

Final Environmental Impact Statement

Management of Conflicts Associated with Double-crested Cormorants



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Final Environmental Impact Statement

For the Management of Conflicts Associated with Double-crested Cormorants

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The U.S. Fish and Wildlife Service (Service) and its mission

"Our mission is working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people."

The Service was established in the Department of the Interior (DOI) in 1940 through the consolidation of bureaus then operating in several federal departments. The primary precursor agency was the Bureau of Biological Survey in the U.S. Department of Agriculture (USDA). Today, the Service enforces federal wildlife laws, manages migratory bird populations, restores nationally significant fisheries, conserves and restores vital wildlife habitat, protects and supports recovery of endangered species, and helps other agencies and governments with conservation efforts. In addition, it administers the distribution of over one billion dollars of excise taxes paid by the hunting, shooting, boating, and angling industries. These funds are distributed to states for fish and wildlife restoration, boating access, hunter education, and related programs.

Summary

The double-crested cormorant (cormorant, *Phalacrocorax auritus*) is a fish-eating migratory bird that is distributed across a large portion of North America. Pursuant to the Migratory Bird Treaty Act (MBTA), it is protected from take unless authorized by the Secretary of the Interior (16 U.S.C. §§ 703-712). The U.S. Fish and Wildlife Service (Service) continues to receive requests from federal, state, tribal, and private entities to lethally take cormorants to alleviate damage and conflicts associated with aquaculture and fishery resources, property, natural resources, and threats to human health and safety. In addition, the Service receives requests to take cormorants for research purposes.

Background

The Service currently reviews and issues individual, site-specific depredation permits in the lower 48 United States (U.S.) pursuant to two separate analyses conducted under the National Environmental Policy Act (NEPA). An Environmental Assessment (EA) developed in 2017 evaluates issuing depredation permits to take cormorants for specific circumstances across 37 central and eastern states and the District of Columbia. In addition, the Service currently authorizes take of cormorants in the western U.S. using guidelines and frameworks associated with a 2015 final environmental impact statement (EIS) evaluating a cormorant management plan to reduce predation on fish resources in the Pacific flyway.

The Service, in cooperation with United States Department of Agriculture, Wildlife Services (WS), prepared this final Environmental Impact Statement (FEIS) to comprehensively present the environmental consequences of making decisions that authorize the take of cormorants to alleviate damage and conflicts in the lower 48 states (excluding Alaska and Hawaii). Pursuant to the MBTA, which implements four international migratory bird conventions, the Service is responsible for maintaining sustainable populations of cormorants and authorizing take when the take is compatible with these conventions. Therefore, the Service is responsible for determining the maximum amount of lethal take that can occur in order to minimize damage and conflicts, while maintaining a sustainable cormorant population. This FEIS presents alternative approaches to authorizing the take of cormorants while maintaining sustainable cormorant populations and the impacts to the human environment associated with those alternative approaches. Based on the analysis in this FEIS, the decision to be made will serve as the primary regulatory approach for managing damage and conflicts associated with cormorants in the contiguous 48 states.

Purpose and Need for Action

As part of the continued effort to address conflicts between cormorants and wild and publicly stocked fisheries and aquaculture facilities, this FEIS evaluates alternatives within the Service's authority to implement measures that address conflicts associated with cormorants within the contiguous 48 United States. Thus, the purpose of the proposed action (a special state/tribal permit) is to establish a long-term, coordinated approach in order to minimize conflicts between cormorants and human interests, while maintaining sustainable populations of cormorants, complying with the Migratory Bird Treaty Act (MBTA), and minimizing the regulatory burden on federal, tribal, and state agencies and individual citizens. The need for this action is to address conflicts and economic damage associated with cormorants while addressing possible impacts to the environment.

The Service conducted four workshops in August 2018, with state fish and wildlife agencies, tribes, and other federal partners to address cormorant-fish conflicts. The Service needs to ensure that any approach, including the proposed action (a special state/tribal permit), is ecologically sound and sustainable in light of physical and biological change, practical, viable, economically realistic, and responsive to the following areas of concern, which were identified in the August 2018 workshops:

- Reduction of predation-related losses of wild and publicly stocked fisheries;
- Reduction of predation-related losses of stocks at aquaculture facilities (aquaculture is the cultivation of aquatic animals and/or plants in natural or controlled aquatic environments for commercial or conservation efforts; in the context here, “aquaculture facilities” refers to any commercial or conservation aquaculture production facility or program that produces fish or other aquatic organisms that are susceptible to cormorant predation or impact during any stage of production, and/or immediately following release into natural or controlled environments);
- Reduction of predation-related losses of federally listed and candidate fish species;
- Reduction of the adverse effects by cormorants on habitats important to bird species of concern through habitat destruction, exclusion, and/or nest competition;
- Reduction of adverse effects on personal property and vegetation, particularly where cormorants nest;
- Reduction of adverse effects on human health and safety;
- Increasing flexibility to federal, tribal, and state agencies to address spatial and temporal complexity of conflicts;
- Ensuring the trust responsibility of the Service to maintain sustainable populations of cormorants; and
- Increasing the level of transparency and accountability of the Service’s decision-making process.

