 1979). Without human intervention, population regulation in many raptor species comes through competition for breeding space assisted by the presence of surplus adults, which breed only when an existing breeding territory becomes vacant. In habitat where nest sites are widely available, breeding density fluctuates generally in synchrony with availability of preferred prey (Newton 1979, Smith and Murphy 1979, Ridpath and Booker 1986, Bates and Moretti 1994). The presence of alternate prey species may allow continued breeding success during periods when the availability of preferred prey species is low (Johnstone 1980, Thompson and others 1982). In other areas, breeding density levels may be influenced by the number of available nest sites rather than by available food supply (Edwards 1969, Boeker and Ray 1971). Consequently, in relatively undisturbed raptor habitat, breeding density is naturally limited primarily by food supply or nest sites, whichever is most limited (Newton 1979, 1991).

Local area adult and subadult eagle populations may be comprised of: pairs occupying a breeding territory; individuals that have secured a breeding territory but not a mate; and individuals that are unable to secure a breeding territory, or "floaters" (non-breeders). Although competition for nest sites and food between established breeders and floaters may reduce nest success, healthy populations over the long term typically depend upon the presence of many floaters. An emphasis on only occupied territories may delay the detection of population declines (Kenward and others 2000), but tracking the proportion of

immature breeders drawn from the floater population can be used as an early-warning sign of population decline (Ferrer and others 2003). Ensuring the availability of suitable settlement areas for dispersing floaters can increase the effectiveness of conservation efforts (Penteriani and others 2005). For additional information regarding population dynamics and how we assessed them in this proposal, see Appendix C.

3.3 Bald Eagle

3.3.1 General Conditions

Bald eagles are an endemic North American species that historically occurred throughout the contiguous United States and Alaska. It historically ranged and nested throughout North America except extreme northern Alaska and Canada and central and southern Mexico. The largest North American breeding populations are in Alaska and Canada, but there are also significant bald eagle populations in Florida, the Pacific Northwest, the Greater Yellowstone area, the Great Lakes states, Maine, and the Chesapeake Bay region. Bald eagle distribution varies seasonally. Bald eagles that nest in southern latitudes frequently move northward in late spring and early summer, often summering as far north as Canada. However, in Arizona bald eagles typically stay in their breeding areas year round. Most eagles that breed at northern latitudes migrate southward during winter or to coastal areas where waters remain unfrozen. Migrants frequently concentrate in large numbers at open water sites where food is abundant and they often roost together communally. Wintering bald eagles occur throughout the United States but are most abundant in the West and Midwest (USFWS 1983) along major river systems and large bodies of water in the mid-western states, Chesapeake Bay region, Pacific Northwestern states, and states of the intermountain west, including Wyoming, Utah, Colorado, New Mexico, and Arizona. On their winter range, bald eagles may roost singly or in small groups but larger communal roosts are important and may predominate in many areas (Platt 1976). Bald eagles have been observed to fly over 24 kilometers (15 miles) from their feeding areas to roosting sites (Swisher 1964). In some cases, concentration areas are used year-round: in summer by southern eagles and in winter by northern eagles.

Breeding bald eagles occupy territories, many of which have been used continuously for many years. One breeding territory in Ohio was occupied continuously for nearly a century (Herrick 1924). Bald eagles generally nest near coastlines, rivers, large lakes, reservoirs, and streams proximate to an adequate food supply. They often nest in mature or old-growth trees, snags (dead trees), sometimes on cliffs or rock promontories, and rarely nest on the ground. They also nest with increasing frequency on human-made structures such as power poles and communication towers. Several alternate nests are built by a single pair in a breeding territory, and in any given year, a new nest may be built or an old nest may be reoccupied (Greater Yellowstone Bald Eagle Working Group (GYBEWG) 1996). The start of the breeding season ranges from October in Florida, to late April or early May in the northern United States.

3.3.2 Population

The first declines in bald eagle populations in the past 250 years occurred due to habitat loss as early European immigrants settled on shorelines in the Chesapeake Bay and elsewhere on the East Coast. More significant declines began in the late 19th Century due to hunting for feathers, trophies, and bounty. In addition, eagles were killed by ingesting poisons used to bait and kill livestock predators. In 1940, Congress enacted the Bald Eagle Protection Act (amended in 1962 to protect golden eagles, and now called the Bald and Golden Eagle Protection Act). In the late 1940s, organochlorine pesticide compounds such as DDT (dichloro-diphenyl-trichloroethane) began to be used in large quantities. DDT metabolites accumulated in the fatty tissues of breeding bald eagles, resulting in production of eggs with abnormally thin eggshells, which cracked or failed to fully develop, causing a severe decline in bald eagle numbers. By 1963, a survey conducted by the National Audubon Society estimated the number of breeding bald eagles in the lower 48 states to be 417 breeding pairs.

Since DDT use in the United States was banned in 1972 and the bald eagle gained the protection of the ESA,[3] bald eagle numbers have rebounded.[4] In 1999, the Service proposed to remove the bald eagle from the list of threatened and endangered species, prompting some states to stop conducting annual surveys for bald eagles. The most recent national census in 2000 counted 6,471 breeding pairs in the lower 48 states. On February 16, 2006, the Service re-opened the comment period on its 1999 proposal to delist the bald eagle (71 FR 8238, Feb. 16, 2006), conservatively estimating at least 7,066 breeding pairs in the contiguous United States As of February 2007, the Service estimates that number to exceed 9,700 (72 FR 37346, July 9, 2007). In July of 2007, the Service removed the bald eagle from the ESA list of threatened and endangered species

3.3.3 Disturbance

Numerous studies have sought to measure the sensitivity of bald eagles to a variety of human activities (Mathieson 1968, Stahlmaster and Newman 1979, Skagen 1980, Gerard and others 1984, Fraser and others 1985, Russell and Lewis 1993, Brown and Stevens 1997, Buehler 2000, Grubb and others 2002), and have shown that bald eagle pairs may react to human activities very differently. Some pairs nest successfully just dozens of yards from human activity, while others abandon nest sites in response to activities much farther away. This variability may be related to a number of factors, including visibility, duration, noise levels, extent of the area affected by the activity, prior experiences with humans, and tolerance of the individual nesting pairs.

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[3] The bald eagle was first protected south of 40° north latitude by the Endangered Species Preservation Act in 1967, then listed as endangered in 43 contiguous states and threatened in the other five under the ESA in 1978, then reclassified to threatened in the lower 48 states in 1995.

[4] Alaskan bald eagles were largely unaffected by DDT and were never protected under the ESA. Today, there are perhaps 50,000 to 70,000 bald eagles in Alaska.

Human activities that cause prolonged absences of breeding adult bald eagles from their nests can jeopardize eggs or nestlings. Depending on weather conditions, this may cause the eggs to either overheat or cool down too much, and then fail to hatch. Unattended eggs and nestlings are subject to predation. Irregular feeding due to human disruption can harm nestlings and adults. Adults startled while incubating or brooding nestlings may damage eggs or injure their nestlings as they abruptly leave the nest. Older nestlings may be startled by loud or intrusive human activities and prematurely jump from the nest before they are able to fly.

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. Human disturbances may constitute a threat to wintering bald eagle populations by causing displacement to areas of lower human activity (Stalmaster 1976, Stalmaster and Newman 1978, Brown and Stevens 1997). Human disturbances may also interfere with foraging behavior of eagles (Mathiesen 1968, Stalmaster 1976).

Additional information regarding the response of bald eagles to disturbance can be found in the final rule removing the bald eagle in the lower 48 states from the list of endangered and threatened wildlife (72 FR 37346, July 7, 2007).

3.4 Golden Eagle

3.4.1 General Conditions

Worldwide, the golden eagle is widely distributed, with five or six subspecies found throughout the northern hemisphere in Europe, Asia, and northern Africa and occasionally in the southern hemisphere (Kochert and others 2002). In North America, golden eagles occur mainly west of the 100th Meridian and in western Canada, nesting and wintering from Alaska south to central Mexico. Historically, the breeding range of the golden eagle included most of North America (Bent 1937). Today, the golden eagle is primarily a winter resident in the eastern United States, but a few pairs nest in Maine, Georgia, and Tennessee (Kochert and others 2002), and in 1997 a nesting pair was documented in Michigan (Wheeler 2003).

In North America, northern breeding golden eagles migrate longer distances to wintering areas than do southern eagles, sometimes up to thousands of kilometers. Golden eagles south of 55° north latitude migrate smaller distances or not at all. More research is needed to establish migration routes or areas, but they appear to be concentrated along the Rocky Mountains and Appalachians (Kochert and others 2002). In some western states golden eagles are year round residents on breeding territories. Golden eagles would occasionally roost communally during severe weather or when prey is abundant (Kochert and others 2002; Craig and Craig 1984). Edwards (1969) observed in Utah that immature golden eagles often associate with one another during winter and they also may roost with bald eagles during winter.

Golden eagles usually occupy open areas (canyon land, open desert, grassland, and shrub habitat) where their preferred prey can be found. However, in southwestern Idaho, eagles selected shrub habitats and avoided grasslands in addition to disturbed areas and agriculture (Marzluff and others 1997). Golden eagles feed primarily on small mammals, most commonly rabbits (*Sylvilagus* spp.), hares (*Lepus* spp.), ground squirrels (*Spermophilus* spp.), marmots (*Marmota* spp.), and prairie dogs (*Cynomys* spp.). They also eat carrion, birds, and reptiles, and less often fish and larger mammals. Millsap and Vana (1984) reported on the importance of waterfowl to wintering golden eagles in the eastern United States

Nest sites are most often on cliffs or bluffs, less often in trees, and occasionally on the ground. Pairs establish and defend breeding territories that may contain multiple nests built and/or maintained by the pair, which are often re-used or attended in subsequent nesting seasons. Individual eagle nests left unused for a number of years may be reoccupied. In a review of the available literature and reports regarding nest use by raptors, Megown and others (2007) reported an interval of over 22 years during which golden eagles did not occupy a nest.

3.4.2 Population

The golden eagle is a Bird of Conservation Concern in the Great Basin, Northern Rockies, Southern Rockies/Colorado Plateau, and Badlands and Prairies Bird Conservation Regions (numbers 9, 10, 16, and 17, USFWS 2002). The golden eagle is also ranked by NatureServe (2007) as critically imperiled in Georgia, Tennessee, and Vermont; breeding golden eagles as critically imperiled in Kansas and Maine; and non-breeding population as critically imperiled in Indiana, Louisiana, Maine, Maryland, and Virginia (see Appendix B). Braun and others (1975) estimated a North American population of perhaps 100,000 individuals in the early 1970s. United States Breeding Bird surveys show no trend for this species (P=0.39, Sauer and others 2005). However, a report on a 2006 survey (Good and others 2007a) showed decreasing populations in two Bird Conservation Regions (BCRs). The current PIF-based United States and Canada population estimate is 80,000, with a “fair” accuracy rating and a “very high” precision rating. Kirk and Hyslop (1998) suggested that golden eagle populations may be declining in some areas of Canada. Golden eagle productivity in Alaska may be lower than that for golden eagles in lower latitudes (Young and others 1995; McIntyre and Adams, 1999). Good and others (2004) estimated that there were just over 27,000 golden eagles in the 4 BCRs in which the species is of conservation concern. These same BCRs encompass much of the western U. S. population and most of the North American population of this species. Breeding bird surveys and migration counts are inconclusive but suggest lowered reproduction rates in the western United States, possibly due to habitat alteration and loss, with concomitant declines in prey (Kochert and others 2002). In addition, McIntyre and others (2006), provided evidence that estimates of annual productivity were not good predictors of first-year survival in migratory juvenile golden eagles. They further suggested more research is needed to

determine whether productivity is an accurate predictor of survival in both non-migratory and migratory populations of golden eagles.

In addition to gaps in knowledge regarding post-fledgling mortality, there is a need to gather more information regarding dispersal patterns of juvenile golden eagles (Edwards and others 1988) as well as adult female survivorship, a key population indicator. They remarked that an apparent male bias in fledgling sex ratios was less skewed than would be expected because, as Newton (1979) noted, female golden eagles usually suffer greater postfledging mortality than males. They also suggested that, among golden eagles from the Snake River Birds of Prey area in Idaho, subadult males may either have lower survivorship relative to females or have greater dispersal tendencies. Greater knowledge regarding sex ratios of survivorship and dispersal tendencies can yield information relevant to adult sex ratios, important for evaluating monitoring results. In addition, skewed sex ratios in wild bird populations may have implications for conservation (Donald 2007).

Good and others (2007b) noted that determining if the golden eagle population in the Western United States is increasing, decreasing, or stable is more important than knowing how many golden eagles are present. Harmata (2002) suggested that conservation and management of golden eagles may be better served if, in addition to productivity, efforts were focused on determining the number of breeding pairs and turnover of breeding eagles over multiple years. In a personal communication (September 25, 2007), Carol McIntyre, wildlife biologist and eagle specialist from Denali National Park and Preserve, reported a general concern among raptor biologists over the proposal to issue take for golden eagles, given the lack of data on population size, productivity, and survival.

3.4.3 Disturbance

Golden eagles appear to be sensitive to human activity, and may be much more sensitive to disturbance than bald eagles (Dr. M. W. Collopy, personal communication, May 15, 2007). They commonly avoid urban and agricultural areas, but this is likely due at least in part to low availability of preferred prey species in those locations. Steidl and others (1993) found when observers were camped 400 m from nests of golden eagles, adults spent less time near their nests, fed their juveniles less frequently, and fed themselves and their juveniles up to 67% less food than when observers were camped 800 m from nests. In studies of golden eagle populations in the southwest (New Mexico and Texas) and the Front Range of the Rocky Mountains (New Mexico, Colorado and Wyoming), Boeker and Ray (1971) reported that human disturbance accounted for at least 85% of all known nest losses. Breeding adults are sometimes flushed from the nest by recreational climbers and researchers, sometimes resulting in the loss of the eggs or juveniles due to nest abandonment, exposure of juveniles or eggs to the elements, collapse of the nest, eggs being knocked from the nest by startled adults, or juveniles fledging prematurely. However, golden eagles rarely flushed from the nest during close approaches by fixed-wing aircraft and

helicopters during various surveys in Montana, Idaho, and Alaska (Kochert and others 2002).

3.5 Biological and Physical Environment

3.5.1 General Habitat Factors

As described above, bald eagles typically occupy coastal areas and shorelines of rivers and lakes, while golden eagles favor the open, more arid habitat of the western states. However, in reality, both species use a variety of habitats and geographical areas. The breeding and wintering habitats of bald eagles and golden eagles together comprise a large portion of the United States. A detailed description of the biological and physical components of this large area is beyond the scope of this DEA. However, the Service can outline some factors in eagle habitat that may be related to population effects.

The Birds of North America accounts for both species make specific recommendations for research relating to eagle environments that is important for adequate and informed management. Buehler (2000) noted that research is needed to define tolerable limits of human development that would not compromise bald eagle population viability. In addition, information on the effects of habitat alteration on golden eagle populations is deficient for both breeding and wintering grounds (Kochert and others 2002).

3.5.1.1 Climate Change

In a review of research evaluating the effects of recent climate change, McCarty (2001) noted that, while scientists have documented the response of species to interannual or geographic variations in climate, they lack sufficient information to understand or predict the responses to the kinds of long-term trends in climatic conditions that have occurred in recent decades. However, changes in the timing of avian breeding and migration and a northward expansion of the geographic range in North American birds have already been documented (McCarty 2001; Peterson 2003; LaSorte and Thompson 2007).

In the western U.S., there is evidence (Ziska and others 2005) that increasing atmospheric CO_2 concentrations associated with climate change may have contributed to cheatgrass productivity and fuel load with subsequent effects on fire frequency and intensity, a factor in golden eagle habitat that is discussed further in Section 3.5.3, Golden Eagle Habitat Factors, page 42. In addition, elevated CO_2 concentrations may contribute to increased expansion of the exotic invasive hydrilla (*Hydrilla verticillata*) (U.S. EPA 2008) that, with an associated epiphytic cyanobacteria species, has been implicated as a link to avian vacuolar myelinopathy (AVM) (Wilde and others 2005). First reported in 1994, AVM has caused the death of at least 100 bald eagles (Thomas and others 1998).

3.5.2 Bald Eagle Habitat Factors

Habitat loss and encroachment from development has been a factor for bald eagles. For example, some of the states with high numbers of bald eagles have also experienced high rates of increased housing unit development from 2000 to

2004 (United States Census Bureau, 2007). Of the twenty states ranked highest in housing unit development, the following States with high concentrations of bald eagles: Florida, Georgia, North Carolina, Virginia, Michigan, Washington, Minnesota, Wisconsin, and South Carolina ranked, respectively, number 1, 4, 5, 7, 10, 14, 16, 17, and 19. In addition, 49 of the top 100 fastest growing counties from April of 2000 until July of 2006 (United States Census Bureau, 2007) have bald eagle breeding locations identified within them (Appendix G and Figure 5).

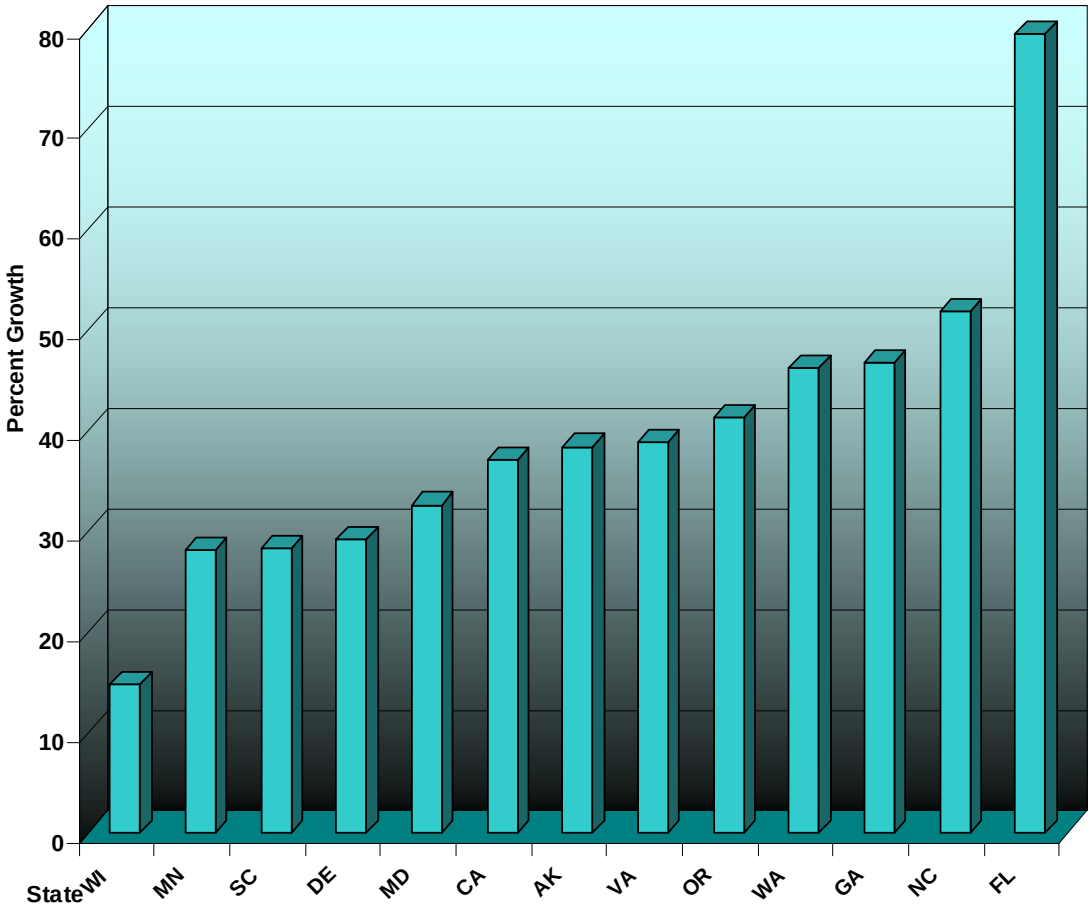

Figure 5 Expected human population growth in 10 fast-growing states with substantial bald eagle populations.

However, many of the fastest growing counties still have relatively low human population densities and low counts of bald eagles. Bald eagle numbers in those areas are still increasing, so, while there may be impacts to individuals in local areas, the Service doesn't believe there have been adverse impacts to overall bald eagle populations.

Increased oil and gas (conventional and coal bed methane) development, and the increase of inter and intra-state pipelines in the Intermountain West is occurring in areas with bald eagle nest and winter roost sites, particularly along riparian corridors. The National Bald Eagle Management Guidelines ((USFWS 2007a))(p. 9), make specific note that in open areas where there are little or no forested or topographical buffers, such as in many western states, the distance

alone must serve as the buffer, and that buffer distances may need to be larger than those in the Guidelines. In the commonly narrow riparian corridors in the Intermountain West, cottonwoods are predominantly used by bald eagles as nest and roost trees. Therefore, the decline of cottonwoods in the arid West (Miller etal. 1995; Lite and Stromberg 2005; Birken and Cooper 2006) has rendered the remaining cottonwoods more valuable as bald eagle habitat. The degree to which these activities result in impacts to habitat, either temporarily or permanently, can vary by reclamation potential in location of project, method of extraction, or success of reclamation, and quantification is beyond the scope of this environmental analysis.

3.5.3 Golden Eagle Habitat Factors

Habitat loss and encroachment from urbanization and conversion of habitat to agricultural uses has negatively impacted golden eagles (Kochert and others 2002). Golden eagle breeding territories were less successful in areas lacking a mosaic of native vegetation (Thompson and others 1982) since the habitat was unable to support abundant jackrabbit populations, their preferred prey. Good and others (2007b) noted that factors that could cause population declines such as habitat loss are increasing. In some areas, especially in southern California (Scott 1985) and the Colorado Front Range (Boeker 1974), urbanization and human-population growth have made areas historically used by eagles unsuitable for breeding. Widespread agricultural development in portions of the golden eagle range has contributed to reduction of jackrabbit populations and has been a factor in rendering areas less suitable for nesting and wintering eagles (Beecham and Kochert 1975; United States Dept. of the Interior 1979; Craig and others 1986).

Another factor affecting golden eagle habitat has been the increasing number, frequency, and intensity of fires. In the Intermountain West, fires have caused large-scale losses of shrubs and jackrabbit habitat in areas used by golden eagles. Greater than 98,000 acres of shrub lands were consumed by wildfires between 1981 and 1987 in the Snake River Birds of Prey National Conservation Area, and adversely affected nesting populations. Nesting success at burned territories in Snake River Canyon declined after major fires. Kochert et al (1999) documented that burned territories abandoned by the original nesting pair were taken over by neighboring pairs increasing the size of their territories. This resulted in a decreased number of nesting pairs in the initial area. Between 2001 and 2006, fire burned approximately 566,800 acres within the range of the golden eagle in the lower 48 States (USFWS 2007b).

The fires affecting golden eagle populations in the Snake River Birds of Prey National Conservation Area were associated with the presence of cheatgrass (*Bromus tectorum*) (Kochert and others 1999). There is evidence that the widespread abundance of cheatgrass, red brome (*Bromus rubens*), and other non-native annual grasses has led to the establishment of frequent annual grass/fire cycle in areas that had relatively low fire frequency prior to their invasion (Link and others 2006, Brooks and others 2004; Whisenant 1990). The

interval of natural fires in sagebrush shrub habitat has been shortened via invasions of annual non-native grasses (Crawford and others 2004.

Empirically derived declines in populations of prairie dogs, a prey species for golden eagles (Kochert and others 2002), have been suggested as a habitat-related factor affecting golden eagle populations. Most of the remaining prairie dogs in the southern grasslands are associated with playas (seasonally wet depressions or dry lake beds), which, although not plowed, are small and dispersed. While apparent declines in white-tailed and black-tailed prairie dogs may not result in listing of either species under the ESA, alterations in availability of prey species can affect golden eagles (Dr. C. Boal, personal communication, 24 August 2007).

Both the 90-Day Finding on a Petition To List the White-Tailed Prairie Dog as Threatened or Endangered (69 FR 64889, Nov. 9, 2004) and the Finding for the Resubmitted Petition To List the Black-Tailed Prairie Dog as Threatened (69 FR 51217, Aug. 18, 2004) cited research suggesting that annual fluctuations in the respective prairie dog populations may have dramatically increased over historical patterns. In the Moreno Valley, New Mexico, Cully (1991) documented a steady decline leading to an apparent disappearance of golden eagles during a period from 1985 to 1987 that correlated with the declines of Gunnison prairie dogs resulting from plague.

Numerous types of energy development occur in golden eagle nesting and wintering habitat. Surface coal mines have impacted nesting sites in Wyoming (Phillips and Beske 1982), and subsidence from underground coal mines impact nests associated with cliffs in Utah. Efforts to construct replacement, artificial nest locations have met with some success in Wyoming's coal mine region (Postovit and others 1982). However, the geomorphology in Utah's primary coal mine region has not been as conducive to the same techniques. There, nests are located on high, steep, cliff faces, and activities under a Part 22.25 permit to remove nests or temporarily exclude birds from nesting in a hazardous situation are often extremely hazardous to human safety.

Dramatically increased oil and gas (conventional and coal bed methane) development in Colorado, Montana, Utah, and Wyoming is occurring in areas centered within the golden eagle range in the lower 48 states. For example, drilling applications in Utah have increased by approximately 250% over the last five years compared to the previous five-year period (Utah BLM 2007). 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, and quantification is beyond the scope of this environmental analysis. 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.

In addition, the Western United States, perhaps because of its combination of wide expanses of inexpensive real estate and high winds has been the focus of

extensive wind energy development.[5] In 2007, installations of new wind turbine facilities increased the national generation capacity by 45%; three of the top five States in terms of capacity were in the Western United States. One of those States, Colorado, experienced an increase from approximately 316 Megawatts (MW) to 1066 MW, an over 200% increase (AWEA 2007). In the 17 states west of 100° west longitude, including Alaska, wind power capacity has increased from 1952 MW in 1999 to 12425 MW at the end of 2007, an increase of over 600% (Figure 6) (Department of Energy 2008).

[5] The Department of the Interior has chartered a committee, which will advise the Secretary on effective measures to avoid or minimize impacts to wildlife and their habitats related to land-based wind energy facilities.

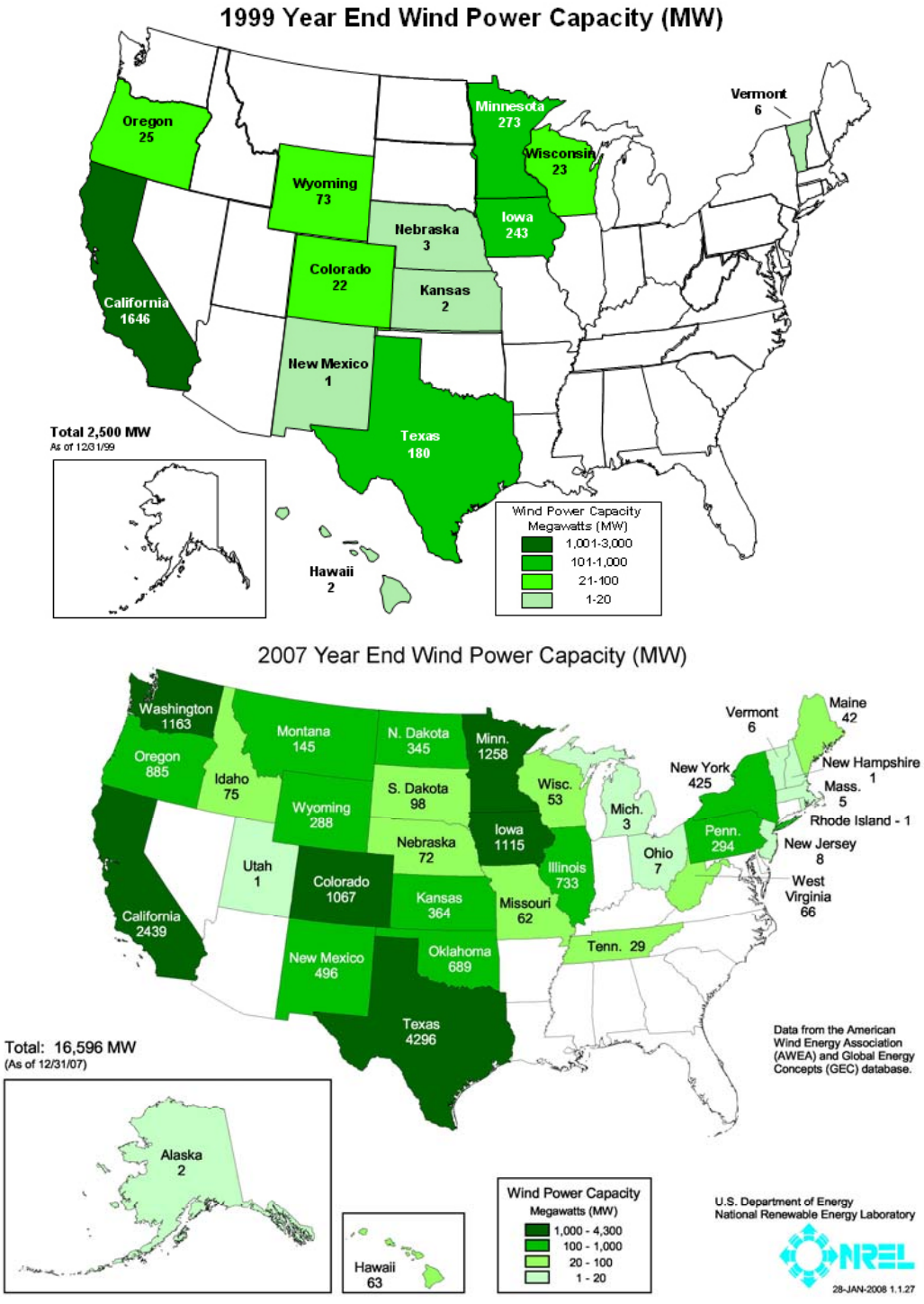

Figure 6 Installed wind power capacity from 1999 – 2007.

3.6 Eagle Mortality Associated with Human Activities

Raptors in general are killed by starvation, disease, predation, electrocution, shooting, trapping, poisoning, and vehicle/aircraft collisions (Newton 1979).

Estimates of mortality and causes of mortality vary with the methods of gathering data, and depend largely upon reporting to appropriate authorities. In this DEA, the Service is limiting the discussion of eagle mortality factors to those human-associated activities for which we expect eagle permits may be requested. Natural eagle mortality factors will not be discussed here, nor will mortality from such unauthorized human-associated factors as vehicle collisions and lead poisoning, for which no permit could reasonably be designed. Currently, under the Eagle Act, the Service relies on prosecutorial discretion and voluntary cooperation between the Service and other agencies and private entities to regulate take of eagles in the absence of an available permit for non-purposeful take.

3.6.1 Power Lines

Improperly constructed power lines, especially distribution lines, are one cause of direct mortality for both eagle species and can result in electrocution of birds attempting to utilize these structures for perching and nesting (Harness and Wilson 2001). Of 4,300 human-caused eagle mortalities investigated by the Department of the Interior from the early 1960s to 1995, electrocution was reported as the second greatest cause of mortality in golden eagles and the third greatest cause for bald eagles (LaRoe and others 1995). A separate review focused only on raptor mortality due to power lines asserted that electrocution is the fourth leading cause of human-caused death for bald eagles, following accidental trauma, poisoning, and shooting (Lehman 2001).

In 2000 and 2001, eagle mortality due to electrocution from, and collision with, small distribution power lines associated with oil and gas wells was documented within a small area in central Montana. Data were collected from 4,090 power poles in the preceding area. Of 273 raptor carcasses collected in 2000 and 2001, the cause of death of 23 raptors, 21 identified as golden eagles and one as a bald eagle, was attributed to mid-span collisions with power lines. Electrocution was the identified cause of death of 280 raptors, 219 of which were identified as golden eagles, four as bald eagles, and 11 were either golden or bald eagles (Schomburg 2003).

3.6.2 Wind Turbines

Commercial wind turbine facilities and their impacts to birds are a recently-identified phenomenon. The problem in the U.S. surfaced in the late 1980s and early 1990s at the Altamont Pass Wind Resource Area (APWRA), a facility then containing some 6,500 turbines on 189 km^2 (73 mi^2) just east of San Francisco Bay, California (Davis 1995). Orloff and Flannery (1992) estimated that several hundred raptors were killed each year at Altamont due to turbine collisions, guy wire strikes, and electrocutions. Smallwood and Thelander (2005) estimated 28-34 golden eagle deaths per year at APWRA between March 1998 and September 2001.

3.6.3 Lead Poisoning

Lead shot and bullet fragments in the carcasses and viscera of game and other animals can pose a hazard to raptors. Diurnal raptors are 1 of the main avian groups affected by lead toxicosis (Miller and others 2002), and lead poisoning accounts for an estimated 10-15% of the recorded post-fledging mortality in bald eagles and golden eagles in Canada and the United States (Scheuhammer and Norris 1996).

3.6.4 Collision with Aircraft

Another source of mortality that results in fewer reported losses of individual eagles, but poses a greater risk to humans, is collisions with aircraft, as reported to the Federal Aviation Administration (FAA) (Figure 7 and Appendix I). Because commercial airfields in particular are generally built on flat areas, often in or adjacent to natural wetlands, this habitat can provide shelter, nesting areas, and feeding areas for bald eagles that may not be present in surrounding metropolitan areas.

On the other hand, many of the United States Air Force's military training ranges, within which they are authorized to fly at low altitudes, are located in golden eagle habitat the western United States. The combination of factors may contribute to the greater number of golden eagle collisions for military aircraft (28 collisions for military aircraft versus 4 collisions for civilian aircraft).

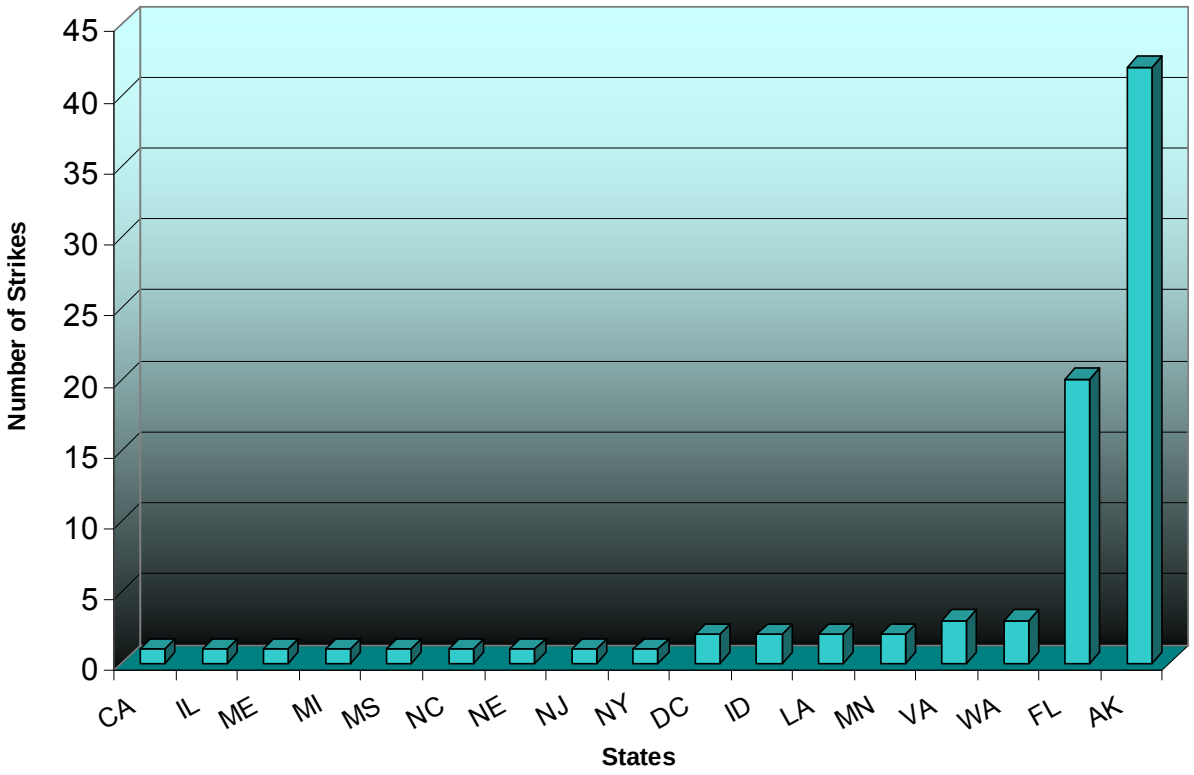

Figure 7 Bald eagle aircraft strikes reported by the FAA (January 1990-May 2007). (For 2 of the strikes, the State in which it occurred was not reported.)

There are a number of differences between commercial and military flying and associated airfields, including the proximity of fields to nesting habitat, location of activities relative to different species, and flight patterns (level and speed). Perhaps related to these differences, more commercial aircraft/eagle collisions seem to occur in the immediate vicinity of the airfield during take-off and landing operations. The greater number of golden-eagle-related collisions by military aircraft, however, may be related to training activities wherein pilots fly low in more open areas.

3.7 Currently-Authorized Take of Eagles

This section of the document discusses the current take authorizations for both species under the Eagle Act as well as existing take authorizations for the bald eagle under the Endangered Species Act (See Appendix C for detailed tables). Some permitted actions may authorize activities, for example, banding, that do not result in removal of an individual from the population or a loss of productivity and would not result in population effects. Others may result in loss of productivity for one year, and others may permanently remove eagles from the population.

3.7.1 Take Authorized under the Bald and Golden Eagle Protection Act

The Service already issues eagle permits under the Bald and Golden Eagle Protection Act through the implementation regulations at 50 CFR Part 22. Permits enable the public to engage in legitimate eagle-related activities that would otherwise be prohibited by law. Permits are issued for scientific, educational, and Indian religious purposes, depredation, and falconry (golden eagles).

§22.21 Scientific and Collecting and Eagle Exhibition

The Service may, under the provisions of this section, issue a permit authorizing the taking, possession, transportation within the United States, or transportation into or out of the United States 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 would not issue a permit under this section that authorizes the transportation into or out of the United States of any live bald or golden eagles, or any live eggs of these birds.

The Service has not authorized any take from the wild for eagle exhibition. Scientific collecting permits that authorize take from the wild for bald eagles have only been authorized in Alaska, where they are numerous and have not been listed under the ESA. In addition, some scientific research was authorized under ESA Recovery permits. Within the last 5 years, 20 bald eagle eggs have been held under this permit, and 23 bald eagles have been sampled and released (Appendix J).

Similar to bald eagles, scientific collecting and exhibition permits for golden eagles are primarily issued within Service Region 6, where the greatest portion of breeding golden eagles occurs in the lower 48 states. Within the last 5 years, 7 golden eagles have been trapped and released under this permit, and 3 have been relocated (Appendix J).

§22.22 Eagle Parts for Native American Religious Purpose/Certification of Enrollment in a Federally Recognized Tribe

The Service may, under the provisions of this section, only issue a permit to members of Indian entities recognized and eligible to receive services from the United States Bureau of Indian Affairs (25 U.S.C. 479a–1) who are engaged in religious activities and satisfy all the issuance criteria of this section. The permits discussed in this DEA are those for religious ceremony needs that require take of eagles from the wild, as opposed to permits under this same section for eagle carcasses, feathers, or parts acquired by another means such as gifting from one tribal member to another or obtaining from the National Eagle Repository. To date, the requests for take of eagles under this permit have been from tribal members wishing to take eagles from sites located on lands within Service Region 2 (Southwest Region) and approximately 23 birds per year have been taken over the last five years. All of the permits authorized have been limited to golden eagles.

§22.23 Take of Depredating Eagles

Under this provision, the Service may also 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 the particular locality. Such take can either be lethal (limited to certain methods) or non-lethal (such as hazing). Criteria which are evaluated include: (1) The direct or indirect effect which issuing such permit would be likely to 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. The Service has also used this permit to authorize safety-related hazing activities intended to reduce the risk of eagle-aircraft collisions at airfields.

§22.24 Eagle Falconry

Under the provisions of this section, the Service may authorize the possession and transportation of golden eagles for falconry purposes. Only golden eagles from a specified depredation area may be trapped for falconry purposes.

§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 any person to take 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. The DEA includes more extensive information on this permit because under the current proposal the Service would apply comparable standards to permits for actions that would result in permanent loss or abandonment of a nest or territory, and for programmatic disturbance permits.

The Service requires applicants to provide the additional information including, but not limited to the following:

- For each golden eagle nest proposed to be taken, the applicant must calculate the area nesting population of golden eagles and identify on an appropriately scaled map or plat the exact location of each golden eagle nest used to calculate the area nesting population unless the Service has sufficient data to independently calculate the area nesting population. The map or plat must contain enough details so that each golden eagle nest used to calculate the area nesting population can be readily located by the Service.
- A description of each activity to be performed during the resource development or recovery operation which involves the taking of a golden eagle nest.
- A statement with any supporting documents from ornithologists experienced with golden eagles or other qualified persons who have made on site inspections and can verify the applicant's calculation of the area nesting population.
- A statement indicating any proposed mitigation measures that are compatible with the resource development or recovery operation to encourage golden eagles to reoccupy the resource development or recovery site. Mitigation measures may include reclaiming disturbed land to enhance golden eagle nesting and foraging habitat, relocating in suitable habitat any inactive golden eagle nest taken, or establishing one or more nest sites. If the establishment of one or more nest sites is proposed, a description of the materials and methods to be used and the exact location of each artificial nest site must be included.

Additional issuance criteria that the permitting office must consider when determining whether to issue this permit include the following:

- Whether the applicant can reasonably conduct the resource development or recovery operation in a manner that avoids taking any golden eagle nest.
- The total number of golden eagle nests proposed to be taken.
- The size of the area nesting population of golden eagles.

- Whether suitable golden eagle nesting and foraging habitat unaffected by the resource development or recovery operation is available to the area nesting population of golden eagles to accommodate any golden eagles displaced by the resource development or recovery operation.
- Whether feasible mitigation measures compatible with the resource development or recovery operation are available to encourage golden eagles to reoccupy the resource development or recovery site. Mitigation measures may include reclaiming disturbed land to enhance golden eagle nesting and foraging habitat, relocating in suitable habitat any golden eagle nest taken, or establishing one or more nest sites.
- Whether the area nesting population is widely dispersed or locally concentrated.

3.7.2 Take Authorized Under the Endangered Species Act

Any take currently authorized under the ESA would be considered part of the reference conditions for this document, under the No Action Alternative, and the Service would not subject ESA-authorized take in any threshold calculations for the Eagle Act permits being considered in this DEA. Populations of the bald eagle have recovered sufficiently to be removed from the ESA list, while supporting take during recovery. Therefore, it is logical to assume populations can both continue to sustain some take and continue to improve. Tables 2 and 3 summarize the reported take authorized under the preceding permits for an approximately 5 year period.

3.8 Societal Issues

Religious and Cultural

Bald eagles and golden eagles are 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 through the species' range. Some American Indian religious ceremonies call for the harvest of eagles from the wild. As discussed in Section 3.6 (Currently Authorized Take), permits are available for this purpose in certain circumstances. In addition, it is often the case that American Indian Tribes and individual tribal members have an interest in a particular eagle nest locality because of its aboriginal cultural, spiritual, religious, or traditional values, but the locality is outside currently-recognized Indian lands. American Indian interests are unique and unlike any other interests based on the status of Tribes as governmental sovereigns and the distinctive relationship between the United States and each Tribe.

Safety

The greatest human-caused risks to eagle safety appear to be electrocution by electrical distribution lines and collisions with various anthropogenic structures. While they pose some risk to individual eagles, aircraft collisions with eagles can represent a high human safety risk at airfields. Military aircraft engaging in training activities represent a collision risk to humans and golden

eagles. Human safety can also be affected by proximity of failing nest trees or platforms to human residences or other facilities. In addition, while not a case of direct risk from an eagle or nest, the ability to conduct such actions as repair of natural gas pipelines in a timely fashion, regardless of season, can be critical to ensuring the ultimate safety of large numbers of humans. The degree to which safety of eagles or humans would be affected would depend in part on the permits available and the application of the permit process.

Socioeconomic

The potentially-affected socioeconomic environment includes the economy, cultural values and norms, recreation, and aesthetic and symbolic values. The degree to which businesses and industry in the vicinity of bald eagle and golden eagle habitat would be affected is difficult to quantify. Industries most likely to be affected may include residential developers, energy transmission companies, timber managers, resource development and recovery operations, utilities, transportation, shipping companies, commercial fishing operations, and businesses that depend on tourism and recreation. The economic value of private land where eagles occur may also be affected.

Numerous facets of the American lifestyle could be affected beyond straightforward economics. Among the many societal “norms” that could be affected are: transportation, urban planning, energy development and consumption, recreation, location of schools and hospitals, and waste management. The magnitude of the lifestyle impacts resulting from the proposed permits depends in part on the rate at which the new permits are approved. If project proponents do not include eagle avoidance and minimization measures into early project planning, they would increase the likelihood their actions would be delayed by the need to revise plans.

Table 1. Estimated Average Annual Actions or Take Reported for the Golden Eagle (2002-2007)

Service Region	Number of Golden Eagle Technical Assistance Requests	22.21 (Scientific and Exhibition) Permits Granted	22.22 (Religious Take) Permits Granted	22.23 (Depredation) Permits Granted	Taken for Falconry Under 22.23	22.25 (Nest Take for Resource Recovery) Permits Granted
1	1	0	0	5	0	1[c]
2	12	1	23	0	0	3[d]
3	0	0	0	0	0	0
4	1	0	0	0	0	0
5	0	0	0	0	0	0
6	338	2	0	8	10	3
7	0	0	0	0	0	0
8	13	0	0	0	0	0
Annual Average		3	23	13	10	na

[a] Since 2003, all 22.22 permits have been issued by Region 9, but take has occurred in Region 2.
[b] Only one nest reported destroyed, all others blocked or relocated.
[c] One nest authorized over five years.
[d] Where the permit did not specify a limit, reported take is provided.

Table 2. Estimated Average Annual Take Reported for the Bald Eagle (2002-2007)

Service Region	Endangered Species Act Authorizations (Reference for this DEA)					Eagle Act Authorizations	
	Actions Where Take Authorized[a]	Total Individuals Authorized	Estimated Average Individuals Authorized Each Year	Total Nests or Roosts Authorized	Total Territories Authorized	22.21 Permits (Scientific and Exhibition) Authorized[b]	22.23 Permit (Depredation/ Hazing) Authorized
1	49	53[b]	18	15	33	0	7
2	10	36	7	0	0	0	0
3[c]	6	4	1	0	0	0	10
4[c]	34	0	0	0	0	0	0
5	0	0	118	2	0	0	0
6	n/a[d]	112	22	6	6[f]	20[e]	14
7[e]	0	0	0	0	0	23	12
8	24	85[g]	17	1	0	0	0
Estimated Average Annual National Total				148			

[a] Under Biological Opinions and Habitat Conservation Plans.
[b] Permits authorized included take of eggs, trap and release of birds, and killing of birds.
[b] Information from Oregon did not differentiate among birds, nests, or territories, but total authorized take is estimated at an additional 40 birds, nests, or territories combined from 2001 through 2007.
[c] Notwithstanding their large populations of bald eagles, Service Regions 3 and 4 were by and large able to emphasize early coordination in order to avoid take.
[d] Information from Region 6 regarding the total number of actions authorizing take could not be extrapolated for comparison.
[e.] Although the Service Region issuing the permit was Region 6, the take occurred in Alaska
[e] The bald eagle was not ESA listed in Alaska. Only Technical Assistance was provided, but estimated at 400 actions per year.
[f] Six adults, 12 juveniles authorized
[g] One programmatic Biological Opinion out of Ventura authorized one bald eagle per year over the life of the project, 25 years to date. That same opinion anticipated that any bald eagles on the installation could be taken by harassment over the life of the project by military maneuvers.

3.9 Summary

Although both are protected under the Eagle Act, bald eagles and golden eagles are two distinct species that are not necessarily subject to the same habitat requirements or pressures. Information available for the bald eagle, outside of the Sonoran Desert population, points to an expanding population. On the other hand, while the information available for the golden eagle is uncertain, it appears populations may be declining in portions of the range. In addition, the Service does not have comparable resources for management of each species. A comparative summary of the resources and pressures for golden eagle versus the bald eagle populations is presented in Table 3.

Table 3. Golden Eagle (GOEA) v. Bald Eagle, comparison of parameters.

Parameter	Bald Eagle	Golden Eagle	Source of GOEA data
North American Population Size	300,000	80,000	PIF
Population Trend	Increasing in most areas	Stable or Decreasing	Expert opinion and local data
Threat Trend	Mostly Decreasing	Increasing	Energy development
Falconry Demand	Low	High	Service Permits Database
Religious Demand	Low	High	Service Permits Database
Mineral resource Nest Take Under BGEPA	No`	Low	Service Permits Database
Depredation and Persecution Issues	No	Yes	Regional data
Dedicated monitoring	Yes	Limited	WEST data

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

4.1 Introduction

In this chapter the DEA applies the elements described in Chapter 2 to the reference or existing conditions to produce projected environmental consequences of the alternatives. In each discussion the potential environmental consequences first, followed by the projected results for each resource and for each alternative. As with development of the alternatives, we have integrated issues and concerns raised in comment letters on the proposed regulation and internal agency scoping into the analysis.

4.1.2 Analysis of Direct and Indirect Impacts

In determining the significance of direct and indirect impacts of the alternatives, the Service evaluated whether the alternative or components therein: 1) would be compatible with the preservation of eagles (maintaining increasing or stable bald eagle and golden eagle populations) on a national or regional scale; 2) would substantially burden a Tribe's free exercise of its religion; 3) may increase the probability of circumstances placing human or eagle safety or health at risk; or 4) would result in impacts deleterious to a broad regional area or sector of the national economy.

Portions of the alternatives may be additive to preceding alternatives. Our analysis of direct and indirect impacts emphasizes those subsequent components that are new or altered. The Service assumes that some components that are the same between alternatives would have similar impacts, and would identify them without redundant analysis. The DEA will analyze potential cumulative impacts in a separate section.

4.2 Management Common to All Alternatives

This portion of the proposal does not contain any management prescriptions, but does provide definitions intended to make implementation of the proposal more consistent and more readily understood. Because permits issued for take of eagles under the Eagle Act may not have been evaluated cumulatively relative to population, and because there are uncertainties regarding population levels and demographics for golden eagles that we discuss in this DEA, there may be localized negative impacts to golden eagles from this management scenario. However, there would be no significant direct impacts on a national scale from any provisions in this portion of the proposal without subsequent authorization of take.

4.3 Alternative 1– No Action: Permit Existing and Future Take Authorized Under the ESA

The potential impacts from creating a permit for previously-authorized take and future take authorized under the ESA are not easy to measure. However,

the Service expects the number of past and future take authorizations under HCPs to be minimal. In addition, measures that would be provided for under the ESA may include extensive habitat measures designed to avoid or minimize the ongoing, future risk of disturbance to eagles.

4.3.1 Bald Eagle

The potential impacts to bald eagles from this alternative are difficult to quantify. However, because the conservation measures required under ESA are adequate to ensure compatibility with the preservation of the eagle, and since the take authorized to date under ESA had no significant impact on the population, the Service expects conditions to remain the same. The extension of ESA take authorization to take under the Eagle Act provides members of the public with continuing authorization to proceed under the conditions of a pre-existing authorization. However, without provisions to effectively permit additional legal take except as associated with a future HCP, there may be greater risk of unauthorized take. In addition, without provisions for take for safety reasons, this alternative may impact a few individual bald eagles or have minor impacts to local area populations.

4.3.2 Golden Eagle

There would be some changes relative to golden eagle management under this alternative by extending Eagle Act take authorization to HCPs that include golden eagles covered as a nonlisted species. Provisions to effectively permit legal take under HCPs comparable to those for bald eagles may reduce the risk of unauthorized take. However, without provisions for take of nests for safety reasons, this alternative may impact a few individual golden eagles or have minor impacts to local area populations. In addition, because permits issued for take of eagles under the Eagle Act may not have been evaluated cumulatively relative to population, and because there are uncertainties regarding population levels and demographics for golden eagles, may be localized negative impacts to golden eagles from the “No Action” alternative.

4.3.3 Biological and Physical Environment

There would be few direct impacts to eagle habitat from this alternative, but there may be beneficial impacts from HCP measures intended to improve habitat conditions. The Service expects few adverse indirect impacts, primarily in cases where unauthorized take occurs, where habitat requirements are poorly applied, or where HCPs with both species emphasize requirements for one at the expense of the other.

4.3.4 Eagle Mortality Associated with Human Activities

This alternative is expected to have few direct impacts on the current level of eagle mortality associated with human activities. Indirectly, the lack of incentives to reduce mortality through a permit process would tend to maintain current rates of mortality.