Public Scoping

Public scoping began on January 22, 2020, when the Service published an Advance Notice of Proposed Rulemaking (ANPR; 85 FR 3601) and announced its intent to prepare a NEPA document (42 U.S.C. 4321 et seq.). This notice stated that the Service intended to establish new regulations regarding the management of conflicts associated with cormorants. The comment period for the ANPR continued through March 9, 2020.

A total of four public scoping webinars were convened, two on February 11, 2020, and two on February 12, 2020. Additionally, two webinars provided only to tribal members were conducted on February 19 and 27, 2020. Attendees of all webinars were provided information on the following topics regarding cormorants, their management, and the regulations process: (1) cormorant biology and population changes; (2) background of the issues and previous management approaches; (3) current management of conflicts; (4) proposed approaches and alternatives; and (5) the planning process for NEPA. In response to the ANPR, the Service received 1,404 comments.

On June 5th, 2020, the Service published a draft Environmental Impact Statement (DEIS) and draft rule. The comment period for each continued for 45 days, ending on July 20th, 2020. The Department of the Interior's policy is, whenever possible, to afford the public an opportunity to participate in the rulemaking process. The Service received more than 1,400 comments in response to the ANPR and 1,047¹ in response to the Draft Rule and DEIS. The public may review the comments received at the Federal eRulemaking Portal: <http://www.regulations.gov> in Docket No. FWS-HQ-MB-2019-0103. The Service considered those comments on the ANPR in developing the draft proposed rule, and comments on the DEIS and proposed rule when developing this final rule. Summaries of both sets of public comments are provided in [Appendix B](#).

Alternatives

Following the scoping process, the Service identified a range of potential alternatives. It considered additional suggestions from the public and revised the alternatives outlined in the ANPR. Some of the preliminary alternatives were changed or combined with other alternatives. In concert with the purpose and need for action, these alternatives examine different ways in which the Service can address conflicts associated with cormorants.

Elements Common to All Alternatives

The Service developed a Potential Take Limit (PTL) model to evaluate allowable take of cormorants in the contiguous 48 states. The PTL model allows the Service to integrate biological and policy elements into the decision-making process of authorizing the take of cormorants to manage damage and to manage the cormorant population. The PTL model estimates the maximum allowable annual take of cormorants given management objectives and desired population size. The maximum allowable take is not simply a prescribed take level for cormorants, but is the predicted maximum allowable annual take that corresponds with a biologically sustainable level of annual take based on knowledge of cormorant population dynamics.

The main differences between the potential alternatives pertain to the burden associated with accurately monitoring the authorized and actual take of cormorants throughout the year. In all analyzed alternatives in this FEIS (except the no action alternative), maximum allowable take would be authorized up to 121,504 cormorants per year, nationally. This level of take is the aggregated maximum allowable take for each population of cormorants, which is explained further in [Appendix E](#). Standard permit conditions and permitting procedures are included in [Appendix D](#). Under all alternatives, the Service would: (1) take measures to monitor reported take to ensure the take threshold is not exceeded and (2) establish population monitoring programs that would assess the effects of lethal take on cormorant populations and ensure take is commensurate with population status. Monitoring will inform future decisions regarding levels of allowable take and allocation of that take. States, tribes, and other partners can provide assistance and information regarding monitoring activities and needs.

¹ Regulations.gov shows 1,052 total comments, which comprise 1,047 public submissions, 2 primary documents (proposed rules), and 3 supporting documents (DEIS, 2003 FEIS, and U.S. Army Corps of Engineers documents)

In addition to annually reporting the amount of take that occurred under each alternative, the Service would also produce a report every five years, and additionally as necessary, that provides analyses from population-monitoring efforts and other status information. This report would be provided to the public to promote transparency of decision making and evaluation of the effectiveness of this conflict-management tool. This report would include, but not be limited to: (1) updated cormorant population status and trends; (2) reported lethal take of cormorants nationally and by cormorant populations; (3) updated PTL analyses based on new or more current population information; (4) the state of the conflict and need for continued management as reported by requests for depredation permits (both individually and programmatically by participating states and tribes); and (5) a conflict-management decision and justification for either continued management or a proposed new management approach, if appropriate and needed.

Under each alternative considered, the Service would continue the issuance of depredation permits (50 CFR 21.41), special purpose permits (50 CFR 21.27), and scientific collection permits (50 CFR 21.23). Responsible entities conducting activities under these various permits (such as airports or public health officials) would be required to annually report all take of cormorants under their authorized management activities. The Service would ensure that authorized take resulting from any alternative and all other permit types would not exceed the limit necessary to maintain cormorant populations at sustainable levels.