4.3.5 Currently-Authorized Take

Under the "No Action" alternative, there would be no changes, and no impacts, to any of the currently-authorized take. Because eagle populations have sustained existing levels of take, the Service expects conditions to remain the same (see discussions of the existing permits in Chapter 3, Affected Environment, Section 3.7, pages 45-47 for comparison to reference conditions).

4.3.6 Societal

Religious and Cultural

Because there would be no change from the current state of management, the Service anticipates no change in direct or indirect impact to Religious and Cultural resources.

Safety

Alternative 1 would have no specific provisions for take of nests in the case of hazard or health risk to eagles or humans. It would not make provisions for a comprehensive approach to managing eagles at airfields, which would result in unnecessary delays that pose safety risks to humans and eagles. Nor would it provide for the removal or relocation of nests away from hazardous sites. Therefore, this alternative would pose significant risks to human and eagle safety at such locations.

Socioeconomic

Project proponents with existing ESA take authorizations, who would receive permits for their actions under the Eagle Act, and future developers of HCPs that include bald eagles or golden eagles as covered, non-listed species would likely be able to proceed without confusion and economic uncertainty. With a permit that clearly sets out conditions for operating within the law, those project proponents and lenders would be able to take actions that might be viewed as disturbing to eagles. While there may be small delays as the permit process is learned, there would likely be no cancellation of residential and commercial development projects, timber operations, natural resource extraction, and other activities that occur in habitat used by eagles, for take previously authorized. However, the lack of additional types of take permits for future activities, except as associated with a future HCP, would mean that projects must be re-located, re-scheduled, or dropped. The socioeconomic impacts from not providing for future take of bald eagles would result in impacts deleterious to a broad regional area or sectors of the national economy. Conversely, for golden eagles, the Service has relied on prosecutorial discretion and voluntary measures to this point to regulate and limit take, which has resulted in unauthorized take that is not prosecuted. Under the "No Action" alternative, the current status would continue. Many activities that incidentally take golden eagles would not be stopped, altered, or rescheduled because there would be no available permit

system for non-purposeful take. Therefore, the socioeconomic impacts from not providing for future take of golden eagles would be minimal.

4.3.7 Summary

Neither species would receive the protection offered by a permit that would allow take of a nest to protect the eagles from a hazard. Nor would there be measures to reduce ongoing TRM. Therefore, this alternative is not compatible with the preservation of the eagle and would not fulfill the purpose and need for the proposal.

4.4 Management Common to Both Action Alternatives

This section discusses the impacts from the proposal to revise some regulations by establishing permit thresholds and to establish a management framework. The Service anticipates requests for take authorizations for numerous types of activities including the following: housing and commercial development; development proposed by governments at all levels (local, State, tribal and federal); energy exploration and development; transportation and energy corridors; timber harvest; and recreation (see Appendix K for Regional perspective). The Service also anticipates increases in take requests for the following reasons:

- A single section 7 exemption sometimes provided authorization to a large number of grantees or permittees; individual authorizations would be required under the Eagle Act.
- Bald eagle and human populations are increasing in most areas.
- The Eagle Act applies to Alaskan eagles, where ESA permits were not applicable, since Alaskan bald eagles were never listed under the ESA.
- Permits would be available for golden eagle take (previously only a few HCPs have covered golden eagles).
- Knowledge regarding the proposed permit would raise awareness that past practices might have resulted in take of golden eagles about which project proponents or agencies were unaware, and for which they would now seek permits.

4.4.1 Bald Eagle and Golden Eagle

The potential impacts to bald eagles and golden eagles of creating a permit for authorized take are difficult to quantify. However, since bald eagle populations flourished despite the take authorized under the ESA, and because the Service is setting permit thresholds for both species based upon half the take the populations are able to support (as predicted by models), we expect no significant adverse impacts on bald eagles or golden eagles. In addition, because the Service intends to regularly reassess the take relative to populations, the Service would be able to modify thresholds before take approaches levels that are not “compatible with the preservation of eagles.” Without a provision allowing the take of nests to protect human or eagle safety, Management Common to Both Action Alternatives would result in some adverse

effects to individual eagles. In addition, without provisions for managing programmatic disturbance, there would be some instances of piecemeal, iterative loss of important eagle-use areas. The proposed management, without additional measures, may result in localized, temporary loss in productivity that may be significant to a local population, but this is not expected to be significant to regional or national populations.

The Service does not expect bald eagle or golden eagle population declines at the national level as the result of the authorizations granted under Management Common to Both Action Alternatives. However, it is also possible that external factors could arise that negatively affect eagle populations. In addition, take occurring at winter roost sites or important foraging areas may have the potential to take greater numbers of birds than we anticipate. Whatever the cause, if data suggest population declines are approaching a level where additional take would be incompatible with the preservation of the eagle (as interpreted above), the Service would refrain from issuing permits until we can re-evaluate the premises upon which our estimation of take is based, and until such time that the take would be compatible with the preservation of the bald eagle and golden eagle.

4.4.2 Biological and Physical Environment

There would be no direct impacts to the biological and physical environment from the creation of a permit for authorized take of eagles. If we create this permit, issuance of take authorization would indirectly result in impacts to eagle habitat from loss, fragmentation, and reduced habitat suitability. On the other hand, especially for golden eagles, creation of this permit system may reduce impacts in many situations. Ongoing or new activities that were implemented in the past without compliance with the Eagle Act because no permit was available for non-purposeful take (e.g., wind power farms and oil or gas well pads) would be more likely to obtain a permit and apply the required mitigation and avoidance techniques. Because our permit thresholds are based upon Service Region and BCR population segments, the Service believes the impacts to habitat would be widely dispersed and would not be incompatible with the protection of the biological and physical environment.

4.4.3 Eagle mortality associated with human activities

The Management Common to Both Action Alternatives is expected to have few direct impacts on the current level of eagle mortality associated with human activities. Indirectly, without incentives to reduce mortality through a programmatic permit process for ongoing TRM, current rates of mortality would tend to remain the same.

4.4.4 Currently-Authorized Take

4.4.4 .1 Take Authorized Under the Bald and Golden Eagle Protection Act

Permits are issued for scientific, educational, and Indian religious purposes, depredation, and falconry (golden eagles) (Tables 4 and 5). The provisions under Management Common to Both Action Alternatives would not eliminate any of the existing permits. However, in some instances, existing permits may authorize activities that would take eagles under the Eagle Act. If so, then those permits would be subject to the cumulative thresholds for the permits under this proposal.

Because permit thresholds involving take would be based upon levels that the populations can support, all existing permits would be compatible with the preservation of eagles under both action alternatives. Therefore, the impacts analyses on "Currently-Authorized Take" would largely consider the current amount of take occurring and the potential impact of the proposal to existing permits.

§22.21 Scientific Collecting and Eagle Exhibition

As noted previously (Section 3.7.1, p. 45), the Service has not authorized any take from the wild for eagle exhibition. Scientific collecting permits that authorize take from the wild for bald eagles have only been authorized in Alaska, where they are numerous and have not been listed under the ESA. Within the last 5 years, twenty bald eagle eggs have been held under this permit, and 23 bald eagles have been sampled and released (Table 4). Within the last 5 years, 7 golden eagles have been trapped and released under this permit, and 3 have been relocated (Table 5).

Because of the limited use of this type of permit, while it may temporarily impact individual eagles, it generally does not affect productivity. On the rare occasion when the Service determines the permitted activity would "disturb" eagles, the permit would be subject to the annual permit thresholds. These permits would still be available. In some instances, permits for scientific collecting and eagle exhibition may not be available. For example, in those areas in Service Region 2 where the bald eagle is not listed and requests for permits exceed the number compatible with the preservation of eagles (see Tables 4 and 5).

§22.22 Eagle Parts for Native American Religious Purposes/Certification of Enrollment in a Federally Recognized Tribe

The currently-authorized average annual take of golden eagles under this permit has been confined to Service Region 2, the Southwest Region, and birds taken have averaged approximately 23 per year over the last five years, although the permits have authorized take of up to 40 birds. In addition, the permits authorized have been limited to golden eagles (Table 5). With the proposed implementation of take thresholds compatible with the preservation of eagles, the total annual golden eagle take in BCR 16, the BCR in which the take would

occur, would currently be 27 (Table 5). Therefore, the implementation of permit thresholds under Management Common to Both Action Alternatives may result in a moderate reduction of take authorized in BCR 16 for this purpose in some years. However, permits would still be available. Therefore the Service does not believe conditions under Management Common to Both Action Alternatives would substantially burden a Tribe's free exercise of its religion.

§22.23 Take of Depredating Eagles

Over a five-year period, the national average annual total for this permit type was 23 for bald eagles (Table 4) and 13 for golden eagles (Table 5). Because of the limited use of this type of permit, while it may temporarily impact individual eagles, it does not result in population-level impacts. Under Management Common to All Alternatives, this permit would be subject to the proposed thresholds. In some rare instances, where requests for permits may exceed the number compatible with the preservation of eagles, permits for depredating eagles may not be available.

§22.24 Eagle Falconry

Only golden eagles from a specified depredation area may be trapped for falconry purposes. There is currently only one such specified depredation area, in Service Region 6, where the Service has permitted falconry take of four eagles annually over a five-year period (Table 5). Because of the limited use of this type of permit, while it may temporarily impact individual eagles, it does not result in population-level impacts. Under Management Common to All Alternatives, this permit would be subject to the proposed thresholds. In some instances, where requests for permits may exceed the number compatible with the preservation of eagles, permits for eagle falconry may not be available.

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

This permit for take of inactive golden eagle nests is rarely issued during a resource development or recovery operation (Table 5). In addition, it must be determined that the taking is compatible with the preservation of the area's nesting population of golden eagles. However, there may be instances when take of an inactive nest may lead to the abandonment of a territory. In such cases, under Management Common to All Alternatives, this would be subject to the proposed thresholds. The Service expects that, with increasing development of energy-related projects, occasionally there may be instances where requests for permits may exceed the number compatible with the preservation of eagles; therefore permits for take of golden eagle nests for resource development and recovery may not be available.

4.4.4.2 Take Authorized Under the Endangered Species Act

There would be no changes to take authorized under the Endangered Species Act from any of the action alternatives; therefore, the Service would eliminate it from further detailed analysis.

4.4.5 Societal

Religious and Cultural

The degree to which religious and cultural resources may be affected under Management Common to Both Action Alternatives would depend to some degree on the number of permits available under the proposed rule.

Under this alternative, the creation of this new permit does not affect the continuation of existing permits for Native American Religious Use. However, by establishing thresholds for permits that populations can sustain, it may result in the occasional unavailability of permits, especially towards the end of the year, and in areas where there are numerous requests for the new take permit. However, the Service would mitigate that impact by implementing a structured-allocation process in each Service Region if there is evidence that demand for take would exceed take thresholds for either species of eagle, to ensure that take of birds necessary to meet the religious need of a Native American Tribe would not be denied due to other take being authorized for another purpose.

Safety

The provisions under "Management Common to Both Action Alternatives" would have no specific provisions for take of nests in the case of hazard or health risk to eagles or humans. It would not make provisions for a programmatic approach to managing eagles at airfields, which would result in risks to humans and eagles. Nor would it provide for the removal or relocation of nests away from hazardous sites. Therefore, without additional, measures, this management scenario may pose significant risks to human and eagle safety.

Socioeconomic

Energy production and distribution, manufacturing, transportation, real estate development, recreation, and other human activities can continue with more predictability because a permit would be available to disturb eagles, and the conditions for the permit would be set out in a binding rule that provides a discernible threshold that the public can comply with. However, because the Service would limit take, especially for golden eagles, in some areas of the country, the uncertainties regarding permit availability and permit limits may lead to postponement or delays in planning for some projects.

In all Service Regions, except Arizona and New Mexico, we would substantially increase the proposed permit allocations for bald eagles over the combined average annual totals for past ESA authorizations and Eagle Act permit authorizations (Table 4). And, with the exception of Native American Religious take from Service Region 2, the proposed permit allocations available for golden eagles would be adequate for moderate development (Table 5). The Service would anticipate minimal impacts to socioeconomic resources from the proposed thresholds.

4.4.6 Summary

The Management Common to Both Action Alternatives meets most of the purposes of the action. It is consistent with the text of the Eagle Act, feasible to implement, predictable for compliance purposes, and enforceable. In addition, while there would be some localized, socioeconomic impacts, there are provisions to ensure this alternative would not result in impacts deleterious to a broad regional area or sector of the national economy. However, neither species would receive the protection offered by a permit that would allow take of a nest to protect the eagles from a hazard. Nor would there be measures to reduce ongoing TRM. Therefore, without additional measures, this management scenario is not compatible with the preservation of the eagle and would not, in itself, fulfill the purpose and need for the proposal.

Table 4. Previously Authorized and Estimated Annual Take and Annual Technical Assistance provided for Bald Eagles, and Proposed Annual Maximum Cumulative Take Allowable[a].

Region	Technical Assistance Actions[b] (2006-2007)	Past ESA-authorized Take/Reference (2002-2007)		Reported Bald Eagle Actions Under the Eagle Act (January 2002-July 2007)		Proposed Service Regional[c] Maximum Cumulative Take Allowable / Predicted Population[d]
		Estimated Average Annual Individuals Authorized	Total Nests or Roosts Authorized	22.21 Permit (Scientific & Exhibition) Avg. Annual Authorized	22.23 Permit (Depredation/Hazing) Avg. Annual Authorized	
R1	30	18	15	0	7	295 / 10,077
R2	126	7	0	0	0	17 / 704
R3	147	1[e]	0[e]	0	10	805 / 27,524
R4	85	0[e]	0[e]	0	0	387 / 13,141
R5	174	118	2	0	0	410 / 12,521
R6	52	22	6	20	14	158 / 5,397
R7	400	0	0	23	13	1,665 / 86,550
R8	4	17	1	0	0	26 / 890
Total	1018	148	24	43	36	3,763 / 156,804

[a] Although the majority of permits issued will authorize disturbance, the maximum cumulative take allowable includes all types of take under the new permit and other existing permits. This includes take of individual eagles; disturbance at nests, communal roosts, and important foraging areas; and nest removal. The Sonoran Desert eagles would be managed under the ESA.
[b] Technical assistance reported for Region 7 is under the Eagle Act because the bald eagle was not listed in Alaska.
[c] Regional presentation for comparison purposes only. Eagles will be managed by BCRs, but permits authorized by Region. See Table C.3. in Appendix C for detailed allocation by BCR.
[d] The predicted population estimates are based on the modeling effort explained in the text, Section 2.4.3.
[e] Notwithstanding the large populations of bald eagles in Service Regions 3 and 4, differences in the take authorized relative to other Service Regions can be partly explained by potential permittees being able to comply with the eagle guidelines so that take was avoided.

Table 5. Reported Golden Eagle Actions under the Eagle Act (January 2002-July 2007) and Proposed Annual Maximum Cumulative Take Allowable[a].

Region	Estimated Annual Technical Assistance Requests for Golden Eagle	22.21 Permit (Scientific & Exhibition) Avg. Annual Reported	22.22 Permit (Religious Take[b]) Avg. Annual Reported	22.23 Permit (Depredation/Hazing) Avg. Annual Reported	22.23 Avg. Annual Reported Transfer for Falconry	22.25 Total Permit (Nest Take for Resource Recovery) Authorized[c]	Proposed Service Regional[d] Maximum Cumulative Take Allowable / Predicted Population
R1	1	0	0	5	0	1 (in 5 years)	15 / 2552
R2	12	1	23	0	0	3/year[e]	14 / 2,445
R3	0	0	0	0	0	0	0
R4	1	0	0	0	0	0	0
R5	0	0	0	0	0	0	0
R6	338	2	0	8	10	3/year	157 / 17,448
R7	0	0	0	12	0	0	18 / 2,050
R8	13	0	0	0	0	0	44 / 7,748
		Average Annual Totals					
Estimated National Totals	365	3	23	25	10	16	292 / 32, 243

[a] Although the majority of permits issued will authorize disturbance, the maximum cumulative take allowable includes all types of take under the new permit and other existing permits. This includes take of individual eagles; disturbance at nests, communal roosts, and important foraging areas; and nest removal.
[b] Since 2003, all 22.22 Permits have been authorized by Service Region 9, but take has occurred in Service Region 2.
[c] Only 1 nest reported destroyed, all others either relocated or access blocked.
[d] Regional presentation for comparison purposes only. Eagles will be managed by BCRs, but permits authorized by Region. For example, the take for BCR 16, from which the Hopi permit is allocated, would be 27 individuals (see Table C.4, in Appendix C for detailed allocation by BCR).
[e] Where permit has no limit specified, reported take used in estimation.

4.5 Alternative 2– Eagle Take Permits, Structured Allocation Authorized, Nest Take for the Public Welfare, and Programmatic Disturbance

In Alternative 2, the Service described issuance criteria providing for: disturbance take of eagles, nest take to protect the public welfare and human and eagle safety, and a proposed programmatic disturbance authorization. In Chapter 4, the DEA specifically analyzes those provisions in Alternative 2 that are additive to Management Common to Both Action Alternatives.

4.5.1 Bald Eagle and Golden Eagle

The potential impacts to both species of eagles from Alternative 2 would be similar to those under the Management Common to Both Action Alternatives. However, the provision in Alternative 2 allowing the take of nests to protect human or eagle safety would result in some benefits to individual eagles. In addition, the provisions for programmatic disturbance would reduce the risk of a piecemeal, iterative loss of important eagle-use areas. Furthermore, setting thresholds and establishing an allocation process based upon modeling and population information, and regular review of golden eagle populations would indirectly improve conditions for the species. These procedures would allow the Service to respond more quickly to declines and develop conservation measures, including the ability to adjust permit levels.

Because the Service would review take thresholds on a regular basis (at least once every five years) relative to bald eagle and golden eagle population and demographic parameters, the Service would be able to modify or adjust permitting accordingly. In addition, the Service used conservative assumptions (estimating take by survival rather than productivity) and application (setting a limit based upon ½ MSY) of the model used to estimate take thresholds to account for inherent uncertainties and limitations of surveys and monitoring efforts.

The Service does not expect population declines to result from the authorizations granted under Alternative 2. However, it is also possible external factors could arise that negatively affect eagle populations. Whatever the cause, if data suggest population declines are approaching a level where additional take would be incompatible with the preservation of the eagle (as interpreted above), the Service would refrain from issuing permits until such time that the take would be compatible with the preservation of the bald eagle and golden eagle.

4.5.2 Biological and Physical Environment

There would be some short-term, direct impacts to the biological and physical environment from this alternative through the provisions for the programmatic disturbance permit. However, the permits would incorporate measures for long-term mitigation or standard practices designed to avoid or minimize the ongoing and future risk of disturbance to eagles. If the Service creates this permit, issuance of take authorization may indirectly result in impacts to habitat from loss, fragmentation, and reduction of suitability for eagles. On the other hand,

development may continue without a permit system, as it has to this point, without mitigation measures and standard practices in place and only the voluntary management guidelines and Service enforcement discretion available to limit or discourage take. Therefore, a permit program requiring mitigation measures and standard practices may also result in benefits to the biological and physical environment. Because we would base our permit thresholds upon Service Region and BCR population segments, the Service believes the impacts to habitat would be widely dispersed and would not be significant at the scale of permitting.

4.5.3 Eagle Mortality Associated with Human Activities

This alternative is expected to have few direct impacts on the current level of eagle mortality associated with human activities, except for the benefits from the few permits authorized for take of nests that pose a hazard to eagles. Indirectly, without incentives to reduce mortality through a programmatic permit process to reduce ongoing TRM, current rates of mortality would tend to remain the same.

4.5.4 Currently-Authorized Take of Eagles

4.5.4.1 Take Authorized Under the Bald and Golden Eagle Protection Act

§22.21 Scientific Collecting and Eagle Exhibition, §22.23 Take of Depredating Eagles, and §22.25 Take of Golden Eagle Nests for Resource Development and Recovery

The impacts to these permits under Alternative 2 are similar to those under Management Common to All Alternatives. On the occasion when the Service determines the permitted activity would take eagles with an effect on the population, the permit would be subject to the annual permit thresholds.

§22.22 Eagle Parts for Native American Religious Purposes/Certification of Enrollment in a Federally Recognized Tribe

The impacts to these permits under Alternative 2 are expected to be less than those under Management Common to All Alternatives. Because permits for Native American Religious Purposes would receive the highest allocation priority, there would be fewer cases where a request for a permit could not be met.

4.5.5 Societal.

Religious and Cultural

The degree to which religious and cultural resources may be affected would depend largely on the availability of permits under the proposed rule. However, implementation of the rule could indirectly affect religious and cultural resources if holders of take permits do not consider the aforementioned resources.

Safety

The provisions under Alternative 2 would have specific provisions for take of nests in the case of hazard or health risk to eagles or humans. We expect that the provisions for a programmatic approach to managing eagles at airfields would reduce permit delays, thus lowering risks to humans and eagles. The provisions for the removal or relocation of nests away from hazardous sites would also be beneficial for humans and eagles. The benefits from this alternative would be localized and for individual eagles. In addition, the Service estimates the numbers of permits authorized under this proposal would be concentrated in areas with larger eagle populations and would not exceed approximately 30 for bald eagles and one for golden eagles nationally. Therefore, we do not expect that these programmatic permits would have significant population impacts at the regional or national scale.

Socioeconomic

Energy production and distribution, manufacturing, transportation, real estate development, recreation, and other human activities could continue with more predictability because a permit would be available to disturb eagles in the course of conducting such activities.

4.5.6 Summary

Alternative 2 meets most of the purposes of the action. It is consistent with the text of the Eagle Act, feasible to implement, predictable for compliance purposes, and enforceable. It would ensure that prioritized interests are met by authorizing take according to an established order. However, neither species would benefit from measures to reduce ongoing TRM. In addition, the lack of programmatic TRM does not meet the purpose of simplifying long-term management issues and could result in unacceptable socioeconomic impacts to local interests. For example, railway corridors that have reduced bald eagle mortality to the extent possible, and for which incidental take may have been available under ESA, would be unable to acquire a take authorization under the Eagle Act. Therefore, without additional measures, this management scenario is not compatible with the preservation of the eagle and would not, in itself, fulfill the purpose and need for the proposal.

4.6 Alternative 3– TRM Option, Individual and Programmatic to Reduce and Minimize Take, with Programmatic Permit for Airfields (Preferred Alternative):

The only differences between Alternative 3 and Alternative 2 are the provisions for non-purposeful TRM. The primary purpose for Alternative 3 is to ensure that any authorized programmatic TRM also include measures to reduce long-term risk of take. This alternative would also authorize programmatic permits for airfields that could include TRM. We would subject authorized individual permits for TRM to the same allocation process used for individual disturbance permits.

4.6.1 Bald Eagle and Golden Eagle

Because the Service is setting thresholds for take based upon the predicted ability of the populations to support that level of take, the impacts of individually-permitted TRM should have a negligible impact on populations. The Service expects the impacts of a Programmatic Permit to Reduce or Minimize TRM Take, as proposed, would result in reductions to ongoing take of bald eagles and golden eagles, and may have population benefits at a local or regional scale. Such reductions would be compatible with the preservation of eagles (maintaining increasing or stable bald eagle and golden eagle populations) on a national or regional scale.

Because the Service would review take thresholds on a regular basis (at least once every five years) relative to bald eagle and golden eagle population and demographic parameters, the Service would be able to modify or adjust permitting accordingly. In addition, the Service used conservative assumptions (estimating take by survival rather than productivity) and application (setting a limit based upon ½ MSY) of the model used to estimate take thresholds to account for inherent uncertainties and limitations of surveys and monitoring efforts.

The Service does not expect population declines as the result of the authorizations granted under Alternative 3. However, it is also possible external factors could arise that negatively affect bald eagle populations. Whatever the cause, if data suggest population declines are approaching a level where additional take would be incompatible with the preservation of the eagle (as interpreted above), the Service would re-evaluate the conditions of existing permits and would refrain from issuing additional programmatic permits until such time that the take would be compatible with the preservation of the bald eagle and golden eagle.

4.6.2 Biological and Physical Environment

There would be no significant direct impacts to the biological and physical environment from this alternative. If the permit is created, issuance of take authorization would indirectly result in impacts to habitat from loss, fragmentation, and reduced suitability for eagles due to implementation of projects or portions of projects that would not have proceeded without the permit because they would be located in areas that are currently considered too high-risk for eagle mortality to site turbines. Conversely, a permit system would provide some benefits to populations because the current system of prosecutorial discretion and voluntary cooperation make it difficult to ensure take is compatible with the preservation of eagles. Because we would base our permit thresholds on Service Region and BCR population segments, the Service believes the impacts to habitat would be widely dispersed and would not be significant at the scale of permitting. In addition, if the permit is widely applied, it would provide indirect benefits to other wildlife by reducing mortality incurred from the same industries currently taking eagles.

4.6.3 Eagle Mortality Associated with Human Activities

Alternative 3, via the option for programmatic permits to manage TRM, is the only alternative that would provide a mechanism to reduce eagle mortality associated with human activities. While the benefits to populations would not be significant on a national or regional basis, they may provide substantial benefits to local area populations. At a minimum, wide-scale adoption and implementation of measures under the programmatic lethal permit may buffer the direct and indirect impacts of increased development.

4.6.4 Currently Authorized Take of Eagles

The Service anticipates no changes to currently-authorized take of bald eagles and golden eagles under the Eagle Act, beyond those already addressed in Alternative 2. However, if the adoption and implementation of the "Performance-Based" Programmatic TRM permit is effective at a broad scale, there may be increases in regional populations. If increases in populations are documented and confirmed, an increase of available take permits may be warranted.

4.6.5 Societal

Religious and Cultural

The Service anticipates impacts to religious and cultural resources from this alternative to be similar to those under Alternative 2. If the adoption and implementation of the "Performance-Based" Programmatic TRM permit is effective, there may be increases in Service Regional populations, thus indirectly benefitting religious and cultural resources.

Safety

The impacts to safety under Alternative 3 would be similar to those under Alternative 2.

Socioeconomic

In addition to the same socioeconomic impacts as Alternative 2, Alternative 3 would provide a mechanism by which industries and agencies could implement practices to reduce ongoing eagle mortality, thus demonstrating their commitment to improving conditions for eagles. Through the proposed permitting process, they would also receive assurances that their practices are in compliance with the Eagle Act. Therefore, the Service expects no impacts deleterious to any sectors of the national economy from this alternative. In addition, TRM may be necessary to protect public welfare.

4.6.6 Summary

This alternative meets the purposes of the action in all respects. It is consistent with Congress's intent to protect bald eagles and golden eagles, consistent with the text of the Eagle Act, feasible to implement, predictable for

compliance purposes, and enforceable. In addition, except for safety-related permits, it would ensure that authorized take of birds necessary to meet the religious need of a Native American Tribe would not be denied due to other take being authorized for another purpose, thereby supporting our trust responsibilities to tribes. Measures for take for the public welfare and the programmatic TRM provisions would decrease the probability of circumstances placing human or eagle safety or health at risk.

Setting national and Service Regional thresholds based upon the sustainability of such take of bald eagle and golden eagle populations, through provisions for programmatic approaches and through measures to reduce ongoing TRM of both species, would: (1) be compatible with the preservation of eagles; (2) develop a management system that would simplify complex, long-term eagle management issues by allowing programmatic approaches; (3) provide a consistent approach to permitting between our Service Regional offices; and (4) make take authorization available for socioeconomic needs.

4.7 Cumulative Impacts

Cumulative impacts are the impacts on the environment that result from the incremental impact of the 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 actions (40 CFR 1508.7). We have focused the cumulative-impacts evaluation primarily on the potential for impacts that would require modification of permit thresholds or conditions. Those impacts could either be to eagle populations or societal resources.

4.7.1 Bald Eagle and Golden Eagle

When considering the impacts of the permit, past activities, current pressures, other foreseeable activities such as development, and effects of climate change, the Service expects that bald eagle populations would continue to grow and expand overall, although there may be some localized adverse cumulative effects. The Service expects there may be localized adverse cumulative effects to golden eagles from the proposed permit, considering past, present, and reasonably-foreseeable future activities, in particular, energy development, including wind, invasive weeds, and the effects of climate change. The cumulative effects to both species from Alternative 1, which would not create a new permit, would be less than the proposed alternative. However, because we are setting thresholds for take based upon the predicted ability of the populations to support that level of take, and because the Service would adjust permit thresholds to incorporate changes in existing conditions, most of the cumulative impacts to eagle populations from this proposal added to other actions would be addressed through the permitting system. In addition, Alternative 3, which provides for programmatic efforts to reduce and minimize take resulting in mortality, may have cumulatively less negative population effects than Alternative 2.

4.7.2 Biological and Physical Environment

Bald Eagle Habitat

The United States Census Bureau (2005) interim population projections for numerical change in population between 2000 and 2030 estimate that Florida, California and Texas would account for 46% of the United States population growth (Appendix G). Habitat loss for bald eagles is likely to occur in the foreseeable future through incremental land clearing for development. For example, it is projected that between 1978 and 2020, the developed area of the Chesapeake Bay watershed would increase by 74% in Maryland and 80% in Virginia (Gray and others 1998). North Carolina is projected to gain 4.2 million. Most of the States that currently have the larger bald eagle populations are projected to have population increases above 2000 levels ranging from nearly 30% to as high as 79.5% in Florida. The cumulative impacts from all alternatives, including the proposal, and human population growth may lead to localized losses and fragmentation of bald eagle habitat. However, because the areas subject to high human population growth are localized within the available habitat for bald eagles, the Service does not anticipate cumulative significant impacts nationally to bald eagle habitat in the foreseeable future.

Oil and gas development within the Intermountain West is expected to continue for the foreseeable future, particularly in Montana, Wyoming, Colorado, New Mexico, and Utah, where bald eagles typically occur along narrow river corridors and reservoirs (Figure 8) (USGS 2007a). In addition, there are undiscovered, technically-recoverable oil and gas resources in other areas supporting bald eagles (Figure 8). For example, the undiscovered, technically-recoverable resources of Michigan Basin include a mean of 990 million barrels of oil and a mean of 311.5 billion cubic meters (11 trillion cubic feet) of natural gas (USGS 2005). In the foreseeable future, the cumulative impacts to bald eagles from the proposal and energy development may lead to negative effects to bald eagles in areas such as the Intermountain West. However, these impacts would be localized, and the Service does not anticipate significant negative impacts from the proposal and energy development on a national scale. Re-evaluation and potential adjustments of the permit thresholds and conditions, as well as comprehensive evaluation of cumulative impacts at the permit issuance stage would minimize the cumulative impacts of the permit and energy development.

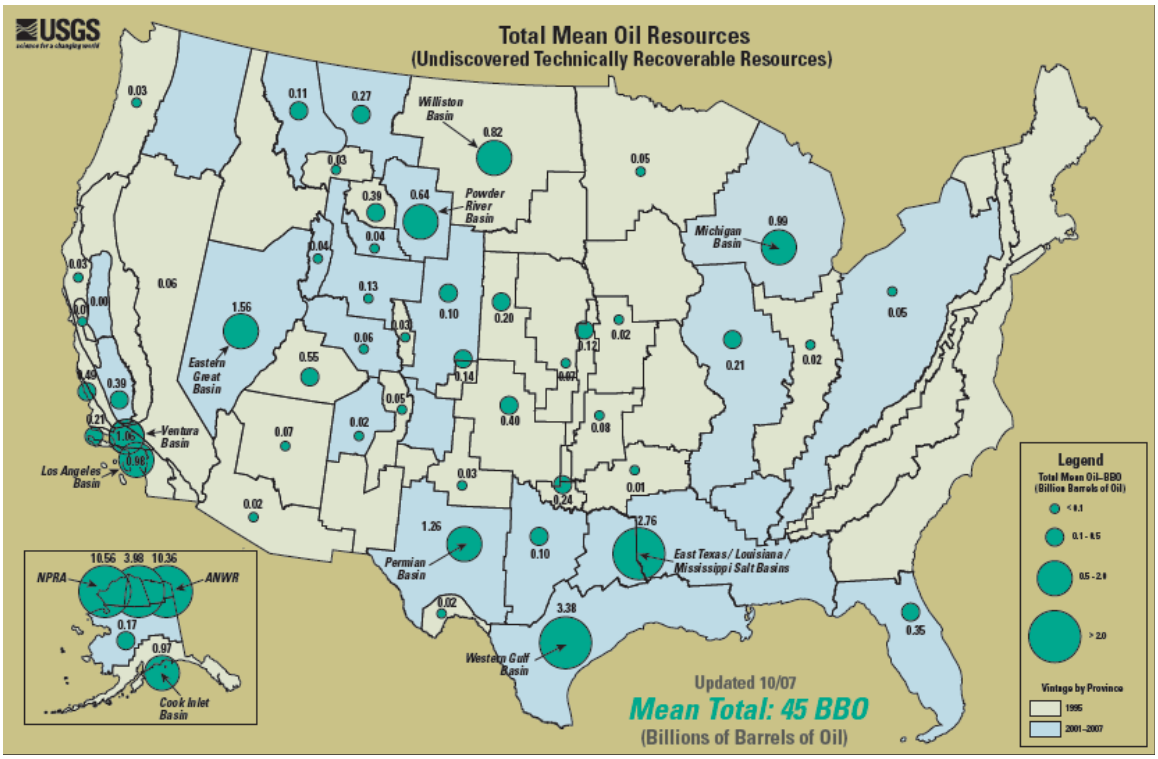

Figure 8 Total Mean United States Oil Resources

Climate Change

Global climate change could raise sea level about one meter by the end of this century by expanding ocean water, melting mountain glaciers, and causing ice sheets to melt or slide into the oceans (Titus 1990). Such a rise would inundate coastal lowlands, and would impact bald eagle nest locations associated with them.

At our request, Dr. J. Weiss at the Department of Geosciences, Environmental Studies Laboratory at the University of Arizona conducted GIS analysis for DEA of predicted sea-level rise relative to coarsely identified bald eagle nest areas[6]. According to Weiss's analysis, using USGS Digital Elevation Models (DEMs) with a 30-meter resolution, a one-meter sea-level rise would impact approximately seven percent of currently-identified bald eagle nest areas (Figure 9). At the time of the analysis, the Service had no data available for nests in Alaska, so they are not shown. However, because most of the surveyed nests in Alaska are in coastal areas, there would be impacts to those nests as well.

[6] Details regarding this analysis can be found at http://www.geo.arizona.edu/dgesl/research/other/climate_change_and_sea_level/sea_level_rise/sea_level_rise_technical.htm.

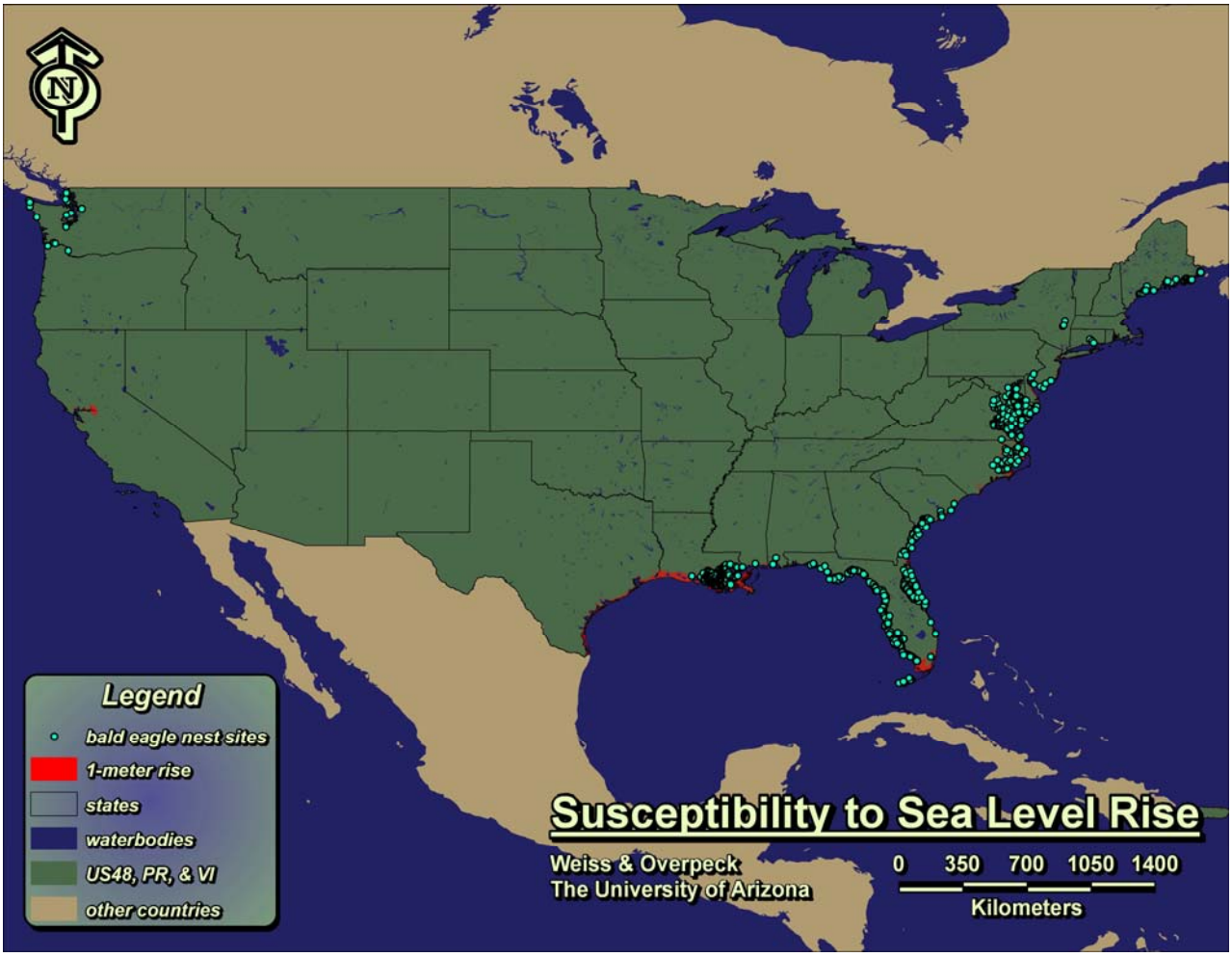

Figure 9 Bald Eagle Nest Areas Susceptible to a One-meter Sea Level Rise

Because the sea-level rise is expected to take place gradually, over a span of years, bald eagles would have time to relocate. Further, in the years ensuing between now and the full extent of a one-meter sea-level rise, the Service expects bald eagle populations to continue to increase. However, because impacts would be occurring to human property in the same areas, the Service may see an increase in the requests and need for permits related to human and eagle safety in these areas.

Cumulatively, if permits thresholds are not adapted to changing conditions, the impacts of permits may exacerbate the climate-change impacts upon the bald eagle's habitat, and may have some localized, negative impacts to bald eagle populations and socio-economic factors. Alternative 1, which would not create a new permit, and may therefore reduce developmental pressures on habitat, would have fewer impacts than either Alternative 2 or 3. Re-evaluation and potential adjustments of the permit thresholds and conditions would minimize the cumulative impacts of the permit and climate change in coastal areas.

Golden Eagle Habitat

Good and others (2007b) state that if human activities, including development, continue to increase in the West, the Service can expect an increase in pressures on golden eagle populations. The sagebrush shrub habitat, identified as one of the most altered and at-risk habitats in the West (Knick and others 2003), is also the focus of widespread restoration initiatives. We expect that efforts throughout the western United States to combat cheatgrass invasions and restore sagebrush shrub habitats will have short-term negative impacts on the availability of habitat supporting golden eagle prey species. The permits proposed, if issued for restoration projects, may contribute to short-term negative cumulative impacts on golden eagle habitat. However, if the restoration projects include habitat provisions addressing the needs of golden eagles, indirect, long-term cumulative benefits could accrue from issuance of the permits.

We also expect continued energy development within the golden eagle's range to a substantial degree for the foreseeable future. For example, the combined total mean, undiscovered, technically-recoverable natural gas resources of the Powder River Basin, SW Wyoming Basin, Uintah Piceance Basin, and San Juan Basin amount to approximately 4.9 trillion cubic meters (173 trillion cubic feet) of gas (Figure 10) (USGS 2007b). In areas where the natural gas reservoirs are limited to few formations, the life of the development would be shorter than that in oil fields, particularly those in complex basins with multiple formations. In addition, reclamation and restoration of fields in arid areas may be prolonged.

We expect the trend towards greater wind-energy development to continue. Although not required for proposals to go forward, if permits are developed that adequately address mortalities from wind turbines, issuance of permits for wind development would indirectly lead to increasing loss and fragmentation of golden eagle habitat. In areas where restoration projects and energy development coincide, issuance of permits under the proposal may cumulatively lead to local degradation of golden eagle habitat. Alternative 1, which would not create a new permit, and may therefore reduce developmental pressures on habitat, would have fewer impacts than either Alternative 2 or 3.

However, these impacts would be localized, although there may be some regional impacts. The Service does not anticipate significant negative impacts to golden eagle habitat from the proposal and energy development on a national scale, although there would be significant impacts to individual golden eagles from direct mortality. Re-evaluation and potential adjustments of the permit thresholds and conditions, as well as comprehensive evaluation of cumulative impacts at the permit issuance stage would minimize the cumulative impacts of the permit and factors affecting habitat.

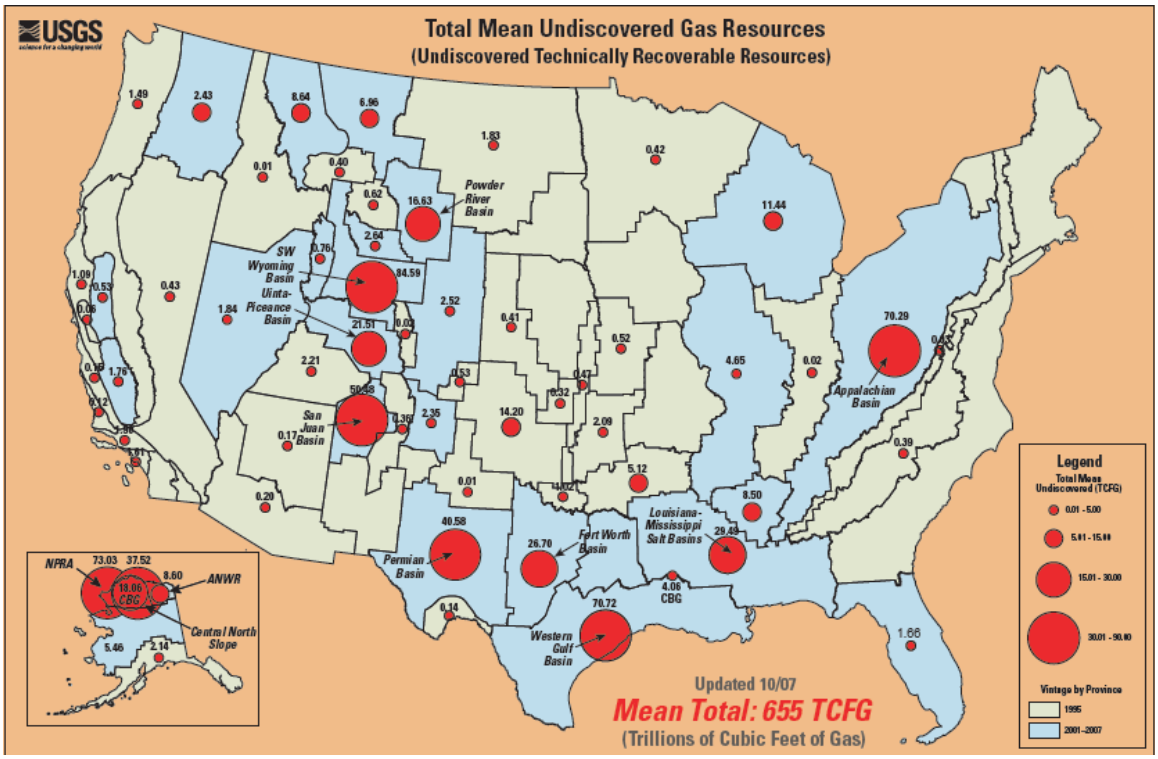

Figure 10 Total Mean Undiscovered Gas Resources

Climate Change

It is difficult to predict the cumulative effects of the permit and global climate change. Climate-change effects would locally lead to increased or lower average annual or seasonal temperatures, or increased or lowered precipitation. Predicting impacts to eagles from the permit and the local effects of climate change is subject to changes or fluctuations in such variables as land use, vegetation, predation dynamics, parasites, prey abundance or cycles of prey abundance, and changes in human behavior that leads to increased disturbance (Mustin and others 2007). For example, effects from climate change in the Great Basin are predicted to exacerbate to some degree the existing golden eagle habitat impacts from altered fire regimes and invasive annual grasses (Wagner 1998). Climate change-related increases in nitrogen deposition and atmospheric CO_2 concentration favor groups of species that share certain physiological or life-history traits that are common among invasive species, allowing them to benefit from global change (Dukes and Mooney 1999). However, raptors in general may be able, through behavioral adaptations such as dispersal to areas with better conditions, to mitigate some of the predicted impacts from climate change (Wichmann and others 2005)

Cumulatively, the Service does not anticipate significant impacts from the proposal when coupled with climate change impacts. However, if permit thresholds were not modified to reflect the altered habitat, the proposal may exacerbate the impacts from climate change and other activities affecting golden eagles and their habitat. The proposal may have some localized cumulative impacts that would require adjustments to permit conditions or thresholds.

4.7.3 Eagle Mortality Associated with Human Activities

The Service does not anticipate significant negative cumulative impacts from the permit proposal to eagle mortality associated with human activities, although achievement of mortality-reduction goals in the programmatic lethal permit could mitigate some of the cumulative impacts. In addition, the proposal, Alternative 3, which provides for programmatic efforts to reduce and minimize take resulting in mortality, may have cumulatively less negative population effects than Alternative 2. Activities currently leading to eagle mortalities would likely increase in scale and there may be additional sources of mortality the DEA has not considered or anticipated. If bald eagle populations continue to increase, the numbers of deaths, but not necessarily the proportion of the population affected, would increase regardless of changes in risks or availability of permits. If current estimates regarding the potential decline of golden eagle population trends is accurate and continues, an increase in the number of deaths would result in an increase in the proportion of the population affected. For both species, if factors leading to habitat alteration remain the same, the numbers of deaths, but not necessarily the percent of the population affected would be expected to rise. If the Service does not modify permit thresholds to reflect the altered mortality, there may be some additional, localized effects to eagles. Notwithstanding predictions, because the Service would review take thresholds on a regular basis relative to eagle population and demographic parameters, we would be able to modify or adjust permitting. In addition, wide-scale adoption and implementation of measures under the programmatic lethal permit would tend to buffer the direct and indirect lethal impacts of increased development.

4.7.4 Currently Authorized Take of Eagles

Cumulatively, the Service does not expect changes or appreciable impacts to the continuation or magnitude of currently-authorized take of eagles from this permit proposal. Nor do we expect the cumulative effect on eagles from the permit proposal and currently-authorized take to alter in the foreseeable future. Notwithstanding predictions, because the Service would review take thresholds on a regular basis relative to eagle populations and demographic parameters, we would be able to modify or adjust permitting. Alternative 1, which would not create a new permit, would have cumulatively fewer impacts on other forms of currently authorized take of eagles than Alternative 2. Alternative 3, which provides for programmatic efforts to reduce and minimize take resulting in mortality, may minimize the cumulative impacts to currently authorized permits by resulting in increased populations and higher take thresholds.

4.7.5 Societal

Religious and Cultural

In some regions of the country, particularly in the Southwest, cumulative impacts from the proposed permit to eagles and habitat from all types of development and climate change may result in local population declines. Because the Service would review take thresholds on a regular basis relative to

eagle population and demographic parameters, the Service would modify or adjust permitting accordingly. This would have some negative impacts to local religious and cultural resources. However, we do not expect significant cumulative impacts to religious and cultural resources from the proposal.

Safety

Cumulatively, the Service does not anticipate appreciable changes or impacts to human or eagle safety from the proposal. There may be some localized impacts to safety if eagle populations increase to the point of becoming over-abundant, or in areas experiencing habitat changes from energy development, invasive species, or climate change effects, or TRM from energy development. Because the Service would review take thresholds on a regular basis relative to eagle population and demographic parameters, the Service would be able to modify or adjust permitting to ameliorate most impacts.

Socioeconomic

The Service does not expect significant cumulative impacts to socioeconomic resources in the foreseeable future. If the bald eagle populations continue to grow in the same Service Regions as the greatest human population growth, there would also likely be an increase in the permit thresholds. That would minimize the potential impacts to development. If bald eagle populations decline while human populations increase, there may also be a decline in available permits, leading to a localized impact on economic development. In some local areas, because of annual permit thresholds and impacts to population from other factors, there may be limitations to the rate of development.

Permit thresholds may have some negative impacts on energy development if it takes place near areas subject to other development pressures.

However, this would be localized and not significant on a regional or national scale. Because the Service would review take thresholds on a regular basis relative to eagle population and demographic parameters, the Service would be able to modify or adjust permitting accordingly. Therefore, the Service expects no impacts deleterious to a broad regional sector of the national economy.

4.7.7 Summary

There are few differences between alternatives relative to the cumulative impacts from factors presented in this DEA. Alternative 3, with provisions for permitting TRM once mortality-reducing performance standards are met, may serve to buffer some negative impacts to eagle populations. Overall, the cumulative impacts to eagle populations from other resources would tend to overshadow the impacts of the proposed permits. Because the Service would review take thresholds on a regular basis (at least once every five years) relative to eagle population and demographic parameters, the Service would be able to modify or adjust permitting accordingly. In addition, the Service would adopt conservative assumptions (estimating take by survival rather than productivity) and application (setting a limit based upon ½ MSY) of the model used to estimate take thresholds to account for inherent uncertainties and limitations of surveys

and monitoring efforts. The periodic review and conservative approach to thresholds would mitigate the cumulative impacts to eagle populations from the proposal and other reasonably-foreseeable activities conducted by other entities.

4.8 Trans-boundary Effects of the Alternatives

The Service foresees no impacts of Alternative 1 on bald eagles or golden eagles in Canada or in Mexico. Alternative 2 and 3 may have some impacts to individual eagles of either species from Canada or Mexico by permitting disturbance of birds at winter roosts or other concentration areas during migration. However, because the majority of the permits are for disturbance and for take during the breeding season, there would be no significant population impacts. The preferred alternative (proposed action), 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.

PREPARERS

The assessment was prepared by Diana M. Whittington and George T. Allen, Ph. D., both from the Division of Migratory Bird Management, in Service Region 9, and Brian A. Millsap, Ecological Services, in Service Region 2.

Ms. Whittington has a number of years experience in land use and energy-related wildlife management issues, with an emphasis on raptor conservation.

Dr. Allen has approximately 20 years experience in wildlife research and management, with an emphasis on raptors. He is a Certified Wildlife Biologist.

Mr. Millsap has 29 years of experience in wildlife research and management, with an emphasis on raptor conservation.

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APPENDIX A

Native American Traditional Cultural Properties

State	County	Resource Name
Arizona	La Paz	Eagletail Petroglyph Site
Georgia	Putnam	Rock Eagle Site
Montana	Lewis and Clark	Eagle's Site
Nebraska	Holt	Eagle Creek Archeological Site
Oregon	Curry	Eagle Rock
Wisconsin	Grant	Eagle Valley Mound District
Wisconsin	Richland	Clipped Wing Eagle Mound
Wisconsin	Richland	Eagle Township Mound Group
Wisconsin	Richland	Hunting Eagle Mound

[a] Data are from a database search on search term ♣eagle♠ on 18 September 2007, from http://www.nps.gov/history/NR/research/index.htm.

[b] Data further refined by conducting a site-by-site, screen for potential association with sites with cultural significance associated with eagles. Information accessed on 10 October 2007, from www.nationalregisterofhistoricalplaces.com.

APPENDIX B

Tribal Status

State Status and NatureServe Conservation Status

We recognize that the information regarding Tribal protection status is not exhaustive, and are soliciting additional information from the tribes during the comment phase on this DEA.

NatureServe Subnational Conservation Status Ranks
S1 - Critically imperiled in the State
S2 - Imperiled in the State
S3 - Vulnerable in the State
S4 - Apparently secure

Breeding Status Qualifiers
B - Status of Breeding Population
N - Status of Nonbreeding Population
M - Status of Migratory Population

Status Terms:
Other Protected- includes statutes specifically prohibiting take of migratory birds, eagles, and/or raptors
SOC - Species of Concern
SSC - Species of Special Concern
U -Unable to find government-specific measures

Table B.1. Tribal Status for Bald Eagles and Golden Eagles, Known as of the Date of This DEA

Tribal Status[a]		
Tribal Entity	**Bald Eagle**	**Golden Eagle**
Eastern Band of Cherokee	Other protected	Other protected
Jamestown Tribe S'Klallam	Other protected	Other protected
Mille Lacs Band of the Ojibwe	Endangered	Endangered
Navajo Nation	No Special Status	Endangered
Nez Perce	Endangered	U
Oneida Nation of New York	Other protected	Other protected
Sault Ste Marie Tribe of the Chippewa	Other protected	Other protected
White Earth Band of the Chippewa	Other protected	Other protected

[a]. Information obtained online by a search of resources provided by the Tribal Court Clearing House, a project of the Tribal Law and Policy Institute.(http://www.tribal-institute.org/lists/codes.htm) and the National Tribal Justice Resource Center (http://www.tribalresourcecenter.org/tribalcourts/codes/default.asp) Data last accessed on October 10, 2007.