Alternatives

Alternative A (preferred alternative) - Special Permit for States and Tribes. This alternative would establish a new permit option under 50 CFR part 21 (special double-crested cormorant permit) that would be available to state and tribal fish and wildlife agencies in the 48 contiguous United States to manage conflicts specifically associated with double-crested cormorants on state or tribal-managed lands and waters within their jurisdiction. The Service may issue a permit to reduce conflicts involving depredation at state- and tribal-owned-or-operated aquaculture facilities (including hatcheries); impacts to health and human safety; impacts to federally threatened and endangered species (as listed in under the Endangered Species Act (ESA) of 1973) and state-listed species identified in their state- or tribal-specific legislation as threatened or endangered; impacts to species listed as Species of Greatest Conservation Need in State Wildlife Action Plans; damage to state or tribal property and assets; or depredations of wild and publicly stocked fish managed by state fish and wildlife agencies or federally recognized tribes and accessible to the public. Those states and tribes not wishing to obtain this new permit could apply for depredation permits (50 CFR 21.41) to address conflicts with cormorants within the scope of conflicts established in the no action alternative. Commercial aquaculture facilities experiencing conflicts associated with cormorants could continue to apply for individual depredation permits (50 CFR 21.41).

Alternative B - New Aquaculture Depredation Order. This alternative would establish a new aquaculture depredation order that would apply to landowners, operators, and tenants engaged in the production of aquaculture stocks in the contiguous lower 48 states. Under this alternative, these entities would be authorized, without a federal permit, to take cormorants when found committing or about to commit depredations to aquaculture stocks on or in close proximity to the premises used for the production of such stocks (e.g., nearby roost sites). Under a new aquaculture depredation order, lethal removal of cormorants would be authorized to occur within the boundaries of all types of aquaculture facilities, including commercial aquaculture facilities and state- and tribal-owned-or-operated aquaculture facilities (including hatcheries). Take at each facility would be limited to a certain number of cormorants each year.

Alternative C - Combination of a Special Permit for States and Tribes and a New Aquaculture Depredation Order (AQDO). This alternative combines Alternatives A and B to establish both a new permit option and a new aquaculture depredation order. Each would be established as described above, but differs in how the Service would authorize take at state- and tribal-owned-or-operated aquaculture facilities (including hatcheries) as well as commercial aquaculture facilities. Under a new permit option under 50 CFR part 21 (special double-crested cormorant permit), the Service would authorize states and tribal fish and wildlife agencies to conduct lethal take of cormorants on lands and waters within their respective jurisdictions. The Service would issue this permit when it is expected to reduce impacts related to health and human safety; impacts to federally threatened and endangered species (as listed under the ESA) and state-listed species identified in their state- or tribal-specific legislation as threatened or endangered; impacts to species listed as Species of Greatest Conservation Need in State Wildlife Action Plans; damage to state or tribal property and assets; and depredations of wild and publicly stocked fish managed by state fish and wildlife agencies or federally recognized tribes and accessible to the public. This alternative would also establish a separate regulation establishing a new aquaculture depredation order (as described in Alternative B). A new aquaculture depredation order would apply within the boundaries of all types of aquaculture facilities, including commercial aquaculture facilities and state- and tribal-owned-or-operated aquaculture facilities (including hatcheries). Take at each facility would be limited to a certain number of cormorants each year.

Alternative D - New General Depredation Order. This alternative would establish a new regulation that creates a general depredation order. A depredation order is used to address depredations at a broad scale, when the risk to bird populations from large-scale take is low, and there is a desire to reduce the administrative burdens of applying for and issuing individual depredation permits. A new general depredation order would authorize state fish and wildlife agencies, federally-recognized tribes, and WS to take cormorants found committing or about to commit, and to prevent, depredations on wild and publicly stocked fisheries stocked by state agencies or federally recognized tribes (including hatchery stock at federal, state, and tribal facilities), human health and safety, threatened and endangered species, personal property, and at or near aquaculture facilities. This authority would apply to all lands and freshwaters (with appropriate landowner permission) in the contiguous 48 states. The new general depredation order would authorize direct depredation-control strategies such as nest and egg destruction, nestling/juvenile and adult trapping and lethal removal on cormorant populations in the U.S.

Alternative E - No Action (Current Process). The no-action alternative would be a continuation of the current procedures and frameworks for making decisions regarding the take of cormorants. Those procedures and frameworks are specified in the MBTA Depredation Permit Regulation (50 CFR 21.41) and the Issuance of Permits Regulation (50 CFR 13.21), the 2015 Final Environmental Impact Statement (USACE 2015) for the management of the western subpopulation of cormorants, and the 2017 Environmental Assessment for management of cormorants essentially east of the Rocky Mountains (USFWS 2017).

Affected Environment

The affected environment focuses on aspects of the human environment, including the physical, ecological, and socioeconomic characteristics, within the geographic scope of the proposed action that may be impacted by conflicts associated with cormorants, as well as the regulatory resources required to manage those conflicts. The geographic scope applicable to all alternatives in this FEIS and the affected environment includes the lower 48 contiguous states. This FEIS addresses the following resources and topics:

- Cormorant populations, biology, and life history;
- Interactions and effects of cormorant presence on the human environment, including the aquaculture industry, wild and publicly stocked fisheries, federally listed species, vegetation and property, co-nesting species, and human health and safety;
- Lethal removal of cormorants and how it can affect the human environment;
- Affected cultural and tribal resources; and
- Environmental justice.