Table B.2. State Status and NatureServe Conservation Status Rank for Bald Eagles and Golden Eagles

State Status/NatureServe Conservation Status Rank				
State	**Bald Eagle**		**Golden Eagle**	
	Status	**NatureServe Subnational Conservation Status Rank**	**Status**	**NatureServe Subnational Conservation Status Rank**
Alabama	Other Protected	S3B	Other Protected	SNA
Alaska	No Special Status	S4B, S4N	No Special Status	S4
Arizona	Other Protected	S2S3B, S4N	Other Protected	S4
Arkansas	Other Protected	S2B, S4N	Other Protected	S3N
California	Endangered	S2	SSC Protected	S3
Colorado	Threatened	S1B, S3N	Other Protected	S3S4B, S4N
Connecticut	Endangered	S1B, S3N	U	SNA
Delaware	Endangered	S2B, S3N	U	SNA
District of Columbia	No Special	SXB, S2N	U	U
Florida	Threatened	S3	U	SNA
Georgia	Endangered	S2	Other Protected	S1
Idaho	Endangered	S3B, S4N	No Special Status	S4B, S4N
Illinois	Threatened	S2B, S3N	Other Protected	SNA
Indiana	Endangered	S2	No Special Status	S1N
Iowa	Endangered	S3B, S3N	No Special Status	SNA
Kansas	Threatened	S1B, S4N	Other Protected	S1B
Kentucky	Endangered	S2B, S2S3N	Other Protected	SXB, S2N

State Status/NatureServe Conservation Status Rank				
State	Bald Eagle		Golden Eagle	
	Status	NatureServe Subnational Conservation Status Rank	Status	NatureServe Subnational Conservation Status Rank
Louisiana	Endangered	S3B, S2N	No Special Status	S1N
Maine	Threatened	S4B,S4N	Endangered	S1B,S1N
Maryland	Threatened	S2S3B, S3N	No Special Status	S1N
Massachusetts	Endangered	S1	Other Protected	S1N
Michigan	Other Protected	S4	No Special Status	SNRN
Minnesota	Threatened	S3B, S3N	No Special Status	SNA
Mississippi	Endangered	S1B, S2N	Other Protected	S1N
Missouri	Endangered	S3	Other Protected	SNRN
Montana	Other Protected	S3	No Special Status	S4
Nebraska	Threatened	S1	Other Protected	S3
Nevada	Threatened	S1B, S2N	Other Protected	S4
New Hampshire	Endangered	S1	Endangered	SHB
New Jersey	Endangered	S1B, S2N	No Special Status	S4N
New Mexico	Threatened	S1B, S4N	Fully Protected	S3B, S4N
New York	Threatened	S2S3B, S2N	E (extirpated)	SHB, S1N
North Carolina	Threatened	S3B, S3N	Other Protected	SXB
North Dakota	Other Protected	S1	Other Protected	S3

State Status/NatureServe Conservation Status Rank				
State	Bald Eagle		Golden Eagle	
	Status	NatureServe Subnational Conservation Status Rank	Status	NatureServe Subnational Conservation Status Rank
Ohio	Threatened	S2	Other Protected	SNA
Oklahoma	Threatened	SNR	SSC Protected	S2
Oregon	Threatened	S4B, S4N	U	S4
Pennsylvania	Endangered	S2B	U	SNA
Rhode Island	No Special Status	S1B, S1N	No Special Status	U
South Carolina	Endangered	S2	U	U
South Dakota	Threatened	S1B, S2N	U	S3S4B, S3N
Tennessee	Other Protected	S3	Threatened	S1
Texas	Threatened	S3B, S3N	Other Protected	S3B
Utah	Other Protected	S1B, S3N	Other Protected	S4
Vermont	Endangered	S1B, S2N	U	S1S2N
Virginia	Threatened	S2S3B, S3N	Other Protected	SHB, S1N
Washington	Threatened	S4B, S4N	SOC candidate	S3
West Virginia	Other Protected	S2B, S3N	Other Protected	S3N
Wisconsin	Other Protected	S4B, S2N	Other Protected	S2N
Wyoming	Other Protected	S3B, S5N	Other Protected	S3B, S3N

APPENDIX C

Methods for Determining Eagle Take Thresholds

Introduction

In general, the study of demographics looks at life events such as births, deaths, immigration, and emigration, factors that affect the size and composition of a population. The timing of these events in life history may be critical; a population with high juvenile mortality will have a very different structure from a population with high adult mortality, a factor that would be removing breeding members of a population at a higher rate. The models applied in developing the permit limits rely on published estimates and have been used to develop estimates regarding overall survivorship and productivity of individuals within a population.

The DEA offers here a demonstration of how such data can be applied, in order to help explain how the Service arrived at the permit thresholds. At its most basic, data from a group or groups of individuals all born in the same time period (cohort) can be used to estimate such things as age- or stage-specific mortality rates, survivorship, and basic reproductive rates. Those rates can be compared from cohort to cohort to provide an idea of annual variation within one population and variation between different populations. For example, a juvenile survival rate of 0.47 means, of 100 first-year birds, 47 survived until the end of the first year. If juvenile survival is 0.84, 84 of 100 survived. There are survival ratios for each succeeding cohort, typically calculated by using juvenile, subadult, and adult stages; in eagles, adult stage is generally assumed to be reached at the fifth year. To illustrate, we present an idealized comparison of 2 first-year cohorts from 2 eagle populations. With only the difference in juvenile survival, and subadult and adult survival of .89 (ratios we have used for golden eagles), we would have notable differences in the total of individuals remaining in this cohort of 100 young at the end of the fifth year (Tables C.1. and C.2.)

Table C.1. Cohort/Population 1 .47 Juvenile Survival Rate

Year (survival Rate)	Starting number 100
1 (.47)	47
2 (.89)	41
3 (.89)	36
4 (.89)	32
5 (.89)	28

Table C.2. Cohort/Population 2 .84 Juvenile Survival Rate

Year (survival Rate)	Starting number 100
1 (.84)	84
2 (.89)	74
3 (.89)	65
4 (.89)	57
5 (.89)	50

The following more detailed discussion relies heavily on published papers by Hunt (1998) and Millsap and Allen (2006). Terms used are defined as follows: productivity is the number of young fledged on average per nesting attempt per nest site; survival rates are the proportion of individuals surviving each year; equilibrium is the stable age structure that eventually results from a given set of productivity and survival rate values in an eagle population; nest site includes the nesting structures and surrounding foraging areas required by a pair of eagles for successful breeding.

Our overall management objective for bald and golden eagle populations is to ensure authorized actions do not result in declines in breeding populations of either species. Determining appropriate levels of take directly is not practical because important population parameters like productivity and survival fluctuate from year-to-year, and direct counts of nests and young (the typical method for estimating eagle population size and health) do not account for non-breeding eagles, which can make up as much as 30% of healthy eagle populations. For this reason, we used a demographic population model to estimate the likely impact of permitted take at different levels on eagle populations over the long-term (defined here as 100 years). In their simplest form, population models use point estimates, usually mean values, for productivity and survival rates for different age classes in an algebraic formula to estimate population size at different points in time. The calculations are relatively straightforward, with population size in year 2 being equal to population size in year 1 minus deaths plus the number of breeding pairs times annual productivity. Such models are termed deterministic models. Complex models, known as stochastic models, incorporate measures of annual variation for the population parameters, and can allow fairly precise estimates of take potential within defined confidence intervals.

In the case of eagles, we lack adequate data on population parameters and annual variation for stochastic modeling. Instead, we adopted a more conservative approach using a deterministic model to estimate the maximum number of individuals that could be taken annually under a given set of productivity and survival rate values without reducing the number of breeders in

the population in the future. The critical point where take is maximized without compromising breeding population size is termed the Maximum Sustainable Yield (MSY) for the population. Because deterministic models are based on average conditions, they overestimate take potential in years with low reproduction or high mortality (and they underestimate take potential in years of high productivity or high survival). Additionally, our estimates of population parameters may be biased or imprecise. To compensate for this uncertainty, we set take limits at no more than ½ MSY to ensure that under all circumstances take does not approach the point where the number of breeders is affected. We determined MSY by running the model to population equilibrium with incremental 1% increases in first-year mortality until we reached the point where the pool of floaters was exhausted and any further increases in mortality resulted in some nest sites being unoccupied. We determined total reduction in the number of young added to the population at this take level, and then found ½ MSY by determining the midpoint between the original total annual production estimate and that at MSY (Figure C.1).

In healthy eagle populations the factor with the greatest impact on population size is the number of suitable breeding sites that exist on the landscape. For some species, the availability of suitable nesting places like cliffs sets this upper limit, while for others, territorial behavior establishes the upper maximum. Regardless, the net effect is to establish an upper limit on the number of pairs that can breed in a given landscape. In healthy populations there are more adults in the population than can breed, and these excess adults are called floaters. Floaters fill vacancies at nest sites as they occur, and as such, serve to buffer populations from decline in times when productivity does not offset mortality. We incorporated this concept into our models by setting an upper limit on the number of pairs that can breed equal to the number of known nest sites in a population.

Types of Take and Their Impacts: We contemplated three basic types of take that might be authorized by the Service. The first is take of individual eagles, either directly (e.g., falconry take of depredating eagles or take of individual for their feathers for Native American cultural or religious use) or indirectly (e.g., powerline electrocutions or collisions with wind turbines). The second is the temporary loss of productivity by causing disturbance of breeding pairs leading to abandonment of nests, or by rending nest sites temporarily unusable (e.g., as might occur through disturbance associated with timber harvest near a nest). The third form of take is the permanent loss of a nest territory, such as might occur with a dam project that inundated a nest site and the surrounding foraging area. In all cases, we assessed the impact of take on eagle populations by determining how the action related to our objective of not allowing cumulative annual take to exceed ½ MSY. Since ½ MSY is measured in units of individual eagles, we related each form of take to the number of individuals that would be removed from the population by the permitted action. This is straightforward for take permits for individual eagles, where the number of

individuals permitted to be taken can be directly subtracted from the take limit. For pairs disturbed to the point that a nesting attempt is abandoned or otherwise lost, we considered the impact to be the loss of average productivity for each site affected. Thus, for a bald eagle population with average productivity of 1.3 young fledged per active nest site, a permit authorizing disturbance of a breeding pair for one year would have the effect of removing 1.3 individuals from the subsequent year's population. For both of these forms of take, the effects are limited to the year in which the action occurs. Thus, take limits go back to their original levels each year.

In the case of the permanent loss of a nest territory, the effect is more complex. Because permanent loss of a nest site permanently reduces the number of potential breeding pairs, take of nests is inherently incompatible with our management objective of not causing declines in the breeding population. Despite this, in some cases, for example cases involving human health and safety, we anticipate needing to issue such permits. The effect of this kind of take will not be limited to the year that take initially occurs, but to all future years as well because the equilibrium population size will be permanently reduced, unless new nest sites are created that offset the loss. We determined the recurring impact of permanent loss of nest territories by running the model with incremental 1-nest site decreases in the number of suitable nesting sites, and then compared the total population size at each new population equilibrium with the original total population size at equilibrium. The permanent loss of a nest territory resulted in constant and predictable decreases in equilibrium population size ranging from 4 to 11 individuals, depending on average productivity (Figure. C.2). While this impact cannot be completely offset by modifying take levels, its effect in reducing the overall reproductive capacity of the population can be partly addressed by permanently reducing the take limit for the population by the difference in equilibrium population size caused by the action. Thus, in a bald eagle population consisting of 1,370 breeding pairs where ½ MSY is 338, the permanent loss of a nest territory reduces equilibrium population size by 8, leading to a new annual take limit of 330 individuals in future years. This take limit remains in effect unless and until population surveys show that new nest sites have become available that offset the losses.

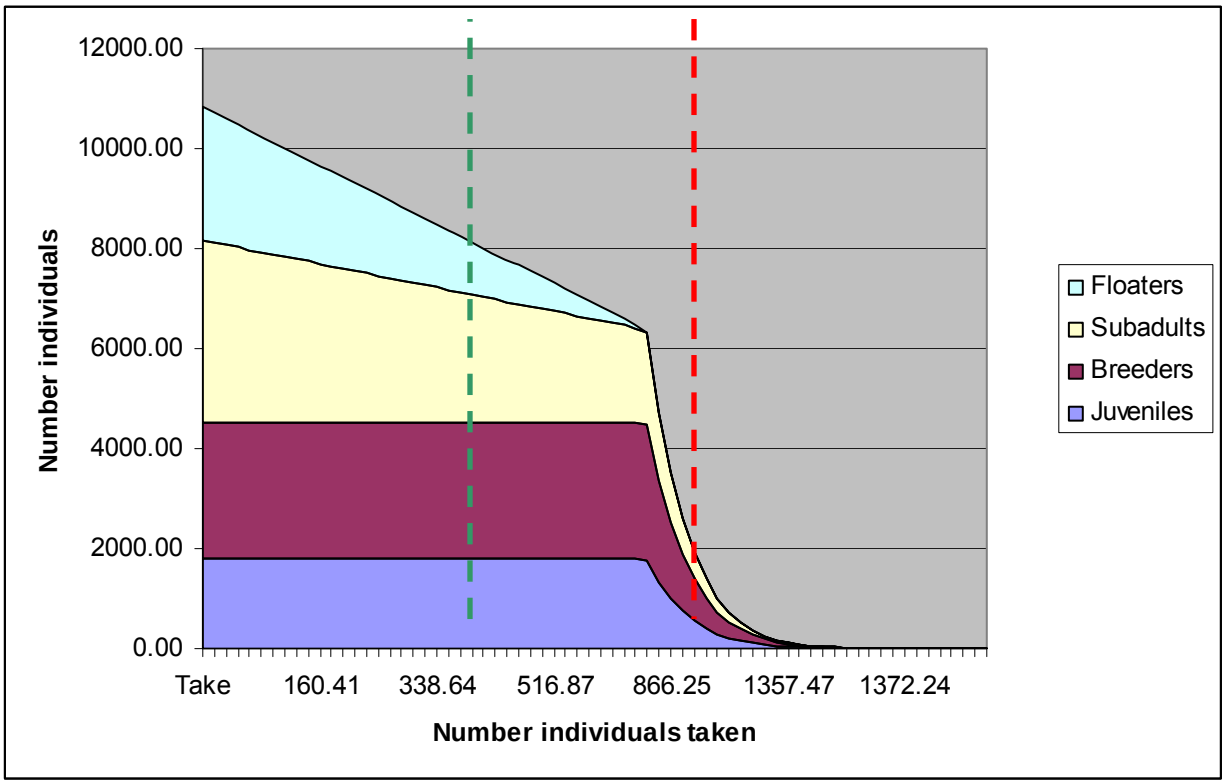

Figure C.1. Results from a series of deterministic model runs for a hypothetical bald eagle population under increasing levels of take. Population structure at each level of take on the X axis is the equilibrium population structure reached after 100 years at that level of take. The red dashed line indicates the point of Maximum Sustainable Yield (MSY), and the green dashed line is ½ MSY, the proposed annual take permitting threshold. Demographic values for the model are from Millsap et al. (2002): productivity = 1.3 young per nest site, juvenile survival = 0.77, subadult survival = 0.88, adult survival = 0.83, and number of nest sites = 1,371.

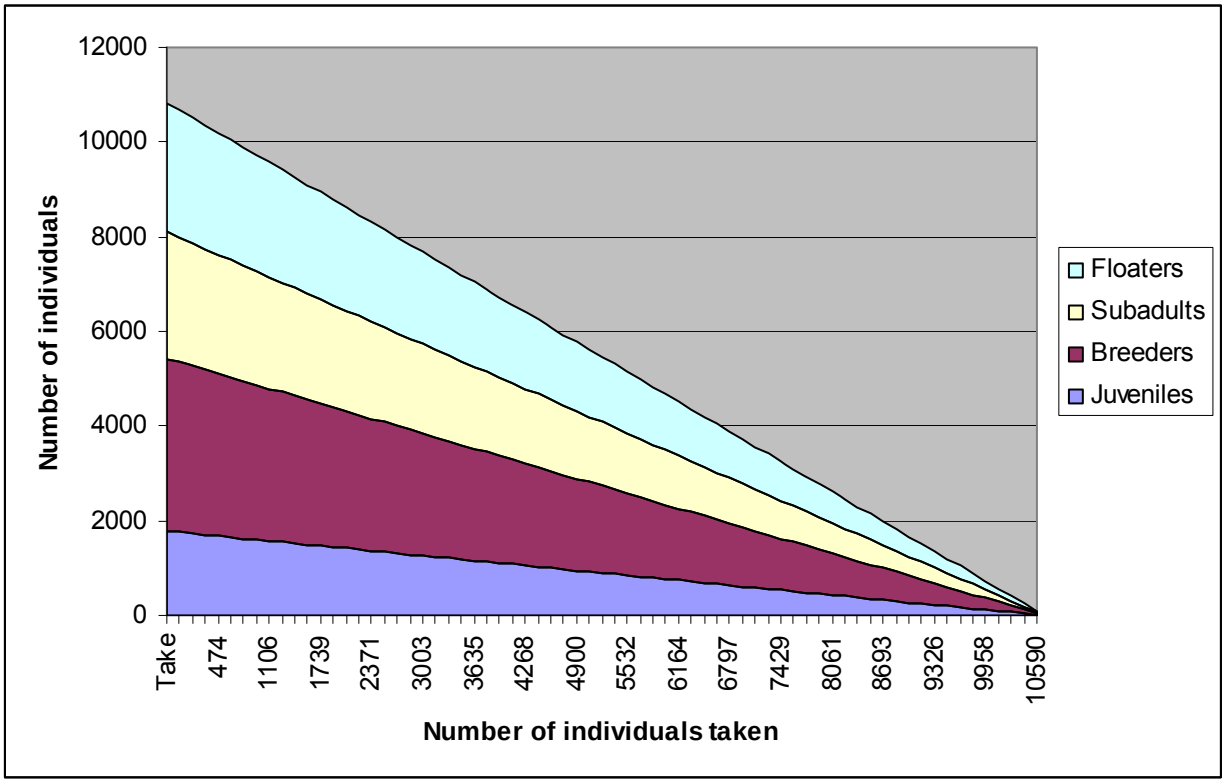

Figure C.2. Results from a series of deterministic model runs for a hypothetical bald eagle population under increasing levels of permanent nest site take. Population structure at each level of take on the X axis is the equilibrium population structure reached after 100 years at that level of take. Note that there is no level of take that does not lead to a decrease in the number of breeders, hence this type of take is inherently incompatible with our stated management goal. Demographic values for the model are from Millsap et al. (2002): productivity = 1.3 young per nest site, juvenile survival = 0.77, subadult survival = 0.88, adult survival = 0.83, and number of nest sites = 1,371.

Determining Bald Eagle Take Thresholds

Estimates of Population Size

For bald eagles, the State nest location database includes both occupied and unoccupied nest sites, so it was not possible to estimate population size directly. However, it is reasonable to presume the state nest data proportionally reflect the distribution of eagles by regional management population. Accordingly, for the coterminous states, the Service estimated the number of occupied nest sites by regional management population by multiplying the minimum number of occupied nest sites at the time of delisting (8,563; 72 FR 37345, July 9, 2007) by the proportion of nests in the State database in each region (Table C.3.). The Service conservatively assumed 15,000 occupied nest sites in Alaska based on partial surveys there (P. Schempf, U.S. Fish and Wildlife Service, personal communication).

For bald eagles, the Service used demographic values reported by Millsap and others (2004) from Florida in the models, which are likely fairly representative (annual adult survival = 83%, annual subadult survival = 88%, annual juvenile survival = 77%, number of juveniles fledged per occupied nest per year = 1.3). Modeling provided us with an estimate of the number of bald eagles within each regional management population, from which the Service estimated the number of occupied nests (Table C.3.).

Take of Individual Eagles

Population size estimates in Table C.3. provide a direct means of establishing annual thresholds for take of individual eagles while maintaining increasing or stable populations, assuming a direct relationship between the loss of individuals and overall population size. This approach assumes that all eagles are equal as long as population growth rates are positive, because under this condition there is a surplus of adult eagles in the population relative to the number of suitable breeding areas. To provide for uncertainty, and to allow for randomness not accounted for in the model, the Service followed the recommendation in Millsap and Allen (2006) and established recommended thresholds for take of individual eagles at levels half the maximum predicted safe values. The total estimated take allocated to each Service Region in Table C.3. is the total for all types of take, of individuals, disturbance of breeding pairs, disturbance of communal roosts and important foraging areas, as well as the permanent loss of nesting territories.

Permanent Loss of Nest Territories Resulting in Permanent Abandonment of Territories

As noted earlier, permanent loss of nest territories, resulting in permanent abandonment has more profound long-term effects on eagle populations than the loss of individual eagles. The Service employed the same model described above to set thresholds on the number of eagle nests that could be permanently taken each year while maintaining increasing or stable populations, again assuming conservatively that populations are at equilibrium. The Service initiated modeling with the current population size estimates in Table C.3., and then recalculated population size estimates with iterative decreases in the number of available nest sites to determine what level of nest loss would decrease in overall population size at population equilibrium. For bald eagles at current population levels, model results indicated the permanent loss of a nest site or abandonment of a territory leading to loss of a nesting pair was demographically equivalent to the loss of 5 to 11 individuals, depending on vital rates.

Cumulative Effects

Recommended thresholds for take of individual bald eagles and nests are not independent of one another. To ensure overall levels of take do not exceed the

recommended thresholds, the Service would consider the permitted likely permanent loss of a nest site or abandonment of a territory resulting in the loss of a nesting pair to be the effective equivalent of the permitted take of 8 individual bald eagles from the regional management population. For the standard bald eagle population: take affecting 1 individual = 1 individual from the threshold; take resulting from disturbance at 1 nest for only 1 time = 1.3 individuals from the threshold, 1 nest take resulting in the permanent abandonment of a territory = 1.3 individuals from the threshold the first year, and a reduction in 8 individuals from the annual individual permit limit each year thereafter until data show the number of breeding pairs has returned to the original estimated, or until it can be demonstrated that the predicted loss has not occurred.

Determining Golden Eagle Take Thresholds

Under the same basic management objective as for bald eagles (i.e., permitting take at a level that would maintain increasing or stable populations), and using the same modeling framework (i.e., that described in Millsap and Allen 2006 as developed by Grainger Hunt), annual take thresholds for golden eagles in the western United States (excluding Alaska) are as indicated in Table C.4..

The approach used here is somewhat different than that taken for bald eagles. For golden eagles, the best available demographic data are from Hunt and others (2002) and Kochert and others, (2002), and these data sets were used by Millsap and Allen (2006) to estimate sustainable falconry harvest. However, the Service also has recent golden eagle population size and juvenile: adult age ratio information from BCRs 9, 10, 16, and 17 from Good and others, (2008), covering a greater area extent than the data from Hunt and others (2002). The Good and others (2008) report suggested the total golden eagle population size for the sampled BCRs in 2003, 2006, and 2007 averaged was 24,602, 18.6% of which were juveniles ($\leq$ 1 year old). The Good and others (2008) report suggests golden eagle reproduction was very high in 2003. In favorable years most if not all golden eagle pairs attempt to breed (Kochert and others 2002). We assumed this was the case in the surveyed BCRs in 2003, and that productivity in that year was equal to the median reported in Kochert and others (2002) (0.87 young fledged per breeding pair). Based on the number of juveniles estimated to be present in 2003 and assuming average productivity of 0.87 per pair, we estimated these BCRs support 5,800 breeding pairs. Assuming 5,800 breeding pairs, we iteratively decreased productivity values in the population model until we reached a juvenile population size that approximated the average number of juveniles estimated in the Good and others (2008) survey for 2003, 2006, and 2007 (4,577). Using this productivity value in the model (0.79 young per breeding pair) yielded an estimated a total population size slightly higher than 24,602, so we iteratively decreased the juvenile survival rate to 0.61, at which point the total population size from the model was approximately equal to the average in Good and others (2008). Our rationale for varying productivity and juvenile survival to balance the equation is that these

vital rates are the most variable in studied golden eagle populations (Kochert and others 2002

This approach could be extended to include golden eagles from Alaska, and for other BCRs outside the study area covered by Good and others (2004). However, estimates of population size in Alaska are coarse, so management would therefore require a conservative approach. Just as the Service used the demographic parameter estimates derived from Good and others (2004) because they covered a greater geographic extent than other information, the Service also, for the same reason, used the golden eagle population data from the Partners in Flight Landbird Populations Estimates Database, based upon the estimates in Rich and others (2005), using BBS data. The Service recognizes the limitations of the data, and discusses them in Millsap and Allen (2006) (Appendix E), and we recognize that the data accuracy and precision vary widely. However, the population estimate of 24,602 derived for BCRs 9, 10, 16, and 17 using data from Good and others (2008), is comparable to the population estimate of 26,265 for the same BCRs from Rich and others (2005). In addition, there are estimates, varying in reliability, for every BCR covered in this proposal with breeding populations of golden eagles. But because there is little evidence BCRs correspond to real breaks in golden eagle distribution, and because the estimates may not exactly reflect population data from individual States, the Service will modify our approach to establishing take thresholds and allocations as better information becomes available. At this point the Service believes the proposed approach would provide the kind of regional safeguards against regional “overharvest” that would be similar to what the Service has proposed for bald eagles.

The model suggests sustainable take thresholds for golden eagles for BCRs 9, 10, 16, and 17 are 182 individuals per year. As the Service used for bald eagles, these values are ½ MSY , a conservative approach to account for model uncertainty. The total estimated take allocated to each Service Region in Table C.4. is the total for all types of take, of individuals, disturbance at nests, communal roosts, and important foraging areas, as well as take of nests.

Cumulative Effects

Recommended thresholds for take of individual golden eagles and nests are not independent of one another. To ensure overall levels of take do not exceed the recommended thresholds, the Service would consider the permitted likely permanent loss of a nest territory resulting in the loss of a nesting pair to be the effective equivalent of the permitted take of 4.26 individual golden eagles from the regional management population. For golden eagles: take affecting 1 individual = 1 individual from the threshold; take resulting from disturbance at 1 nest for only 1 time = .79 individuals from the threshold, 1 nest take resulting in the permanent abandonment of a territory = .78 individuals from the threshold the first year, and a reduction of 4.26 individuals from the annual individual permit limit each year thereafter until data show the number of breeding pairs has

returned to the original estimated, or until it can be demonstrated that the predicted loss has not occurred.