Summary of Environmental Consequences Across all Alternatives

Environmental consequences of the No-Action Alternative and the four other alternatives are summarized below.

Resource topic	Alternative A: State/Tribal Permit	Alternative B: AQDO	Alternative C: State/Tribal Permit + AQDO	Alternative D: General Depredation Order	Alternative E: No Action
<i>Cormorant Populations</i>	Negligible adverse impacts; projected population would remain sustainable with use of PTL and maximum allowable take limit and consistent monitoring of populations	Similar to A should the Service develop necessary cormorant take tracking and monitoring systems.	Similar to A should the Service develop necessary cormorant take tracking and monitoring systems.	Minor to moderate adverse impacts; the Service will have the greatest challenge ensuring authorized levels of take stay within the allowable PTL limit.	Similar to A
<i>Wild & Publicly stocked Fisheries</i>	Primarily minor to moderate benefits depending on site variability	No benefits	Similar to A	Same as A, but with a potentially larger geographic scope	No benefits
<i>Aquaculture Industry</i>	Primarily minor to moderate benefits depending on site variability	Similar to A	Similar to A	Same as A, but with a potentially larger geographic scope	Similar to A
<i>Co-nesting Species and Wildlife</i>	Beneficial where efforts to reduce impacts on co-nesting migratory birds from cormorant-related conflicts exist; negligible negative impact to impact species of similar appearance.	Similar to A	Similar to A	Similar to that of A, but across a potentially larger geographic scale	Similar to A
<i>Human Health and Safety</i>	Primarily minor to moderate benefits depending on site variability	Similar to A	Similar to A	Similar to A	Similar to A
<i>Threatened and Endangered Species</i>	Beneficial where efforts to reduce impacts on threatened or endangered species from cormorant-related conflicts exist;	Similar to A	Similar to A	Similar to that of A, but across a potentially larger geographic scale	Similar to A
<i>Cultural Resources</i>	Primarily minor to moderate benefits depending on site variability	Tribes would not be able to address conflicts where wild and tribally stocked fisheries occur	Similar to A	Similar to A, but across a potentially larger geographic scope.	Similar to B

Resource topic	Alternative A: State/Tribal Permit	Alternative B: AQDO	Alternative C: State/Tribal Permit + AQDO	Alternative D: General Depredation Order	Alternative E: No Action
<i>Socio-economics</i>	Broadly beneficial to aquaculture industry and recreational fisheries, though variability would occur due to cormorants shifting from site to site.	Similar to A, however recreational fisheries would be excluded from this scope and socioeconomic losses may continue in these areas.	Similar to A	Similar to A, but across a potentially larger geographic scope.	Similar to B.
<i>Cumulative Impacts</i>	Primarily beneficial	Primarily beneficial but only to aquaculture industry	Similar to A	Same as A, but potentially under a larger geographic scope	Primarily beneficial but only to aquaculture industry

What Happens Next

Upon publication in the federal register of the Notice of Availability of this FEIS, there will be a 30-day waiting period before the publication of the Service's Record of Decision. Publication of the final rule in the federal register will be the final agency action.

The selected alternative's goals, objectives, and strategies will become the primary components of a comprehensive conflict-management approach. Selected management activities and projects would be implemented as funds become available. This document does not constitute a commitment for funding, and future budgets could influence implementation priorities.

TABLE OF CONTENTS

Summary	ii
Background.....	ii
Purpose and Need for Action	ii
Public Scoping.....	iii
Alternatives	iv
Elements Common to All Alternatives	iv
Alternatives	v
Affected Environment	vii
Summary of Environmental Consequences Across all Alternatives	vii
What Happens Next	ix
Abbreviations and Acronyms.....	xv
Introduction	1
Background.....	1
Purpose and Need for Action	3
Decision to be Made	5
Legal and Policy Guidance	5
Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-711; 40 Stat. 755).	5
Animal Damage Control Act of 1931 and Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988 (7 U.S.C. §§ 8351-8352; 46 Stat. 1468).	6
Endangered Species Act (ESA), as amended (7 U.S.C. § 136; 16 U.S.C. §§ 460 et seq.).	6
Environmental Justice and Executive Order 12898.....	6
Executive Order 13186.	7
Native American Policy.....	7
National Environmental Policy Act of 1969 (NEPA).....	7
Public Involvement and Tribal Outreach.....	8
Proposed Federal Action and Alternatives Considered.....	9
Elements Common to All Alternatives	9
Alternative A (preferred Alternative): Special Permit for States and Tribes	11
Alternative B: New Aquaculture Depredation Order.....	13
Alternative C: Combination of the Special Permit for States and Tribes and a New Aquaculture Depredation Order.	13
Alternative D: General Depredation Order.....	14
Alternative E: No Action (Current Process)	15

Differences in Regulatory Frameworks that would address Conflicts Across all Alternatives	18
Alternatives Considered but Dismissed from Further Consideration	19
Removal of Double-crested Cormorants from the List of Species Protected by the Migratory Bird Treaty	19
Conservation Order	20
Regulated Hunting of Cormorants.....	21
No Management Alternative	22
Affected Environment.....	23
Introduction.....	23
Double-crested Cormorants (population, habitat, Life History)	23
Description and Life History	23
Overview of Populations.....	23
Authorized Take of Cormorants Through Previous Depredation Orders and Individual Permits	27
Interactions with and Effects of Cormorants on the Human Environment	28
The Aquaculture Industry	28
Predation-related Losses at Aquaculture Facilities	29
Wild and Publicly Stocked Fisheries, including Federally listed Fish Species	32
Recreational Fisheries and Cormorants	41
Effects of Cormorants on Vegetation	43
Effects of Cormorant Presence on Human Health and Safety	45
Effects of Cormorants on Property.....	46
Lethal Removal of Cormorants and the Human Environment.....	46
Cormorants and Co-nesting Bird Species	46
Federally listed Co-Nesting Species (other than fish).....	48
Use of Lead Ammunition in the Human Environment	49
Affected Cultural and Tribal Resources.....	51
Double-crested Cormorants and Tribal and Cultural Resources	52
Environmental Justice	53
Environmental Consequences	55
Regulatory Effects	56
Direct and Indirect Effects of the Alternatives on Cormorants	56
Maximum Allowable Take of Cormorants under the Proposed Actions.....	56
Potential Take Level and Population Size	56
Effects of Lethal Take on Cormorant Populations as Described in the Alternatives.	57
Direct and Indirect Effects of the Alternatives on Fisheries	63
Impacts from Lead Deposition via Take of Cormorants.....	65
Impacts from Take of Cormorants on Co-nesting Migratory Bird Species and Eagles	66
Impacts from Take of Cormorants on Threatened and Endangered Species (non-fishery)	69

Socioeconomic Impacts from Take of Cormorants (Aquaculture and Recreational Fisheries)	70
Effects to Tribal and Cultural Resources and Environmental Justice.....	72
Health and Human Safety Impacts from Take of Cormorants	73
Impacts to Existence and Aesthetic Values from Take of Cormorants	74
Cumulative Impact Analysis	74
Cormorant Populations	75
Wildlife, Threatened and Endangered Species, and Co-nesting Species	77
Wild and Publicly Stocked Fisheries and Aquaculture	79
Human Health and Safety.....	80
Cultural Resources	80
 Summary of Analysis.....	81
 APPENDIX A. List of Preparers and Consultants	83
 APPENDIX B. Summary of Public Involvement	87
Comments on Advance Notice of Proposed Rulemaking, and Intention to Prepare Draft EIS	87
Comments in Response to the DEIS and Proposed Rule.....	89
 Introduction	90
 Issue 1: Comments on the NEPA and Rulemaking Process	91
 Issue 2: Comments on the Preferred Alternative and Proposed Rule	94
Sub-issue: Comments pertaining to regulatory requirements under the MBTA.....	94
Sub-issue: Comments pertaining to the Scope of Authorized Take under the Proposed Action	96
Sub-issue: Comments pertaining to Implementation of the Proposed Action.....	99
Sub-issue: Use of Nonlethal Methods for Cormorant Management, and Considerations for Types of Lethal Take.....	107
Sub-issue: Use of Decoys for use in Cormorant Management	109
Sub-issue: Take of Cormorants on Private Property	111
Sub-issue: Impacts to Non-target Species from Cormorant Management	112
Sub-issue: Use of Nontoxic Shot for Take of Cormorants	114
Sub-issue: Comments Requesting Clarity on a Cormorant Population Monitoring Program	116
 Issue 3: Comments on the PTL and Impacts to Cormorants, Including the Western Subpopulation of Cormorants	117
Sub-issue: Comments on Data Analyses and Impacts to the Western Subpopulation	117
Sub-issue: Additional Comments on the PTL	124
Sub-issue: Impacts to Cormorants from the Proposed Action	131

Issue 4: Comments Pertaining to Evidence that Cormorant Presence is a Limiting Factor to Fisheries	133
Issue 5: Comments on the DEIS Analyses Unrelated to Cormorant Subpopulations.....	138
Issue 6: Comments in Support of, or Requesting Clarity about other Alternatives	140
Issue 7: Additional Issues not Included in any Particular Category or Theme	152
APPENDIX C. Applicable Statutes, Executive Orders, Policies, and Regulations	157
Cultural Resources.....	157
Fish and Wildlife	157
Water Resources	158
APPENDIX D. Standard Authorization Conditions for Take	159
APPENDIX E. Assessment of Double-crested Cormorant Take.....	163
APPENDIX F. Federally listed Fish Species within the Affected Environment	171
APPENDIX G. Literature Cited	178
APPENDIX H. U.S. Fish and Wildlife Service Application Form; Special Double-crested Cormorant (Migratory Bird Treaty Act; 50 CFR 21.28).....	194
APPENDIX I. U.S. Fish and Wildlife Service Special Double-crested Cormorant Annual Report Form (Migratory Bird Treaty Act; 50 CFR 21.28)	200
Intra-Service Section 7 Biological Evaluation Form	203