Determining Take Allocation for Life History Traits pertaining to Both Eagles

Thresholds for Take of Communal Roosts and Important Foraging Areas

The degree to which eagles might be disturbed (as defined at 50 CFR 22.3) by the loss of a communal night roost or foraging area would probably require case-by-case evaluation. Where eagles are known to be heavily dependent on a particular roost or foraging site, abandonment of the site due to human activities constitutes a disturbance. In cases where disturbance is deemed likely to occur, the most probable expression of that disturbance would be loss of the individual eagles. Recommended thresholds for take which results in a temporary loss of productivity would incorporate the total permitted disturbance of eagles at communal night roosts and important foraging areas. Determination of the amount of take incurred per location would be determined on a case-by-case basis by the Service Regions.

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Table C.3. (Service Regions 1-4) Maximum Cumulative Take Allowable for Bald Eagles

Region/Managment Unit/State	Number Mapped Nests	% Total Mapped Nests	Predicted Number Nesting Pairs[A]	Predicted Total Population Size[B]	1/2 MSY Threshold (% Annual Production and/or % Nests Disturbed)[C]	Mean Number Fledged per Occupied Nest	Estimated Annual Production	Annual Individual Take Threshold[D]	Annual Nesting Pair Disturbance Threshold[E]	Territory: Individual Ratio[F]	Maximum Cumulative Territory Take Threshold[G]
Region 1	***2,321.00***	***14.71%***	***1,259.73***	***10,077.82***	**18.00%**		***1,637.65***	***294.78***	***226.75***		***36.85***
Northern Rocky Mountains	***168.00***	***1.06%***	***91.18***	**729.46**	**18.00%**	**1.30**	***118.54***	**21.34**	**16.41**	**8.00**	**2.67**
1-Northern Rocky Mountains-ID	168.00	1.06%	91.18	729.46	18.00%	1.30	118.54	21.34	16.41	8.00	2.67
Pacific	***2,153.00***	***13.65%***	***1,168.55***	**9,348.36**	**18.00%**	**1.30**	***1,519.11***	**273.44**	**210.34**	**8.00**	**34.18**
1-Pacific-OR	1,362.00	8.63%	739.23	5,913.83	18.00%	1.30	961.00	172.98	133.06	8.00	21.62
1-Pacific-WA	791.00	5.01%	429.32	3,434.54	18.00%	1.30	558.11	100.46	77.28	8.00	12.56
Region 2	***187.00***	***1.19%***	***101.49***	**703.45**			***116.72***	***17.38***	***6.20***	***8.00***	***2.18***
Lower Mississippi	***136.00***	***0.86%***	***73.81***	***590.51***	**18.00%**	***1.30***	***95.96***	***17.27***	***6.06***	***8.00***	***2.16***
2-Lower Mississippi-OK	62.00	0.39%	33.65	269.21	18.00%	1.30	43.75	7.87	6.06	8.00	0.98
2-Lower Mississippi-TX	74.00	0.47%	40.16	321.31	18.00%	1.30	52.21	9.40		8.00	1.17
Southwest	***51.00***	***0.32%***	***27.68***	***112.94***	**0.50%**	***0.75***	***20.76***	***0.10***	***0.14***	***4.00***	***0.03***
2-Southwest-AZI[H]	46.00	0.29%	24.97	101.86	0.50%	0.75	18.72	0.09	0.12	4.09	0.02
2-Southwest-NMI[H]	5.00	0.03%	2.71	11.07	0.50%	0.75	2.04	0.01	0.01	4.09	0.00
Region 3	***6,339.00***	***40.18%***	***3,440.51***	***27,524.04***			***4,472.66***	***805.08***	***619.29***		***100.63***
Great Lakes	***6,339.00***	***40.18%***	***3,440.51***	***27,524.04***	**18.00%**	***1.30***	***4,472.66***	***805.08***	***619.29***	***8.00***	***100.63***
3-Great Lakes-IA	423.00	2.68%	229.58	1,836.67	18.00%	1.30	298.46	53.72	41.33	8.00	6.72
3-Great Lakes-IL	149.00	0.94%	80.87	646.96	18.00%	1.30	105.13	18.92	14.56	8.00	2.37
3-Great Lakes-IN	64.00	0.41%	34.74	277.89	18.00%	1.30	45.16	8.13	6.25	8.00	1.02
3-Great Lakes-MI	1,920.00	12.17%	1,042.08	8,336.67	18.00%	1.30	1,354.71	243.85	187.58	8.00	30.48
3-Great Lakes-MN	1,512.00	9.58%	820.64	6,565.13	18.00%	1.30	1,066.83	192.03	147.72	8.00	24.00
3-Great Lakes-MO	124.00	0.79%	67.30	538.41	18.00%	1.30	87.49	15.75	12.11	8.00	1.97
3-Great Lakes-OH	139.00	0.88%	75.44	603.54	18.00%	1.30	98.08	17.65	13.58	8.00	2.21
3-Great Lakes-WI	2,008.00	12.73%	1,089.85	8,718.77	18.00%	1.30	1,416.80	255.02	196.17	8.00	31.88
Region 4	***3,003.00***	***19.03%***	***1,629.88***	***13,140.70***			***2,125.28***	***386.90***	***296.38***		***47.92***
Lower Mississippi	***690.00***	***4.37%***	***374.50***	***2,995.99***	**18.00%**	***1.30***	***486.85***	***87.63***	***67.41***	***8.00***	***10.95***
4-Lower Mississippi-AR	130.00	0.82%	70.56	564.46	18.00%	1.30	91.73	16.51	12.70	8.00	2.06
4-Lower Mississippi-KY	84.00	0.53%	45.59	364.73	18.00%	1.30	59.27	10.67	8.21	8.00	1.33
4-Lower Mississippi-LA	369.00	2.34%	200.28	1,602.20	18.00%	1.30	260.36	46.86	36.05	8.00	5.86
4-Lower Mississippi-MS	42.00	0.27%	22.80	182.36	18.00%	1.30	29.63	5.33	4.10	8.00	0.67
4-Lower Mississippi-TN	65.00	0.41%	35.28	282.23	18.00%	1.30	45.86	8.26	6.35	8.00	1.03
Mid Atlantic	***79.00***	***0.50%***	***42.88***	***444.64***	***25.00%***	***1.45***	***62.17***	***15.54***	***10.72***	***10.37***	***1.50***
4-Mid Atlantic-NCJ	79.00	0.50%	42.88	444.64	25.00%	1.45	62.17	15.54	10.72	10.37	1.50
Southeast	***2,234.00***	***14.16%***	***1,212.51***	***9,700.07***	**18.00%**	***1.30***	***1,576.26***	***283.73***	***218.25***	***8.00***	***35.47***
4-Southeast-AL	78.00	0.49%	42.33	338.68	18.00%	1.30	55.04	9.91	7.62	8.00	1.24
4-Southeast-FL	1,751.00	11.10%	950.36	7,602.87	18.00%	1.30	1,235.47	222.38	171.06	8.00	27.80
4-Southeast-GA	170.00	1.08%	92.27	738.14	18.00%	1.30	119.95	21.59	16.61	8.00	2.70
4-Southeast-SC	235.00	1.49%	127.55	1,020.37	18.00%	1.30	165.81	29.85	22.96	8.00	3.73

[A]Applies % distribution of mapped nests for lower 48 to total number of occupied nests, assuming a proportional relationship exists between mapped and occupied nests at the region/management units/state level. Alaska mapped number is already a large underestimate of occupied nests, so it is used as the predicted number as well.

[B] Predicted population size calculated using demographic model described in Millsap and Allen (2006). Unless otherwise specified, demographic data used come from Millsap et al. (2004) from a satellite-tagged eagle study in Florida: Adult survival = 0.83, subadult survival = 0.88, juvenile survival = 0.77, and number of young fledged per occupied territory = 1.3.

[C]Harvest threshold = 1/2 maximum sustainable yield (MSY), calculated as in Millsap and Allen (2006).

[D]1/2 estimated MSY.

[E]The maximum number of nesting pairs that can be disturbed or caused to fail annually and not exceed the individual take threshold.

[F]Given model predictions and estimated productivity, the estimated population size reduction at equilibrium resulting from the permanent loss of a nest territory.

[G]This is the maximum number of territories that can be lost without exceeding individual eagle take thresholds of the initial population. However, because loss of a territory confers a permanant decrease in population size and growth potential, this loss is not sustainable and should be managed such that the annual rate of permitting does not result in overall population decline > 0.5% per year, and cumulatively across years does not exceed the value in this column. For example in a management population where the predicted population size = 10,000 and with a territory:individual ratio of 8, the maximum number of individuals that could be permanently lost annually is 50 (10,000*0.05), thus the maximum number of territories that could be permitted to be permanently taken in 1 year is 6 (50/8 = 6.25, rounded down to 6). Note that if such a permit were issued, the individual take threshold for that management population would be reduced in each subsequent year by 48 (6*8) since the loss of a nest site is the equivalent of an annually recurring permit to take 8 individuals.

[H]Predicted population size calculated using the following demographic data provided by G. Beatty, USFWS: Adult survival = 0.88, subadult survival (average survival of age classes 2 - 4 years) = 0.78, juvenile survival = 0.73, number of young fledged per occupied territory = 0.75 (0.995 nestlings per territory * 0.75 survival rate through fledging).

Table C.3. (Service Regions 5-8) Maximum Cumulative Take Allowable for Bald Eagles

Region/Managment Unit/State	Number Mapped Nests	% Total Mapped Nests	Predicted Number Nesting Pairs[A]	Predicted Total Population Size[B]	1/2 MSY Threshold (% Annual Production and/or % Nests Disturbed)[C]	Mean Number Fledged per Occupied Nest	Estimated Annual Production	Annual Individual Take Threshold[D]	Annual Nesting Pair Disturbance Threshold[E]	Territory: Individual Ratio[F]	Maximum Cumulative Territory Take Threshold[G]
Region 5	***2,479.00***	***15.71%***	***1,345.48***	***12,520.98***			***1,860.34***	***410.11***	***294.08***		***43.59***
Mid Atlantic	***1,365.00***	***8.65%***	***740.86***	***7,682.68***	***25.00%***	***1.30***	***1,074.24***	***268.56***	***185.21***	***9.00***	***25.90***
5-Mid Atlantic-MD[I]	373.00	2.36%	202.45	2,099.37	25.00%	1.45	293.55	73.39	50.61	10.37	7.08
5-Mid Atlantic-NJ[I]	50.00	0.32%	27.14	281.42	25.00%	1.45	39.35	9.84	6.78	10.37	0.95
5-Mid Atlantic-NY[I]	166.00	1.05%	90.10	934.30	25.00%	1.45	130.64	32.66	22.52	10.37	3.15
5-Mid Atlantic-PA[I]	50.00	0.32%	27.14	281.42	25.00%	1.45	39.35	9.84	6.78	10.37	0.95
5-Mid Atlantic-VA[I]	705.00	4.47%	382.64	3,967.98	25.00%	1.45	554.83	138.71	95.66	10.37	13.38
5-Mid Atlantic-WV[I]	21.00	0.13%	11.40	118.20	25.00%	1.45	16.53	4.13	2.85	10.37	0.40
New England	***1,114.00***	***7.06%***	***604.63***	***4,838.29***	***18.00%***	***1.30***	***786.10***	***141.55***	***108.87***	***8.00***	***17.69***
5-New England-CT	10.00	0.06%	5.43	43.42	18.00%	1.30	7.06	1.27	0.98	8.00	0.16
5-New England-MA	19.00	0.12%	10.31	82.50	18.00%	1.30	13.41	2.41	1.86	8.00	0.30
5-New England-ME	1,067.00	6.76%	579.12	4,632.93	18.00%	1.30	752.85	135.51	104.24	8.00	16.94
5-New England-NH	17.00	0.11%	9.23	73.81	18.00%	1.30	11.99	2.16	1.66	8.00	0.27
5-New England-RI	1.00	0.01%	0.54	5.63	25.00%	1.45	0.79	0.20	0.14	10.37	0.02
Region 6	***1,243.00***	***7.88%***	***674.64***	***5,397.13***			***877.03***	***157.87***	***121.44***		***19.73***
Northern Rocky Mountains	***873.00***	***5.53%***	***473.82***	***3,790.58***	***18.00%***	***1.30***	***615.97***	***110.87***	***85.29***	***8.00***	***13.86***
6-Northern Rocky Mountains-MT	713.00	4.52%	386.98	3,095.86	18.00%	1.30	503.08	90.55	69.66	8.00	11.32
6-Northern Rocky Mountains-WY	160.00	1.01%	86.84	694.72	18.00%	1.30	112.89	20.32	15.63	8.00	2.54
Rocky Mountains and Plains	**370.00**	**2.35%**	**200.82**	**1,606.55**	**18.00%**	**1.30**	**261.06**	**46.99**	**36.15**	**8.00**	**5.87**
6-Rocky Mountains and Plains-CO	82.00	0.52%	44.51	356.05	18.00%	1.30	57.86	10.41	8.01	8.00	1.30
6-Rocky Mountains and Plains-KS	22.00	0.14%	11.94	95.52	18.00%	1.30	15.52	2.79	2.15	8.00	0.35
6-Rocky Mountains and Plains-ND	49.00	0.31%	26.59	212.76	18.00%	1.30	34.57	6.22	4.79	8.00	0.78
6-Rocky Mountains and Plains-NE	133.00	0.84%	72.19	577.49	18.00%	1.30	93.84	16.89	12.99	8.00	2.11
6-Rocky Mountains and Plains-SD	71.00	0.45%	38.54	308.28	18.00%	1.30	50.10	9.02	6.94	8.00	1.13
6-Rocky Mountains and Plains-UT	13.00	0.08%	7.06	56.45	18.00%	1.30	9.17	1.65	1.27	8.00	0.21
Region 7	**15,000.00**		**15,000.00**	**86,550.00**			**11,100.00**	**1,665.00**	**2,250.00**		**288.56**
7-Alaska-AK[J]	15,000.00		15,000.00	86,550.00	15.00%	0.74	11,100.00	1,665.00	2,250.00	5.77	288.56
Region 8	***205.00***	***1.30%***	***111.26***	***890.11***	***15.00%***	***1.30***	***144.64***	***26.04***	***20.03***	***8.00***	***3.25***
Other	**26.00**	**0.16%**	**14.11**	**112.89**	**18.00%**	**1.30**	**18.35**	**3.30**	**2.54**	**8.00**	**0.41**
8-Other-CA	23.00	0.15%	12.48	99.87	18.00%	1.30	16.23	2.92	2.25	8.00	0.37
8-Other-NV	3.00	0.02%	1.63	13.03	18.00%	1.30	2.12	0.38	0.29	8.00	0.05
Pacific	**179.00**	**1.13%**	**97.15**	**777.22**	**18.00%**	**1.30**	**126.30**	**22.73**	**17.49**	**8.00**	**2.84**
8-Pacific-CA	179.00	1.13%	97.15	777.22	18.00%	1.30	126.30	22.73	17.49	8.00	2.84
TOTAL (less AK)	**15,777.00**		**8,563.00**	**70,254.23**			**11,234.32**	**2,098.15**	**1,584.17**		**254.16**
TOTAL	**30,777.00**		**23,563.00**	**156,804.23**			**22,334.32**	**3,763.15**	**3,834.17**		**542.72**

[A]Applies % distribution of mapped nests for lower 48 to total number of occupied nests, assuming a proportional relationship exists between mapped and occupied nests at the region/management units/state level. Alaska mapped number is already a large underestimate of occupied nests, so it is used as the predicted number as well.

[B] Predicted population size calculated using demographic model described in Millsap and Allen (2006). Unless otherwise specified, demographic data used come from Millsap et al. (2004) from a satellite-tagged eagle study in Florida: Adult survival = 0.83, subadult survival = 0.88, juvenile survival = 0.77, and number of young fledged per occupied territory = 1.3.

[C]Harvest threshold = 1/2 maximum sustainable yield (MSY), calculated as in Millsap and Allen (2006).

[D]1/2 estimated MSY.

[E]The maximum number of nesting pairs that can be disturbed or caused to fail annually and not exceed the individual take threshold.

[F]Given model predictions and estimated productivity, the estimated population size reduction at equilibrium resulting from the permanent loss of a nest territory.

[G]This is the maximum number of territories that can be lost without exceeding individual eagle take thresholds of the initial population. However, because loss of a territory confers a permanant decrease in population size and growth potential, this loss is not sustainable and should be managed such that the annual rate of permitting does not result in overall population decline > 0.5% per year, and cumulatively across years does not exceed the value in this column. For example in a management population where the predicted population size = 10,000 and with a territory:individual ratio of 8, the maximum number of individuals that could be permanently lost annually is 50 (10,000*0.05), thus the maximum number of territories that could be permitted to be permanently taken in 1 year is 6 (50/8 = 6.25, rounded down to 6). Note that if such a permit were issued, the individual take threshold for that management population would be reduced in each subsequent year by 48 (6*8) since the loss of a nest site is the equivalent of an annually recurring permit to take 8 individuals.

[I]Predicted population size calculated using the following demographic data provided by E. Davis, USFWS: Survival rates as in footnote B, but number of young fledged per occupied territory = 1.45.

[J]Predicted population size calculated using the following demographic data provided by P. Schempf, USFWS: Adult survival = 0.88, subadult survival = 0.95, juvenile survival = 0.71, number of young fledged per occupied territory = 0.74.

Table C.4. Maximum Cumulative Take Allowable for Golden Eagles

Region/Managment Unit/State	Estimated Total Population Size	Predicted Number of Nesting Pairs[C]	1/2 MSY Threshold (% AnnualL Production or % Nests Disturbed)[C]	Mean Number Fledged per Occupied Nest	Estimated Annual Production	Annual Individual Take Threshold[D]	Annual Nesting Pair Disturbance Threshold[E]	Territory: Individual Ratio[F]	Maximum Cumulative Territory Take Threshold[G]
Alaska (BCR 2)[A]	900.00	211.27	4.00%	0.79	166.90	6.68	8.45	4.26	1.57
Alaska (BCR3)[A]	300.00	70.42	4.00%	0.79	55.63	2.23	2.82	4.26	0.52
Alaska (BCR 4)[A]	700.00	164.32	4.00%	0.79	129.81	5.19	6.57	4.26	1.22
Alaska (BCR 5)[A]	150.00	35.21	4.00%	0.79	27.82	1.11	1.41	4.26	0.26
California portion of Northern Pacific Rainforest (BCR 5)	108.00	25.35	4.00%	0.79	20.03	0.80	1.01	4.26	0.19
Prairie Potholes (BCR 11)[A]	1,680.00	394.37	4.00%	0.79	311.55	12.46	15.77	4.26	2.93
Sierra Nevada (BCR 15)[A]	84.00	19.72	4.00%	0.79	15.58	0.62	0.79	4.26	0.15
Shortgrass Prairie (BCR 18)[A]	1,080.00	253.52	4.00%	0.79	200.28	8.01	10.14	4.26	1.88
Coastal California (BCR 32)[A]	960.00	225.35	4.00%	0.79	178.03	7.12	9.01	4.26	1.67
Sonoran and Mojave Deserts (BCR 33)[A]	600.00	140.85	4.00%	0.79	111.27	4.45	5.63	4.26	1.04
Sierra Madre Occidental (BCR 34)[A]	360.00	84.51	4.00%	0.79	66.76	2.67	3.38	4.26	0.63
Chihuahuan Desert (BCR 35)[A]	720.00	169.01	4.00%	0.79	133.52	5.34	6.76	4.26	1.25
Great Basin (BCR 9)[B]	6,859.00	1,610.09	4.00%	0.79	1,271.97	50.88	64.40	4.26	11.94
Northern Rockies (BCR 10)[B]	6,172.00	1,448.83	4.00%	0.79	1,144.57	45.78	57.95	4.26	10.75
Southern Rockies and Colorado Plateau (BCR 16)[B]	3,770.00	884.98	4.00%	0.79	699.13	27.97	35.40	4.26	6.56
Badlands and Prairies (BCR 17)[B]	7,800.00	1,830.99	4.00%	0.79	1,446.48	57.86	73.24	4.26	13.58
TOTAL	**32,243.00**	**7,568.78**			**5,979.34**	**239.17**	**302.75**	**68.16**	**56.14**

[A]Population estimates derived from BBS counts taken in late spring (pre-fledging), following the approach used by Partners in Flight (Rich et al. 2004). These end-of-year estimates were converted to beginning of year estimates to conform with population estimates under footnote B by adding back in estimated annual mortality for all age-classes.

[B]Population estimates derived from aerial transect surveys conducted by Goode et al. (2007) in late summer (post-fledging).

[C]Number of nesting pairs and harvest thresholds predicted from estimated total population size using demographic model described in Millsap and Allen (2006). Demographic modeling started using parameter estimates reported in Millsap and Allen (2006). We then adjusted the parameter estimates to balance with the average of population size and adult:non-adult age ratios from golden Eagle surveys in BCRs 9, 10, 6,and 17 in 2003, 2006, and 2007 as reported in Goode et. al (2008). The final model used the following parameter estimates: adult survival = 0.91, subadult survival = 0.79, juvenile survival = 0.61, and number of young fledged per breeding pair = 0.79.

[D]1/2 estimated MSY, or 4% of annual production.

[E]The maximum number of nesting pairs that can be disturbed or caused to fail annually and not exceed the individual take threshold.

[F]Given model predictions and estimated productivity, the estimated population size reduction at equilibrium resulting from the permanent loss of a nest territory.

[G]This is the maximum number of territories that can be lost without exceeding individual eagle take thresholds of the initial population. However, because loss of a territory confers a permanent decrease in population size and growth potential, this loss is not sustainable and should be managed such that the annual rate of permitting does not result in overall population decline > 0.5% per year, and cumulatively across years does not exceed the value in this column. For example in a management population where the predicted population size = 10,000 and with a territory:individual ratio of 4, the maximum number of individuals that could be permanently lost annually is 50 (10,000*0.05), thus the maximum number of territories that could be permitted to be permanently taken in 1 year is 12 (50/4 = 12.5, rounded down to 12). Note that if such a permit were issued, the individual take threshold for that management population would be reduced in each subsequent year by 24 (6*4) since the loss of a nest site is the equivalent of an annually recurring permit to take 4 individuals.

APPENDIX D

Millsap, B.A. and G.T. Allen. 2006. Effects of falconry harvest on wild raptor populations in the United States: theoretical considerations and management recommendations. Wildlife Society Bulletin 34: 1392-1400.

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Effects of Falconry Harvest on Wild Raptor Populations in the United States: Theoretical Considerations and Management Recommendations

BRIAN A. MILLSAP,[1,2] *Division of Migratory Bird Management, United States Fish and Wildlife Service, Arlington, VA 22203-1610, USA*
GEORGE T. ALLEN, *Division of Migratory Bird Management, United States Fish and Wildlife Service, Arlington, VA 22203-1610, USA*

Abstract

*We used recent population data and a deterministic matrix model that accounted for important aspects of raptor population biology to evaluate the likely impact of falconry harvest (including take of different age classes) on wild raptor populations in the United States. The harvest rate at maximum sustainable yield (MSY) ranged from 0.03 to 0.41 for the species examined. At least for peregrine falcons (*Falco peregrinus*), harvest rate at MSY was greatest for nestlings and lowest for adults. The quality of demographic data for the species influenced MSY. For most species the state of current knowledge probably underestimates the capacity for allowed harvest because estimates of vital rates, particularly survival, are biased low, because emigration is not distinguished from survival. This is offset somewhat by biases that might overestimate sustainability inherent in MSY-based analyses and deterministic models. Taking these factors into consideration and recognizing the impracticality of monitoring raptor populations to determine actual effects of harvest, we recommend that falconry harvest rates for juvenile raptors in the United States not exceed one-half of the estimated MSY up to a maximum of 5%, depending on species-specific estimates of capacity to sustain harvest. Under this guideline, harvest rates of up to 5% of annual production are supported for northern goshawks (*Accipter gentilis*), Harris's hawks (*Parabuteo unicinctus*), peregrine falcons, and golden eagles (*Aquila chrysaetos*); lower harvest rates are recommended for other species until better estimates of vital rates confirm greater harvest potential.* (WILDLIFE SOCIETY BULLETIN 34(5):1392–1400; 2006)

Key words

demographics, falconry, harvest, maximum sustainable yield, modeling, raptors, United States.

Falconry has been practiced in the United States since at least the 1920s. Prior to inclusion of Falconiformes and Strigiformes under the Migratory Bird Treaty Act (MBTA) with amendment of the treaty with Mexico in 1972, falconry was not federally regulated, and no comprehensive records are available on the number of falconers or number of raptors removed from the wild annually. Regulations promulgated by the United States Fish and Wildlife Service (USFWS) in 1976 (50 CFR Part 21) formally legalized falconry under MBTA and necessitated that the USFWS assess the likely impacts of falconry harvest on wild raptor populations. Those regulations required falconers to be permitted and to report the harvest and subsequent disposition of raptors acquired for use in the sport. The requirements resulted in data useful in assessing the likely impacts of falconry on wild raptor populations, and the USFWS used those data to conduct its first environmental assessment of falconry in 1988 (United States Department of the Interior 1988). The 1988 environmental assessment concluded that the impact of falconry on wild raptor populations in the United States was inconsequential.

Since 1988 2 important things have changed. First, the American peregrine falcon (*Falco peregrinus anatum*) was removed from the federal list of endangered and threatened wildlife in 1999. The subspecies had been protected from falconry harvest since federal regulation of the sport began because of its listed status. Subsequent to delisting, a conservative and carefully controlled harvest was allowed in the western United States (USFWS 2004). This action prompted a legal challenge to the USFWS's assertion that falconry harvest of American peregrine falcons will have minimal impacts on the wild population and the allegation that the USFWS's failure to adequately monitor peregrine populations to determine the impact of harvest violates the MBTA (Audubon Society of Portland et al. vs. United States Fish and Wildlife Service 2004). Second, the federal government has adopted more stringent standards for information for making science-based decisions. The standard requires clearer articulation and more scientific peer review of the information used in such determinations (Office of Management and Budget 2004).