LIST OF FIGURES

Figure 1. Breeding range of the six double-crested cormorant populations in North America (appended from Mercer 2008).....	24
Figure 2. Telemetry tracks of 119 cormorants fitted with Global Positioning System transmitters in 2004–2007 (Guillaumet et al. 2011, used with permission).....	25

LIST OF TABLES

Table 1. How conflicts relating to cormorants would be addressed for each alternative.	18
Table 2. Regional pre-breeding double-crested cormorant population estimates (breeding and non-breeding birds combined). Breeding pair/nest estimates were extrapolated (using a multiplier of 2.320 to 2.567) to include non-breeding birds (see Appendix E).	27
Table 3. Overview of Research Examining the Economic Effects of Cormorant Depredation at Aquaculture Facilities.	30
Table 4. Studies conducted examining double-crested cormorant diet and/or their impact on economically important fish species that were not included in the 2003 FEIS.	33
Table 5. ESA-listed Fish Species that Occur within the Subregions of the Affected Environment.	40
Table 6. Freshwater Fishing in the U.S., 2016.	41
Table 7. Selected Fish by Type of Fishing (millions), 2016.	42
Table 8. 2006 National Fish Hatchery Recreational Stocking by Major Species.	43
Table 9. Current cormorant population size estimates and projected population estimates (Neq [lower 95 percent confidence interval; upper 95 percent confidence interval]), based on simulation for Proposed Actions and Potential Take Level.	57
Table 10. Summary of Effects on Cormorant Populations from Lethal Take as Described in the Alternatives.....	62
Table 11. Summary of Effects on Wild and Publicly Stocked Fisheries from Take of Cormorants.	65
Table 12. Summary of Effects on Migratory Bird Species and Eagles from Take of Cormorants.	69
Table 13. Summary of Socioeconomic Effects at Aquaculture Facilities and Recreational Fisheries	71
Table 14. Summary of Effects on Cultural Resources and Environmental Justice from Take of Cormorants.	73
Table 15. Summary of Environmental Consequences across all Alternatives.....	81

Abbreviations and Acronyms

ANPR	Advanced Notice of Proposed Rulemaking
AQDO	Aquaculture Depredation Order
CFR	Code of Federal Regulations
DCCO	Double-crested Cormorant
DEIS	Draft Environmental Impact Statement
DOI	Department of the Interior
DPS	Distinct Population Segment
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESU	Evolutionarily Significant Units
FEIS	Final Environmental Impact Statement
MBTA	Migratory Bird Treaty Act
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
PRDO	Public Resources Depredation Order
PTL	Potential Take Limit
Service	United States Fish and Wildlife Service
USC	United States Code
USDA	United States Department of Agriculture
WS	Wildlife Services

Introduction

The U.S. Fish and Wildlife Service (Service) prepared this Final Environmental Impact Statement (FEIS) to evaluate the effects associated with this proposed action. The FEIS complies with the National Environmental Policy Act (NEPA) in accordance with Council on Environmental Quality regulations (40 CFR 1500-1509) and Department of the Interior (DOI) (43 CFR 46; 516 DM 8) and Service regulations and policies.² A list of those who contributed to development of this FEIS are in [Appendix A](#). NEPA requires examination of the effects of proposed actions on the natural and human environment. We address compliance with other applicable statutes, executive orders, and regulation in [Appendix C](#).

Background

The Migratory Bird Treaty Act of 1918 (MBTA), as amended (16 U.S.C. §§ 703–712), is the implementing legislation for four international conventions with Great Britain (for Canada), Mexico, Japan, and Russia for the protection of migratory birds. The four international conventions require that the United States ensure the preservation of migratory birds. The Service, through the DOI, is responsible for carrying out the purposes of the MBTA (16 U.S.C. § 704). The MBTA prohibits the take (i.e., killing, injuring, or possessing protected birds, their young, eggs, or nests) of migratory birds, which are listed in 50 CFR 10.13, unless authorized (16 U.S.C. § 703). The MBTA allows for the authorization of take of migratory birds when it is compatible with the terms of the four international conventions (16 U.S.C. § 704(a)). The Service implements the provisions of the MBTA through regulations in parts 10, 13, 20, 21, 22 and 92 of title 50 of the Code of Federal Regulations (CFR).

The double-crested cormorant (cormorant) is a fish-eating migratory bird that is distributed across a large portion of North America, and pursuant to the MBTA, is protected from take unless authorized by the Service (16 U.S.C. §§ 703-712). The Service continues to receive requests from federal, state, tribal, and private entities to take cormorants to alleviate damage and conflicts associated with aquaculture facilities, wild and publicly stocked fisheries, property, natural resources, and threats to human health and safety. In addition, the Service receives requests to take cormorants for research purposes.