Several aspects of raptor population biology are particularly germane to an assessment of impacts of falconry harvest. In addition to the overall limiting effect of prey availability, nesting densities of healthy wild raptor populations usually are further constrained by the availability of suitable nesting sites, spatial restrictions imposed by territoriality, or both (Newton 1979, Hunt 1998). The net effect is that an upper limit exists on the number of adult individuals that can breed in a given landscape. This, in turn, may result in a large number of nonbreeding adults awaiting opportunities to occupy vacancies at breeding territories (Newton 1988, Hunt 1998). These "floating" adults are not accounted for by conventional counts of

[1] *E-mail: Brian_A_Millsap@fws.gov*
[2] *Present address: New Mexico State Administrator, United States Fish and Wildlife Service, Albuquerque, NM 87102, USA*

territorial pairs or nestlings (Newton 1988), yet they can profoundly affect populations by buffering the effects of population declines, by contributing to decreases in reproductive success of breeders directly through interference competition and direct mortality (Tordoff and Redig 1997), and, perhaps indirectly, through competition for food resources (Newton 1988). Further, as a consequence of intense competition for nesting territories, age at first breeding is increased in healthy raptor populations, presumably because younger adults face competition with established or experienced older birds for vacancies at breeding sites.

This paper describes the likely impact of falconry harvest on wild raptor populations in the United States. We use the USFWS's most recent data on numbers of raptors taken from the wild and employ deterministic models to assess estimated effects on populations. We also illustrate how the dynamics of most raptor populations make monitoring the short-term impact of falconry harvest on populations in the wild nearly impossible and certainly impractical, and we make recommendations on how this should be accounted for in harvest strategies.

Methods

Definitions

We use the term juvenile to refer to an individual <1 year old, subadult to refer to a raptor >1 year of age but typically not old enough to breed, and floater to refer to an adult that has not settled into a breeding slot at an established nesting site. Falconry harvest typically focuses on juvenile raptors, either nestlings (eyases) or fledged young <1 year old (passagers). "Harvest" and "take" in this paper refer to the capture and removal from the wild of raptors for use in falconry. Harvest rate is the difference between the annual survival rate of the harvested age class without harvest and with harvest; in the case of eyas and passage age classes, this equals the proportion of the annual cohort of young harvested by falconers. The maximum sustainable yield (MSY) is the greatest harvest rate (in 0.01-unit increments) that does not produce a decline in the number of breeding adults in the modeled populations; we refer to harvest levels below this rate as sustainable. Moffat's equilibrium is the stable age structure at equilibrium population size for a given set of demographic parameter values (Hunt 1998). When we report population size at Moffat's equilibrium, we include all age classes, unless otherwise noted. Demographic parameters of interest are productivity, defined as mean number of young fledged per occupied nest site annually (ρ) as recommended by Steenhof (1987), and the juvenile (θ_j), subadult (θ_s), and adult (θ_a) annual survival rates (proportions alive at fledging time each year).

Falconry Harvest

Falconers who take raptors from the wild generally are required to do so either by removing eyases from nests or by trapping passage birds during their first year of life. Because of difficulties distinguishing age classes, current regulations do not restrict harvest of American kestrels (*Falco sparverius*) and great horned owls (*Bubo virginianus*) to first-year individuals. In addition, golden eagles (*Aquila chrysaetos*) older than one year may be taken, but all harvest of golden eagles is restricted to depredating individuals under special circumstances by provisions in the Bald and Golden Eagle Protection Act (16 U.S.C. 668–668d). Each falconer must report to the USFWS and the respective state fish and wildlife agency all acquisitions and dispositions of raptors taken or otherwise acquired under his or her falconry permit (50 CFR 21). United States Fish and Wildlife Service regional migratory bird permit offices input all data on raptors taken from the wild into the USFWS's permit-tracking database. We used data for 2003 and 2004 from this database to assess the number of raptors removed from the wild by species for the purposes of our analyses. Some wild take may go unreported each year, but we believe such actions are infrequent enough to be considered inconsequential in the context of this analysis.

We used the harvest statistics reported above and modified population size estimates for continental North America from the Partners in Flight North American Landbird Conservation Plan (Rich et al. 2004) to estimate the proportion of the year-1 cohort removed from the wild by falconers in 2003 and 2004. These estimates are for Canada and the United States, which is the appropriate geographic scale for this assessment because migrant raptors from Canada are undoubtedly included in the United States harvest of passage raptors. We eliminated the ad hoc visibility correction factor employed by Rich et al. (2004) that doubled population estimates derived from breeding bird survey (BBS) counts under the general assumption that 50% of individuals were not detected because they were incubating or brooding on nests. This assumption likely is not valid for raptors because most species have large young that do not require brooding by the time BBS routes are run in May and June, and delayed maturation and nest-site limitations result in large numbers of subadult and floaters in most populations (Newton 1979). We agree that the probability of detection for raptors is certainly <1.0 on BBS routes but, in the absence of an empirically derived visibility correction factor, we chose to use the more conservative unadjusted estimates of population size. For the peregrine falcon, opportunities for falconry harvest currently are restricted to a portion of the species' North American range. Accordingly, we used population estimates for the peregrine falcon for the portion of the species' geographic range that is subject to harvest from USFWS (2004).

Demographic Effects of Harvest

We modeled the effects of falconry harvest at different rates on hypothetical closed raptor populations using the best demographic data from contemporary periods (1971–2002) available for each species. We gave preference to findings from long-term mark–recapture or radiotracking studies where emigration probabilities were estimated because such studies yield less biased estimates of juvenile and adult survival rates than simple band recovery or mark–recapture analyses (Kenward et al. 2000). For species lacking intensive

Table 1. Species, data sources, and demographic input to models used to assess effects of falconry harvest on wild raptor populations in the United States. All original data used are from contemporary time periods (1971–2002); specific dates of individual studies can be found by consulting the referenced papers.

Species	Data source	Geographic locale	Annual juvenile survival	Annual subadult survival[a]	Annual adult survival	No. young per occupied nest site	Age at first breeding (yr of age of limiting sex)	Max. age[b]
Eurasian sparrowhawk	Newton 1986	Southern Scotland	0.45		0.61	2.30	1	13
Northern goshawk	Kenward et al. 1999	Baltic Islands, Sweden	0.58	0.65	0.81	1.45	2	17
Harris's hawk	Bednarz 1995	Composite USA	0.70	0.64	0.82	2.10	2	17
Red-tailed hawk	Preston and Beane 1993	Composite USA	0.46	0.80	0.80	1.40	2	17
American kestrel	Smallwood and Bird 2002	Composite USA	0.31		0.55	3.30	1	11
Peregrine falcon	Craig et al. 2004	Colorado, USA	0.54	0.67	0.80	1.66	2	17
Prairie falcon	Steenhof 1998	Composite USA	0.25		0.75	2.78	1	14
Golden eagle	Survival rates from Hunt (2002), productivity from Kochert et al. 2002	California, USA for survival; composite USA for productivity	0.84	0.90	0.91	0.80	5	25

[a] For species indicated as breeding at 1 year of age, there is no subadult age class in the models. For others, the subadult age class includes years after year 1 (juvenile) and the age at first breeding. Most species indicated as first breeding at age 2 do occasionally breed at age 1, particularly females (Newton 1979), but we used the values reported here in our models as we felt they were appropriately conservative.
[b] Maximum age as calculated in models. We assumed no breeding senescence, so maximum breeding age equals maximum age.

long-term demographic studies that accounted for emigration rates, we used the midpoints of ranges for estimates of demographic parameters reported in applicable Birds of North America accounts.

We selected the following species for analysis because they are harvested regularly by United States falconers or they are biologically similar to harvested United States species: 1) Eurasian sparrowhawk (*Accipiter nisus*), biologically similar to the Cooper's hawk (*A. cooperii*) and sharp-shinned hawk (*A. striatus*), using data from a marked population in Southern Scotland from 1971 to 1984 (Newton 1986); 2) a radiotagged and banded population of northern goshawks (*A. gentilis*) from the Baltic island of Gotland, Sweden, using demographic data from 1980 to 1987 (Kenward et al. 1999); 3) Harris's hawk (*Parabuteo unicinctus*) using summarized demographic data from Bednarz (1995); 4) red-tailed hawk (*Buteo jamaicensis*) using summarized demographic data in Preston and Beane (1993); 5) American kestrel using summarized demographic data in Smallwood and Bird (2002); 6) peregrine falcon using demographic data from a color-marked population in Colorado, USA, collected from 1973 to 2001 (Craig et al. 2004); 7) prairie falcon (*F. mexicanus*) using summarized demographic data in Steenhof (1998); and 8) golden eagle using age-specific survival-rate estimates from a long-term radiotracking study in California by Hunt (2002) and composite productivity values from Kochert et al. (2002; Table 1). It is important to note that there are differences among species in how occupied nest sites were defined. In the case of the Eurasian sparrowhawk, occupied nests were defined as nests in which $\geq$1 egg was laid (Newton 1986). For other species, occupied nest sites were sites with a territorial pair in attendance, but the likelihood of detecting pairs whose nests fail early in the nesting cycle varies among species (Steenhof 1987). These differences affect strict comparability of productivity estimates among species, but we believe the bias does not compromise our overall conclusions.

To estimate how falconry harvest likely affects raptor populations, we used a deterministic, Excel-based matrix model (Hunt 2003) that limited the number of adults that could breed annually to 2,000 (i.e., we assumed 1,000 suitable breeding sites for each hypothetical population). The algebraic formulas used to compute equilibrium stage structure are given in Hunt (1998). Models were run for 100 years using point estimates of mean values for ρ, θ_j , θ_s (for species with delayed maturation), and θ_a from the peer-reviewed literature for the 8 species of raptors. We used the model output to estimate population size and structure at Moffat's equilibrium. We fixed parameters of the model that, in reality, likely would shift to buffer declines (e.g., a decrease in age at first breeding, an increase in mean productivity as nest sites of lesser quality became unoccupied and interference competition relaxed; Newton and Mearns 1988, Ferrer and Donazar 1996). However, we also made no effort to account for demographic or environmental stochasticity, nor did we account for potential lowered reproductive success of first-time breeders (Newton 1979), both factors that could affect population structure and growth rates. We recognize that not incorporating these features of raptor populations in our models oversimplifies what likely occurs in nature, but we believe the model outputs adequately illustrate the probable impacts of harvest on wild raptor populations.

In our initial model runs, we incorporated harvest effects by decreasing first-year survival rates in 0.01-unit increments, which would be the case if all harvest was of passage raptors. For comparison purposes, we also simulated an eyas-only and adult-only harvest of peregrine falcons by decreasing productivity values, and by increasing adult mortality values, respectively, by 0.01-unit increments. Response variables of interest at Moffat's equilibrium after

Table 2. Number of raptors removed from the wild by licensed falconers in the United States in 2003 and 2004 according to United States Fish and Wildlife Service records. Population size estimates are from Rich et al. (2004), which are based on population size estimates derived from Breeding Bird Surveys from the 1990s. Percent harvest estimates use the mean number harvested.

Species	North American population size[a]	Estimated % juveniles[b]	No. juveniles[b]	No. harvested			% juveniles harvested	Recommended max. harvest rate
				2003	2004	Mean		
Sharp-shinned hawk	291,500	0.50	145,750	15	15	15	0.0103	1.0%
Cooper's hawk	276,450	0.50	138,225	67	72	69.5	0.0503	1.0%
Northern goshawk	120,050	0.30	36,015	52	46	49	0.1361	5.0%
Harris's hawk	19,500	0.25	4,875	50	32	41	0.8410	5.0%
Ferruginous hawk	11,500	0.30	3,450	7	6	6.5	0.1884	1.0%
Red-shouldered hawk	410,850	0.30	123,255	3	3	3	0.0024	1.0%
Red-tailed hawk	979,000	0.30	293,700	527	645	586	0.1995	4.5%
American kestrel	2,175,000	0.60	1,305,000	100	101	100.5	0.0077	1.5%
Merlin	325,000	0.60	195,000	48	52	50	0.0256	1.0%
Gyrfalcon	27,500	0.30	8,250	8	19	13.5	0.1636	1.0%
Peregrine falcon	9,870[c]	0.30	2,961	1[c]	18	18	0.6079	5.0%
Prairie falcon	17,280	0.50	8,640	31	42	36.5	0.4225	1.0%
Eastern screech-owl	369,600	0.60	221,760	1	0	0.5	0.0002	1.0%
Western screech-owl	270,100	0.60	162,060	0	3	1.5	0.0009	1.0%
Great horned owl	1,139,500	0.30	391,850	6	7	6.5	0.0020	1.0%
Snowy owl	72,500	0.30	21,750	1	1	1	0.0046	1.0%
Total				917	1,062	998		

[a] Unless otherwise noted, taken from Rich et al. (2004) but modified as described in the Methods. Units are total number of individuals.

[b] The percentage of juveniles was estimated from observed population structure in species-specific population models at equilibrium (see Fig. 1 and Table 1). Estimates for sharp-shinned hawks and Cooper's hawks are from the model for the Eurasian sparrowhawk; estimates for the red-shouldered hawk, ferruginous hawk, great horned owl, and snowy owl are from the model for the red-tailed hawk; estimates for the merlin and screech-owls are from the model for the American kestrel; and estimates for the gyrfalcon are from the model for the peregrine falcon.

[c] Harvest of peregrine falcons is limited to states west of the 100th meridian, and that is the population included here. This population size estimate is from United States Fish and Wildlife Service (2004), based on direct counts from states. Harvest of wild peregrine falcons for falconry was authorized only in Alaska in 2003 but was expanded to include other western states in 2004.

100 years of harvest at the specified rates included resultant numbers of breeders (N_b), juveniles (N_j), subadults (N_s), and floating adults (N_f); the annual rate of population change (λ) if all breeding-age adults were able to breed and produce young at the rate of the population mean; and the floater-to-breeder ratio (ζ), which is the ratio of nonbreeding adults to breeders. In general, λ is a useful way of gauging the impacts of harvest in a nonsaturated population where growth is possible, and ζ is the more useful metric when the population is at equilibrium and all breeding sites are occupied (Hunt 1998). We also developed MSY curves with harvest rate as the variable of interest for golden eagles, peregrine falcons, and American kestrels. These 3 species represent the range of harvest potential based on available data.

To estimate actual harvest rates, we divided the number of individuals of each species harvested by the estimated size of the juvenile population of each species. We used the average of the number of individuals of each species harvested in 2003 and 2004 as the numerator. We estimated the denominator by multiplying the overall population estimate for each species by an estimate of the proportion of the population that was $\leq$1 year old (and, therefore, subject to harvest). We based our estimate of the proportional size of the $\leq$1-year-old age class on the species-specific population structure from our models at the 0% harvest rate at Moffat's equilibrium. For species for which we lacked data to develop specific models, we used the model output for the species with the most similar life-history characteristics. Estimates for sharp-shinned hawks and Cooper's hawks are from the model for the Eurasian sparrowhawk; estimates for the red-shouldered hawk (*Buteo lineatus*), ferruginous hawk (*B. regalis*), great horned owl, and snowy owl (*Bubo scandiacus*) are from the model for the red-tailed hawk; the estimate for the merlin (*F. columbarius*), Eastern screech-owl (*Megascops asio*), and Western screech-owl (*M. kennicottii*) are from the model for the American kestrel, and estimates for the gyrfalcon are from the model for the peregrine falcon.

Results

Actual Falconry Harvest in 2003 and 2004

Falconers harvested 917 and 1,062 raptors of 15 species from the wild in the United States in 2003 and 2004, respectively (Table 2). Although the most frequently harvested species was the red-tailed hawk, the estimated harvest rate was greater for the Harris's hawk, peregrine falcon, and prairie falcon. For all species, the estimated harvest rate was below 1.0% of the juvenile cohort.

Modeled Impacts of Harvest on Populations

Passage harvest models for all 8 example raptor species at Moffat's equilibrium showed that numerical effects of harvest primarily are restricted to the subadult and floating adult components of populations (Fig. 1). When higher harvest rates compromise the equilibrium, floaters are absent because all adults are able to acquire breeding sites. At the highest levels of harvest, equilibrium population size of all age classes are predicted to be substantially below that at MSY, and the degree of reduction is related to the degree to which harvest rate exceeds MSY. The harvest rate at MSY

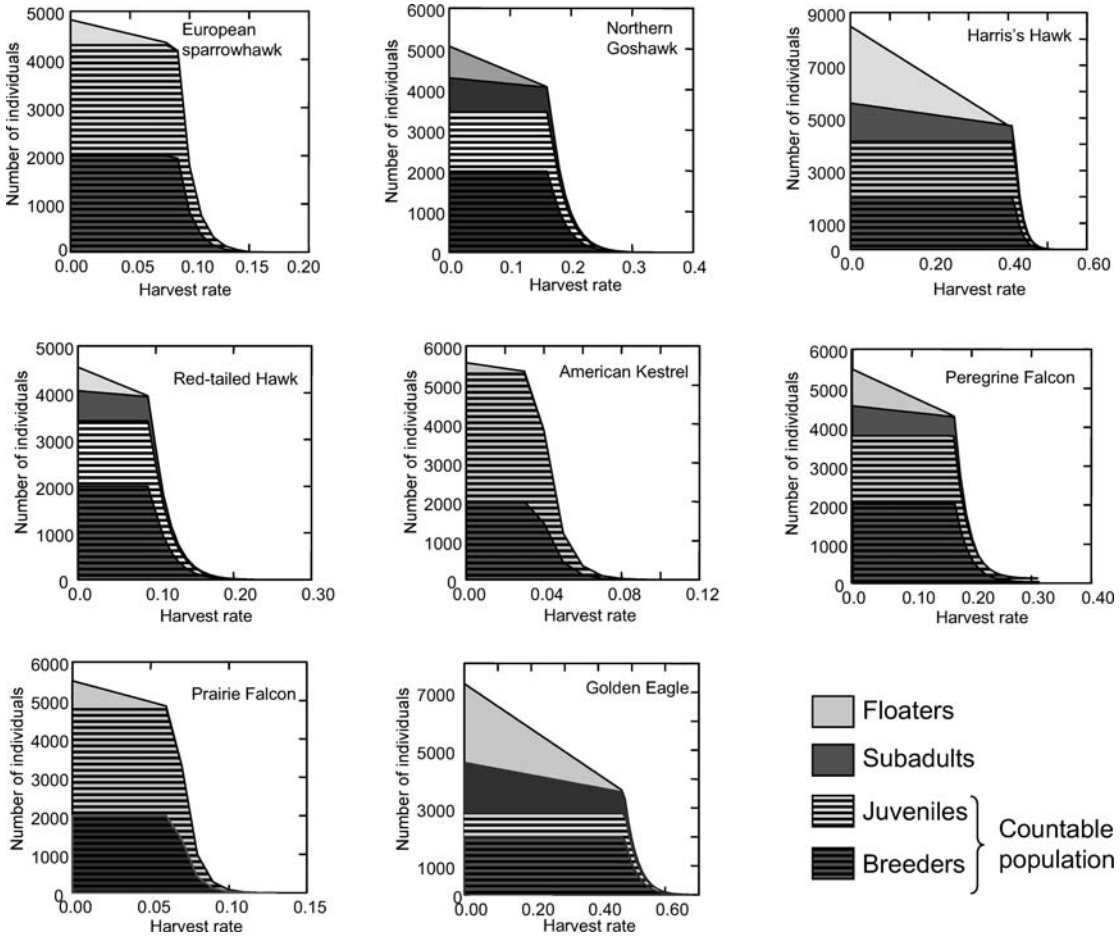

Figure 1. Estimated population structure of 8 raptor species at various passage harvest rates (percentage of juvenile cohorts taken by falconers) based on demographic data from contemporary time periods (1971–2002; see references in Table 1 for specific study periods). See Methods section in text for definitions. The component of the population that can be accounted for through nest-site monitoring is cross-hatched. For all species effects of harvest on populations below the harvest rate at maximum sustainable yield (MSY) are primarily in population segments that are not associated with nest sites. Above the MSY harvest rate, nest-site occupancy and production are maintained at lower equilibrium levels than would otherwise be supportable.

differs considerably depending on the age classes included in the harvest and, as expected, is greatest for a harvest of eyases and lowest for a harvest of adults (Table 3; Fig. 2). The MSY passage harvest rate varies among species in accordance with variation in vital rates (Fig. 3) and this variation also is apparent in changes in λ for unsaturated populations of those species (Fig. 4).

Discussion

Our results suggest that the sustainability of falconry harvest varies among raptor species in accordance with variation in vital rates. Model predictions indicate a comparatively low relative harvest potential for several species (Eurasian sparrowhawk, red-tailed hawk, American kestrel, prairie falcon). We suspect this is largely due to the underestimation of vital rates for these species because survival rates for them were derived from banding or marking studies that did not include unbiased correction for emigration, and to a lesser degree for the effects of differential mortality among age classes, which can affect reporting rates (Newton 1979, Kenward et al. 2000). In contrast, vital rate estimates for goshawks, golden eagles, and to a lesser degree, peregrine falcons, were based on radiotracking or marking studies that allowed for estimation and correction for these biases. As Kenward et al. (2000) showed, banding and marking typically greatly underestimate survival in raptors relative to findings for the same populations from radiotagging studies. Our findings highlight the need for better information on vital rates of these raptors.

Our model output confirms, at least for the peregrine falcon, that the impacts of harvest are proportional to the age of the cohort harvested, with nestling harvest having the least impact. This is consistent with findings of many previous studies that show raptor populations are most sensitive to changes in adult mortality rates (Newton 1979). Changes in raptor populations in response to sustainable harvest are largely restricted to the subadult and floating adult components of the populations, neither of which is amenable to population monitoring by traditional methods of counting breeding adults and young at nest sites. Overharvest initially would produce a decrease in the number of floating adults, which likely would increase the

Table 3. Summary of model output for 8 species of raptors using demographic data in Table 1. All original demographic data are from contemporary time periods (1971–2002); specific dates of individual studies can be found by consulting the references in Table 1. The floater/breeder ratio (ζ) is descriptive of saturated populations at Moffat's equilibrium, whereas the annual rate of population change (λ) is applicable for populations that are below carrying capacity and still capable of growth. The harvest rate at maximum sustainable yield (MSY) assumes populations are at Moffat's equilibrium and likely are not representative of maximum sustainable harvest rates for all populations of the species.

Species	Age of harvest	Initial ζ	Initial λ	Harvest rate at MSY
Eurasian sparrowhawk	Passage	0.26	1.07	0.06
Northern goshawk	Passage	0.39	1.05	0.16
Harris's hawk	Passage	0.45	1.45	0.41
Red-tailed hawk	Passage	0.25	1.03	0.09
American kestrel	Passage	0.14	1.04	0.03
Peregrine falcon	Eyas	0.46	1.06	0.31
Peregrine falcon	Passage	0.46	1.06	0.16
Prairie falcon	Passage	0.37	1.07	0.06
Golden eagle	Passage	1.35	1.07	0.31

number of younger breeders at nests (Newton 1979, Ferrer et al. 2003) and could eventually cause a decrease in nest-site occupancy. Monitoring trends in the age of breeders at nests could provide an early indication of decline (Ferrer et al. 2003), but such a pattern also would also be expected in an unsaturated population that was increasing (Newton and Mearns 1988, Tordoff and Redig 1997).

Our models oversimplify what would be expected to occur in nature, and ideally our predictions should be tested experimentally with wild populations. We encourage study in this area but recognize that the logistics of such work will be daunting given the difficulty measuring population responses among nonbreeders. Previous attempts to estimate sustainable harvest rates for raptor populations have examined empirical data on rates of recovery of depleted populations, sustainability of populations under persecution, or, in one case, population responses to experimental harvest (Conway et al. 1995, Kenward 1997). The conclusions of these analyses generally mirror what we found: that many raptor populations can sustain eyas or passage harvest rates of 10–20% and sometimes higher. This increases our confidence in the results presented here. That said, we also believe a degree of caution is warranted in applying these results. The MSY approaches to harvest management frequently overestimate sustainability, and monitoring capabilities often are not adequate to determine when harvest rates need to be reduced or modified (Ludwig et al. 1993). Moreover, deterministic models can produce overly optimistic projections of sustainability by masking the consequences of stochastic events that can temporarily depress production or elevate mortality (Beissinger and Westphal 1998).

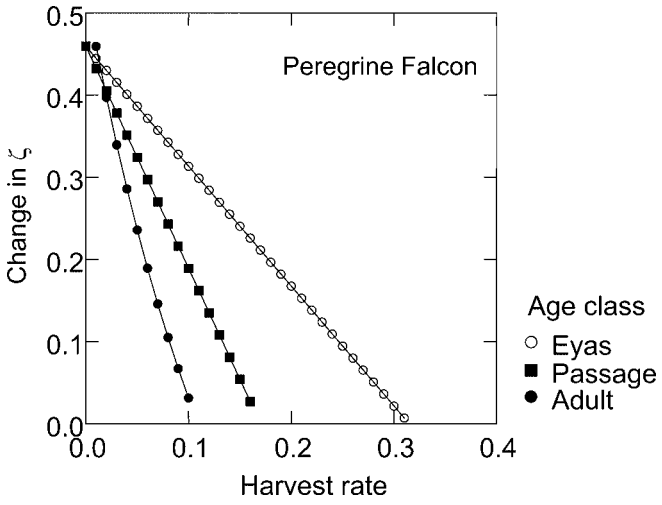

Figure 2. Change in floater/breeder ratio (ζ) with increasing harvest rate in a hypothetical peregrine falcon population at Moffat's equilibrium, using demographic data in Table 1. Under these demographic parameter values, the harvest rate at maximum sustainable yield is 3 times greater for an eyas-only harvest compared to a harvest of adults.

In our models we used demographic values that, while realistic for the species, are not likely representative of all populations of those species at all times. Though this justifies caution in applying our findings to local populations, we believe that our overall findings are representative for raptor populations in healthy condition. In declining populations, harvest would amplify declines commensurate with harvest rate. However, to determine the ultimate effects of falconry harvest on a declining raptor population, it would be important to know the cause of the decline. For example, we doubt that raptor populations declining due to locally deteriorating habitat conditions or declines in food availability would be appreciably impacted over the long term by falconry harvest if the proportion harvested remained constant through the range of changes in population size. This is because, once the population reached carrying capacity under the new conditions, demographic values would be expected to stabilize at healthy levels. On the other hand, population declines in species experiencing excessive mortality or reproductive failure would be exacerbated by harvest at any level and, unless the underlying cause of the decline was remedied or the harvest stopped, extirpation or extinction would occur more rapidly than would otherwise be the case.

Our analyses, which assume that raptor harvest constitutes an irrevocable additive mortality effect on populations, are conservative for 2 reasons. First, not all raptors harvested by falconers are permanently removed from the wild. Mullenix and Millsap (1998) reported that about 40% of falconer-

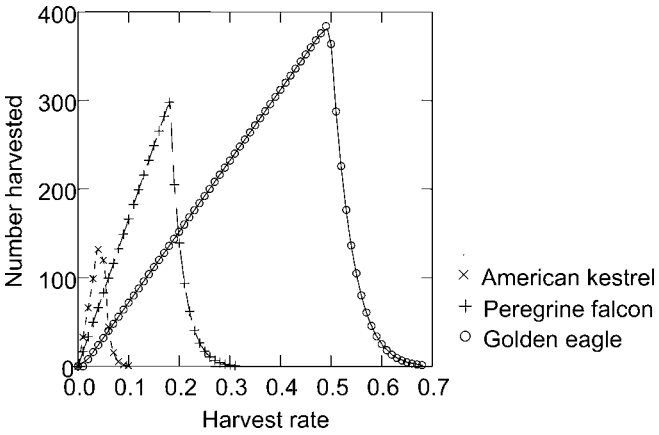

Figure 3. Harvest equilibrium curves for 3 species of raptors representing the range of harvest potential observed. Modeled harvest is of passage individuals, and models use the demographic data for each species from Table 1.

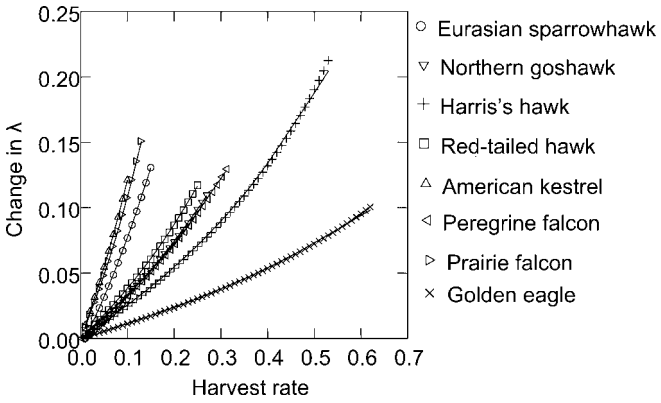

Figure 4. Change in population growth rate (λ) with changing passage harvest rate for 8 species of raptors at harvest levels below maximum sustainable yield, using demographic parameter values from Table 1.

harvested red-tailed hawks and American kestrels are either purposefully or accidentally returned to the wild each year. Survival rates and fitness of these birds are unknown, but some almost certainly survive and return successfully to the wild population. For example, in Great Britain, the northern goshawk was reestablished as a breeding species from escaped falconry stock (Kenward 1974, Kenward et al. 1981). Second, Conway et al. (1995) found that nestling prairie falcons left in nests from which siblings were harvested had higher survival and breeding-recruitment rates than nestlings from unharvested nests. This suggests that in the case of eyas harvest there may be a compensatory effect of harvest on survival of remaining nestlings.

Management Implications

Our results suggest that harvest strategies employed by agencies seeking to regulate the take of raptors by falconers should manage take based on each species' ability to sustain harvest, recognizing that for some species the state of current knowledge probably underestimates that capacity. Further, we believe that harvest rates should be conservative given the potential for MSY-based analyses to overestimate sustainability and the impracticality of measuring the actual effects of harvest on wild raptor populations. Finally, limiting take to eyas and passage raptors, as is currently the case for most species, is an effective strategy for limiting effects of harvest on populations.

As a practical guide, we recommend that in the United States, harvest of juvenile raptors be limited to one-half of the estimated MSY up to a maximum of 5%, depending on species-specific estimates of capacity to sustain harvest. We suggest that the available information on vital rates are sufficient to justify harvest rates of up to 5% for northern goshawks, Harris's hawks, peregrine falcons, and golden eagles; species with estimated MSYs greater than twice this value. We advocate harvest rates of one-half MSY for other North American species we assessed and harvest rates of 1% for species without adequate demographic data to estimate MSY until better estimates of vital rates confirm greater harvest potential (Table 2). We believe that harvest rates below these levels are unlikely to produce discernible effects on raptor numbers or the sustainability of otherwise healthy populations and probably are inconsequential in declining populations if those declines are caused by a reduction in the amount of suitable habitat or prey availability.

One obvious difficulty in this approach is the lack of reliable annual information on abundance for raptor species from which to calculate harvest rates. The BBS-based abundance estimates we used here likely are conservative for most species, particularly with the modification we employed that eliminated the visibility correction factor used by Rich et al. (2004). Given this, and considering that most raptor populations tend to be fairly stable from year to year (Newton 1979), annual estimates of abundance may not be necessary for management of falconry take. Rather, we suggest the approximate annual harvest rate estimates derived from known annual harvest divided by the estimated number of juveniles in Table 1 should suffice to identify species for which harvest might be approaching the thresholds identified here. Under this approach, we suggest that juvenile population-size estimates for species with declining BBS trends be recalculated every 3 years and that those for other species be revised every 6 years. While BBS-based population estimates will never be ideal for raptors, they could be improved if future recalculations included some measure of annual variation so that confidence intervals could be constructed for the estimates.

The approach outlined above seems particularly appropriate when one considers that estimated harvest rates in 2003 and 2004 for all raptor species in the United States were well below the recommended thresholds. The primary harvest regulation mechanism in effect in these years was a 2-bird-per-falconer limit on the number of raptors that could be removed from the wild each year, in conjunction with an overall maximum possession limit of 3 birds. Thus, even with some 4,250 licensed falconers in the United States (USFWS files) and a potential harvest of up to 8,500 raptors, harvest rates were extremely conservative under this

regulatory framework; only 11.7% of the recommended allowable take occurred.

Although we include golden eagles in our analysis, harvest of golden eagles is regulated differently than other falconry species. The Bald and Golden Eagle Protection Act (16 U.S.C. 668–668d) provides added restrictions specific to the take of golden eagles: only falconers with >7 years of overall falconry experience and eagle-handling experience may take golden eagles from the wild and only in certified depredation areas. Therefore, take of golden eagles for falconry is far more limited than is other falconry harvest.

Our assessment indicates take of wild raptors for falconry is very unlikely to have a significant adverse impact on wild raptor populations in the United States. Because of the limited participation in falconry and because nearly half of all raptors used in the sport are produced through captive breeding and not taken from the wild (Peyton et al. 1995), we believe impacts are unlikely to increase. Nevertheless, our recommendations provide a relatively easy and cost-effective way to track the potential national impact on an annual basis using harvest reports already being provided by falconers. Only if the potential for impacts increase, either through substantial growth in the number of licensed falconers or an increase in harvest rates for a particular species, would additional safeguards be necessary.

Acknowledgments

We are indebted to G. Hunt for help in all phases of this analysis, but particularly for sharing software for modeling raptor population structure at Moffat's equilibrium. The manuscript benefited greatly from reviews and constructive criticism by W. Burnham, J. Enderson, G. Hunt, R. Kenward, M. Mullenix, K. Wilkins, and an anonymous reviewer.

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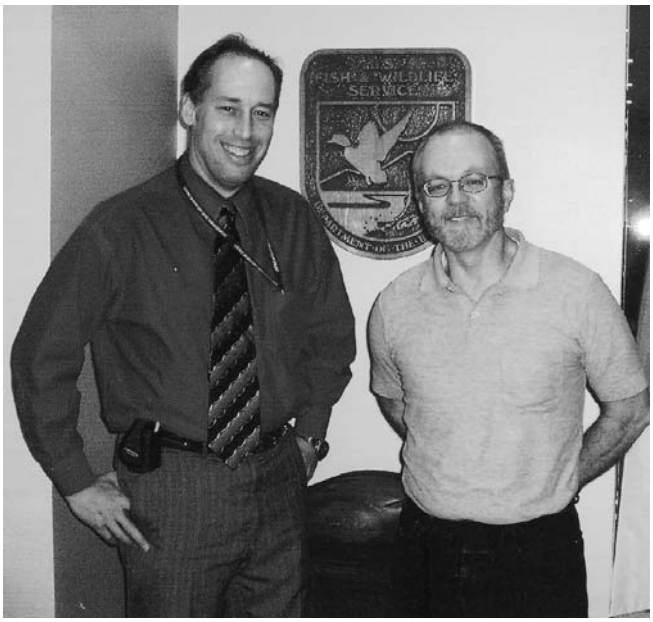

Brian A. Millsap (left) is currently New Mexico State Administrator for the United States Fish and Wildlife Service, but at the time this paper was written he was Chief of the United States Fish and Wildlife Service's Division of Migratory Bird Management in Arlington, Virginia, a position he held since 2002. He holds a B.S. in wildlife biology from Colorado State University and an M.S. in evolutionary and systematics biology from George Mason University. Prior to working for the Fish and Wildlife Service, he served as Chief of the Bureau of Wildlife Diversity Conservation for the Florida Fish and Wildlife Conservation Commission, as a raptor biologist for the National Wildlife Federation, and as a wildlife biologist for the Bureau of Land Management in Arizona and Wyoming. He is a past president of the Raptor Research Foundation, North American Falconers Association, and Florida Chapter of the Wildlife Society. ***George T. Allen*** (right) is the Chief of the Branch of Policy, Permits, and Regulations in the Division of Migratory Bird Management. He completed a B.S. at the Pennsylvania State University, an M.S. in Environmental Science at Washington State University, and a Ph.D. in zoology at North Dakota State University. He has worked for the Washington Department of Wildlife and for the Fish and Wildlife Service. He spent about 10 years assessing environmental contaminants for the Service before moving to Migratory Bird Management, where he's been for about 9 years. He served as President of the Kansas Chapter of the Wildlife Society and Newsletter Editor for the Central Mountain and Plains Section.

Associate Editor: *Euler.*

APPENDIX E

Draft Reporting Forms

U.S. FISH & WILDLIFE SERVICE - MIGRATORY BIRD PERMIT OFFICE
EAGLE TAKE (§ 22.26) - ANNUAL REPORT

PERMITTEE: _____
ADDRESS: _____
_____
City State Zip Code
9 Check here if reporting a change of name, address, or contact inform

PERMIT NUMBER: _____
REPORT FOR CALENDAR YEAR*: _____
REPORT DUE DATE: _____
PHONE: (_____)_____-_____
Email: _____

INSTRUCTIONS: Type or print the information requested below for each Important Eagle-Use Area (IEUA) identified on your permit during the year covered by this report and return the completed report to the above address by the due date. Filing an accurate annual report is a condition of your permit. Failure to file a timely report can result in permit suspension. Please note that the absence of eagles from an IEUA you are monitoring will in no way affect the continued validity of your permit. Accurate reporting will play an essential role in future eagle management**. Use a separate supplemental sheet for each IEUA identified on your permit.**
MAKE SURE YOU SIGN & DATE THE CERTIFICATION STATEMENT BELOW BEFORE YOU SUBMIT YOUR REPORT. (50 CFR parts 13, 21, & 22)

IMPORTANT USE AREA :

Identify nest, communal roost, or foraging area. If more than one of one type of IEUA is identified on your permit, designate which nest (or roost or foraging area) data applies to.

DATE EAGLES OBSERVED	**TIME OF DAY**	**NUMBER OF EAGLES OBSERVED** (If in large numbers, please estimate)	**OBSERVED BEHAVIOR** P – perched F – feeding N – sitting on or attending nest IF– in flight	**DESCRIPTION OF HUMAN ACTIVITY AT TIME EAGLES WERE OBSERVED** (e.g., surveying; excavation; pile driving; interior work, etc.) If activity is completed, enter "Completed"

CERTIFICATION: I certify that the information in this report is true and correct to the best of my knowledge. I understand that any false statement herein may subject me to the criminal penalties of 18 U.S.C. 1001.

Signature: _____ Date:

OMB No. 1018-xxxx Expires x/xx/xxxx Form 3-202-15

SUPPLEMENTAL SHEET

EAGLE TAKE ANNUAL REPORT **REPORT YEAR_____** **SUPPLEMENTAL PAGE #:____**

PERMITTEE:_____ **PERMIT NUMBER:_____**

IMPORTANT USE AREA :

Identify nest, communal roost, or foraging area. Use a separate supplemental sheet for each IUA

DATE EAGLES OBSERVED	**TIME OF DAY**	**NUMBER OF EAGLES OBSERVED** (If in large numbers, please estimate)	**OBSERVED BEHAVIOR** P – perched F – feeding N – sitting on or attending nest IF– in flight	**DESCRIPTION OF HUMAN ACTIVITY AT TIME EAGLES WERE OBSERVED** (e.g., surveying; excavation; pile driving; interior work, etc.) **If activity is completed, enter "Completed"**

FWS FORM 3-202-15

U.S. FISH & WILDLIFE SERVICE - MIGRATORY BIRD PERMIT OFFICE
EAGLE NEST TAKE (§ 22.27) - REPORT

PERMITTEE: _____
ADDRESS: _____
_____
City State Zip Code
9 Check here if reporting a change of name, address, or contact information

PERMIT NUMBER: _____
REPORT FOR CALENDAR YEAR*: _____
*Programmatic take only
PHONE: (_____)_____-_____
Email: _____

Instructions: Complete all sections. MAKE SURE YOU SIGN & DATE THE CERTIFICATION STATEMENT BELOW BEFORE YOU SUBMIT YOUR REPORT.

1. ☐ Bald Eagle Nest Take ☐ Golden Eagle Nest Take

2. Did (does) the permit authorize take of a specific nest or nests?

☐ Yes. ☐ No, the permit authorizes programmatic nest take.

3. Provide the following information for each authorized nest take. If more than one nest was taken, please complete a supplemental page for each nest.

A. Date the authorized nest take occurred: ____ /____/_____

B. Location of the nest that was taken: _____

C. Disposition of the nest: ____Destroyed ____Relocated within territory ____Relocated outside territory ____Donated to a permitted recipient ____Destroyed, substitute nest provided in territory ____Destroyed, substitute nest provided outside territory

D. If nest was relocated or a substitute nest provided, are adult eagles tending the new nest? ____Yes ____No ____No, but nest removal was conducted outside eagle breeding season ____ Do not know

E. If nest was active, disposition of chicks and eggs (e.g., name and contact information of permitted rehabilitator, State agency, or USFWS):

_____

4. Describe the mitigation measures you have conducted to offset the nest take. If your permit does not require mitigation, you may leave this blank.

CERTIFICATION: I certify that the information in this report is true and correct to the best of my knowledge. I understand that any false statement herein may subject me to the criminal penalties of 18 U.S.C. 1001.

Signature: _____ Date:

OMB No. 1018-xxxx Expires x/xx/xxxx Form 3-202-16

EAGLE NEST TAKE REPORT **SUPPLEMENTAL SHEET**

PERMITTEE:_____	**REPORT DATE _____** **PERMIT NUMBER:_____**	**SUPPLEMENTAL PAGE #:____**

3. Provide the following information for each authorized nest take.

A. Date the authorized nest take occurred: ____ /____/_____

B. Location of the nest that was taken: _____

C. Disposition of the nest: ____Destroyed ____Relocated within territory ____Relocated outside territory ____Donated to a permitted recipient ____Destroyed, substitute nest provided in territory ____Destroyed, substitute nest provided outside territory

D. If nest was relocated or a substitute nest provided, are adult eagles tending the new nest? ____Yes ____No ____No, but nest removal occurred outside the eagles breeding season ____ Do not know.

E. If nest was active, disposition of chicks and eggs (e.g., name and contact information of permitted rehabilitator, State agency, or USFWS):

_____

4. Describe the mitigation measures you have conducted to offset the nest take. If your permit does not require mitigation, you may leave this blank.

FWS FORM 3-202-16

APPENDIX F

Projected Change in Total Population for States Having Large Bald Eagle Populations, 2000 to 2030

State	Numerical Change	Percent Change
Wisconsin	787,089	14.7
Minnesota	1,386,651	28.2
Delaware	229,058	29.2
Maryland	1,725,765	32.6
Virginia	2,746,504	38.8
North Carolina	4,178,426	51.9
South Carolina	1,136,557	28.3
Georgia	3,831,385	46.8
Florida	12,703,391	79.5
Washington	2,730,680	46.3
Oregon	1,412,519	41.3
California	12,573,213	37.1
Alaska	240,742	38.4

Data from United States Census Bureau, Population Division, Interim State Population Projections, 2005. Internet release date: 21 April 2005.

APPENDIX G

Counties among the 100 Fastest Growing that Also have Bald Eagle Breeding Sites

Rank	Geographic Area	Rank	Geographic Area
1	Flagler County, FL	48	Stafford County, VA
2	Sumter County, FL	49	Canyon County, ID
5	Loudoun County, VA	55	Bryan County, GA
6	Henry County, GA	57	Carver County, MN
7	Pinal County, AZ	59	Montgomery County, TX
11	Osceola County, FL	61	Lake County, FL
12	Douglas County, CO	63	Collier County, FL
14	Lincoln County, SD	64	Horry County, SC
15	Cherokee County, GA	65	Baldwin County, AL
17	Delaware County, OH	66	James City County, VA
19	Madison County, ID	69	Clay County, FL
20	Scott County, MN	71	Union County, GA
22	Lee County, FL	72	Beaufort County, SC
23	St. Johns County, FL	75	Archuleta County, CO
26	Walton County, FL	76	King George County, VA
27	St. Lucie County, FL	77	Wakulla County, FL
30	Culpeper County, VA	79	Indian River County, FL
32	Weld County, CO	80	Suffolk City, VA
34	Wright County, MN	82	Grand County, CO
36	Sherburne County, MN	85	Isanti County, MN
41	Brunswick County, NC	87	New Kent County, VA
42	St. Croix County, WI	89	Lee County, GA
44	Deschutes County, OR	90	Currituck County, NC
45	Prince William County, VA	96	Williamson County, TN
46	Dallas County, IA		

From Housing Unit Estimates for the 100 Fastest Growing Counties With 5,000 or More Housing Units in 2006, United States Census Bureau, August 2007.

APPENDIX H

Eagle/Aircraft Collisions

Table H.1. Bald Eagle/Aircraft Collision Information

USAF Bird Air Strike Hazard Data 1985-2006[a]		FAA Wildlife Strikes Jan 1990-May 2007[b]	
State	Strikes	State	Strikes
Alaska	1	Alaska	42
Idaho	1	California	1
Michigan	1	District of Columbia	2
Nebraska	1	Florida	20
North Carolina	1	Idaho	2
Oklahoma	1	Illinois	1
Texas	2	Louisiana	2
Unknown	1	Maine	1
Washington	2	Michigan	1
		Minnesota	2
		Mississippi	1
		North Carolina	1
		Nebraska	1
		New Jersey	1
		New York	1
		Unknown	2
		Virginia	3
		Washington	3
Totals	11		87

[a] Data acquired via e-mail from the United States Air Force Bird Airstrike Hazard Team on 8 August 2007.

[b] Source: FAA National Wildlife Strike Database (Level IIIA) - Version 8.8. Downloaded Oct 1, 2007.

Table H.2.Golden Eagle/Aircraft Collision Information

USAF Bird Air Strike Hazard Data 1985-2006[a]		FAA Wildlife Strikes Jan 1990-May 2007[b]	
State	Strikes	State	Strikes
Arizona	3	California	2
Arkansas	1	Montana	1
California	2	Unknown	1
Colorado	1		
Kansas	1		
Louisiana	1		
Maryland	1		
Mississippi	2		
Nebraska	1		
Nevada	1		
New Mexico	2		
North Carolina	1		
Oklahoma	1		
Oregon	1		
Texas	2		
Unknown	7		
Totals	28		4

[a] Data acquired via e-mail from the United States Air Force Bird Airstrike Hazard (B.A.S.H.) Team on 8 August 2007. Table reflects only those confirmed by experts at the Smithsonion Institute as eagles. There are an additional 203 strikes falling under the general categories of “hawks, eagles, kites” and “hawks, eagles, vultures, falcons” for which the species was not determined.

[b] Source: FAA National Wildlife Strike Database (Level IIIA) - Version 8.8. Data accessed 1 October 2007.

APPENDIX I

Existing Eagle Permits

Bald Eagle

Table I.1. Scientific Collecting

Year	State	Actions Authorized						Actions Reported			
		Birds	Trap and Release	Relocate	Eggs	Nests	Age	Eggs	Action	Birds	Action
2002	AK	0	0	0	5	0		0			
2002	AK	0	0	0	15	0		2	Held		
2002	AK	0	0	0	15	0		1	Held		
2002	AK	0	0	0	15	0		0			
2002	AK	0	0	0	30	0		7	Held		
2002	AK	0	0	0	15	0		0			
2002	AK	0	0	0	15	0		10	Held		
2004	AK	20	0	0	20	0	Eggs, Runt Chicks				
2006		0	100	0	0	0		0		23	Sampled, Released

No permits were given to trap and retain bald eagles.

Bald Eagle

Table I.2. Depredation

Year	Service Region	State	Relocate	Haze	Birds	Action
2002	1	OR	0	4	0	
2004	6	UT	0	10	10	Hazed
2005	3	WI	0	1	50	Hazed
2005	6	NE	0	20	0	
2006	1	OR	0	12	6	Hazed
2006	1	WA	0	1	3	Hazed
2006	3	MO	0	1	0	
2006	6	CO		4	2	Hazed
2006	6	NE		20	0	
2007	1	OR	0	12	5	Hazed
2007	6	NE	0	20	0	
2007	3	MN	5	1	0	
2007	3	WI	0	1	0	

No permits were given to take, trap and retain, or take eggs or nests.

Golden Eagle

Table I.3. Scientific Collecting

Year	State	Trap and Release	Relocate	Haze/Harass	Birds
2002	WY	30	0	0	7
2002	WY	40 over 3 years	0	0	7
2003	WY, CO	0	15 over 3 years	0	0
2006	UT	0	0	30 Nests	0
2007	NM	0	3	0	3
2007	UT	0	0	10 Nests	0
2007	WY	0	0	10 Nests	0
2007	CO	0	0	10 Nests	0

No permits were given for take of eggs or nests.

Table I.4. Resource Recovery Nest Take

Year	State	Authorized	Action	Number	Action
2002	WY	1	Relocate man-made nest	0	-
2002	WY	1	Take	0	-
2002	WY	2	Take/Transport - mine	0	-
2002	WY	1	Relocate - mine	0	-
2003	CO	1	Remove from tower	1	Relocated
2003	NM	1	Remove from tower	1	Relocated
2003	WY	1	Take -mine reclamation	0	-
2004	WY	2	Relocate - mine	2	Relocated
2005	CA	1	Take	1	Destroyed
2005	NM	1	Remove/relocate/block access - cliffs near turbines	2	Relocated
2005	MT	1	Take - mine	0	-
2006	SD	2	Remove/relocate - transmission line	2	Relocated
2006	WY	1	Relocate	0	-
2006	WY	2	Relocate	1	Relocated
2007[a]	NM	3	Relocate		
2007	NM	1	Remove/block access - cliffs near turbines		

[a] Reports for 2007 not yet received.

No permits were given to kill or to trap and retain, or to relocate.

No take of eggs was authorized.

Table I.5. Indian Religious Take

Year	State	Authorized	Reported Take	Age
2002	AZ	40	14	Nestling
2003	AZ	40	12	Nestling
2004	AZ	40	26	Nestling
2005	AZ	40	25	Nestling
2006	AZ	40	22	Nestling
2006	NM	2	2	Immature
2007	AZ	40	36	Nestling
2007[a]	NM	1		-
2007	NM	2		Mature
[a] Report for 2007 not yet received.				

No permits were given for take of eggs or nests.

Table I.6. Depredation Permits

Year	State	Trap/ Retain	Relocate	Eggs	Haze	Birds	Action	Eggs	Action	Nests	Action
2002	OR	0	0	0	1	0		0			0
2002	SD	0	1	0	1	7	Relocated	0			0
2002	WY	0	1	0		1	Trapped and Released	0			0
2003	SD	0	1	0	1	0		0			0
2003	UT	0	10	0	10	0		0			0
2003	WY	0	1	0	1	6	Transferred for Falconry	0			0
2003	WY					1	Banded	0			
2004	CA	0	15	0		4	Relocated	0			0
2004	UT	0	16	0	16	9	Relocated	0			0
2004	UT					5	Hazed	0			
2004	WY	8	0	0		4	Transferred for Falconry	0			0
2005	CA	0	10	2		4	Relocated	2	Destroyed	2	Destroyed
2005	CA	0	0	0	2	2	Hazed	0			0
2005	CA	0	20	0		4	Relocated	0			0
2005	SD	0	1	0	1	0		0			0
2005	UT	0	15	0	15	0		0			0
2005	WY	8	0	0		4	Transferred for Falconry	0			0
2006	CA	0	10	0		3	Relocated	0			0
2006	CA	0	0	0	2	2	Hazed	0			0
2006	SD	0	1	0	1	0		0			0
2006	WY	10	0	0		5	Transferred for Falconry	0			0
2007	CA	0	-1	0		3	Relocated	0			0
2007	WY	10	0	0				0			0
2007	UT	0	15	0	15			0			0

No take of live eagles or nests was authorized.

APPENDIX J

Activities for Which Service Regions Anticipate Requests for Permits Developed Under This Proposal

Table J.1. General Development Activities

Region	Private (Housing)	Commercial	Government Sponsored	Transportation
1	X	X	X	X
2	X	X	X	X
3	X	X	X	X
4	X	X	X	X
5	X	X	X	X
6	X	X	X	X
7	X	X	X	X
8	X	X	X	X

Table J.2. Energy Exploration and Development Activities

Region	Fluid Minerals (oil, gas, geothermal)	Coal and Other Energy Mining	Geophysical Exploration	Pipelines and Transmission Corridors	Power Plants	Hydro-electric
1	X			X	X	X
2	X	X	X	X	X	
3	X	X	X	X	X	X
4	X		X	X	X	X
5	X	X		X	X	X
6	X	X	X	X	X	X
7	X		X	X	X	
8	X			X	X	X

Table J.3. Types of Activities Potentially Resulting in Disturbance

Region	Non-energy Mining	Agricultural and Habitat-related Activities[a]	Recreation	Aircraft and Airfields	Military Training	Timber Harvest
1		X	X	X		X
2		X	X	X	X	
3	X	X	X	X	X	X
4	X	X	X	X	X	X
5	X	X	X	X	X	X
6	X	X	X	X	X	X
7	X		X	X	X	X
8		X	X	X		X

[a] For disturbance associated with carrying out activities. This category also covers activities such as habitat restoration and Clean Water Act Section 404 permitting.

Table J.4. Types of Activities Potentially Resulting in Mortality

Region	Power Lines	Communication Towers	Wind Development	Transportation	Timber Harvest
1	X	X	X		X
2	X	X	X		
3	X	X	X		X
4	X	X			X
5	X	X	X	X	X
6	X	X	X	X	X
7	X	X	X		X
8	X	X	X		X

DIVISION OF MIGRATORY BIRD MANAGEMENT