Prior to 1998, the sole method for authorizing the lethal take of depredating cormorants to alleviate damage and conflicts was through the issuance of depredation permits pursuant to 50 CFR 21.41, which allows the take of migratory birds that are injuring “crops or other interests.” In 1998, the Service published a final rule establishing a depredation order that authorized commercial freshwater aquaculture producers in 13 states to take cormorants without the need for a depredation permit when cormorants were found committing or about to commit depredations on aquaculture stocks. That rule was previously located at 50 CFR 21.47. The Service continued to issue depredation permits to address damage and conflicts to property, natural resources, and threats to human health and safety pursuant to 50 CFR 21.41.

² The Service initiated development of this FEIS was prior to the establishment of updated CEQ regulations on September 14, 2020, and is, therefore, written to comply with the previous regulations.

The increase in the cormorant population across areas of North America and the subsequent range expansion of cormorants has been well documented, along with concerns of the negative impacts associated with the expanding population (e.g., see Taylor and Dorr 2003, Hunter et al. 2006, Atlantic Flyway Council and Mississippi Flyway Council 2010, Pacific Flyway Council 2012). In response to increasing requests for depredation permits to alleviate damage and conflicts associated with cormorants, the Service issued an FEIS pursuant to NEPA and made changes to the regulations governing the take of cormorants in 2003. The 2003 FEIS considered direct, indirect, and cumulative effects of alternatives for cormorant management in the United States and discussed mitigating measures (this 2003 FEIS is available at <https://www.regulations.gov/> for this rulemaking). In November 2003, based on analysis in the FEIS and review of public and agency comments, the Service published a final rule that modified the existing depredation order for aquaculture facilities (previously located at 50 CFR 21.47). The modified depredation order for aquaculture facilities eliminated the need for private individuals, corporations, state agencies, and federal agencies to obtain a depredation permit to take cormorants at aquaculture facilities in 13 states. It also allowed USDA Wildlife Services (WS) employees to take cormorants at roost sites in the vicinity of aquaculture facilities during the months of October, November, December, January, February, March, and April.

The final rule also established a depredation order that authorized federal agencies, state fish and wildlife agencies, and federally recognized tribes in 24 states to take cormorants without the need for a depredation permit to reduce damage to and conflicts with public resources. That depredation order defined a “public resource” as a natural resource managed and conserved by public agencies, which included fish (free-swimming fish and stocked fish at federal, state, and tribal hatcheries that are intended for release in public waters), wildlife, plants, and their habitats. The depredation order for public resources was previously located at 50 CFR 21.48.

To evaluate the potential effects on the cormorant population from the implementation of the two depredation orders, a mitigating measure required by the 2003 FEIS was to review and renew the two depredation orders every five years. Subsequently, the Service developed an Environmental Assessment (EA) pursuant to NEPA in 2009 and again in 2014 that determined that a five-year extension of the expiration date of the two depredation orders would not threaten cormorant populations and activities conducted under the two depredation orders would not have a significant impact on the human environment. Therefore, from October 2003 through May 2016, the Service authorized the take of cormorants under the two depredation orders (which covered certain states), through the issuance of depredation permits for activities and in states not addressed in the two depredation orders, and through the issuance of scientific collecting permits.

In May 2016, the depredation orders were vacated by the United States District Court for the District of Columbia. The Court concluded that the Service did not sufficiently consider the effects of the depredation orders on cormorant populations and other affected resources and failed to consider a reasonable range of alternatives in the 2014 EA pursuant to NEPA. After the Court vacated the two depredation orders, authorizing lethal take of depredating cormorants reverted back to the issuance of individual depredation permits pursuant to 50 CFR 21.41. Currently, the Service is issuing depredation permits in the lower 48 states under two separate environmental reviews conducted pursuant to NEPA. An EA developed in 2017 evaluates issuing depredation permits to take cormorants for specific circumstances across 37 central and eastern states and the District of Columbia (this 2017 EA is available at <https://www.regulations.gov/> for this rulemaking). In addition, the Service is authorizing take of cormorants in the Pacific flyway using guidelines and frameworks associated with a 2015 FEIS evaluating a cormorant management plan to reduce predation on fish resources in the Pacific flyway (this 2015 FEIS is also available at <https://www.regulations.gov/> for this rulemaking).

In accordance with NEPA, the Service, in cooperation with WS, is preparing this FEIS to comprehensively present the environmental consequences of making decisions that authorize the take of cormorants to alleviate damage and conflicts in the contiguous 48 states (i.e., excluding Alaska and Hawaii). Consistent with the MBTA, the Service is responsible for maintaining sustainable populations of cormorants and authorizing take when the take is compatible with the MBTA. Therefore, the Service is responsible for determining the maximum amount of lethal take that can occur in order to minimize damage and conflicts, while maintaining a sustainable cormorant population. This FEIS presents alternative approaches to authorizing the take of cormorants while maintaining sustainable cormorant populations and the impacts to the human environment associated with those alternative approaches.

Purpose and Need for Action

The Service's Migratory Bird Program is increasingly being asked to evaluate and respond to conflicts in which a protected migratory bird species is perceived to be negatively affecting a resource to the extent that intervention is necessary to reduce those effects. Conflicts can occur across social, economic, environmental, and regulatory contexts. Each conflict is somewhat unique in terms of species biology, stakeholders involved, extent of damage, and other factors. These conflicts can range from minimal, such as a minor nuisance, to potentially significant economic and ecological damages or risks to human health and safety.

To better address these conflicts, the Service developed a systematic approach to promote consistency and coordination with stakeholders in identifying and implementing management solutions. This approach consists of a conceptual framework of step-wise guidance to identify needs and potential actions that could be implemented to resolve conflicts, including identifying whether lethal take is necessary, and, if so, the necessary level of lethal take to reduce the conflict.

The Service conducted four workshops in August 2018 with state fish and wildlife agencies, tribes, and other federal partners to address cormorant-fish conflicts. The report summarizing the outcome of these workshops was released in March 2019. The objectives of the workshops were to:

- Gather available information and data regarding the impacts cormorants have on free-swimming fish populations³;
- Better understand the scope and magnitude of cormorant impacts on recreational and commercial fishing;
- Better understand the social and economic importance of the issue; and
- Serve as a model process for addressing avian predation conflicts with other species.

As part of the continued effort to address conflicts between cormorants and wild and publicly stocked fisheries and aquaculture facilities, this FEIS evaluates alternatives within the Service's authority to implement measures that address conflicts associated with cormorants within the contiguous 48 United States. Thus, the purpose of the proposed action (a special state/tribal permit) is to establish a long-term, coordinated approach in order to minimize conflicts between cormorants and human interests, while maintaining sustainable populations of cormorants, complying with the MBTA, and minimizing the regulatory burden on federal, tribal, and state agencies and individual citizens. The need for this action is to address conflicts and economic damage associated with cormorants, while addressing possible impacts to the environment. The Service needs to ensure that this approach is ecologically sound and sustainable in light of physical and biological change, practical, viable, or economically realistic, and responsive to the following areas of concern, which were identified in the August 2018 workshops:

- Reduction of predation-related losses of wild and publicly stocked fisheries⁴;
- Reduction of predation-related losses of stocks at aquaculture facilities (aquaculture facilities refer to the cultivation of aquatic animals and/or plants in natural or controlled aquatic environments for commercial or conservation efforts. In the case of this action, aquaculture references any commercial or conservation aquaculture production facility or program that produces fish or other aquatic organisms that are susceptible to cormorant predation or impact during any stage of production and/or immediately following release into natural or controlled environments);
- Reduction of predation-related losses of federally listed and candidate fish species;
- Reduction of the adverse effects by cormorants on habitats important to bird species of concern through habitat destruction, exclusion, and/or nest competition;
- Reduction of adverse effects on personal property and vegetation, particularly where cormorants nest;
- Reduction of adverse effects on human health and safety;
- Increasing flexibility to federal, tribal, and state agencies to address spatial and temporal complexity of conflicts;
- Ensuring the trust responsibility of the Service to maintain sustainable populations of cormorants; and
- Increasing the level of transparency and accountability of the Service's decision-making process.

³ The Service notes that in the workshop summary the phrase “free-swimming fish” was used: the ambiguity of this phrase caused confusion. Since that time, the Service refined the phrase to “wild and publicly stocked fisheries” so that it is clearer to stakeholders and represents the scope of fisheries applicable to this FEIS.

⁴ Generally in this FEIS, we will use “publicly stocked” to refer to fish stocked by public or state agencies for public use. In some cases specific to Tribal situations, “tribally stocked” refers to fish stocked by tribes for tribal use.

Decision to be Made

The Service is the primary federal agency responsible for conserving, protecting, and enhancing the nation's fish, wildlife, and plant resources and their habitats. The mission of the Service is "to work with others to conserve, protect and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people" (USFWS 2018). The Service shares responsibility with other federal, state, tribal, and local entities. However, the Service has specific responsibilities for the protection of threatened and endangered species under the Endangered Species Act (ESA), migratory birds, inter-jurisdictional fish, and certain marine mammals as well as for lands and waters that the Service administers for the management and protection of those resources, such as the National Wildlife Refuge System.

The mission of the Migratory Bird Program within the Service is to provide "leadership in migratory bird conservation and management through effective partnerships, applied science, and innovative strategies" (USFWS 2020). The three priority goals of the Migratory Bird Program are to provide leadership in migratory bird conservation, manage sustainable populations of birds of management concern and their habitats, and manage bird data and information for use in decision making. Because the Service is the federal agency responsible for managing migratory bird populations pursuant to the MBTA, including authorizing take of migratory birds, the Service is the lead agency for this FEIS.

Based on the analysis in this FEIS, the decision to be made will define the comprehensive Service strategy for managing conflicts associated with cormorants across the United States and across the cormorant population in the United States.

Legal and Policy Guidance

MIGRATORY BIRD TREATY ACT OF 1918, AS AMENDED (16 U.S.C. §§ 703-711: 40 STAT. 755).

The Service has the primary statutory authority to manage migratory bird populations in the United States--authority that comes from the MBTA. The original treaty was signed by the U.S. and Great Britain (on behalf of Canada) in 1916 and imposed certain obligations on the U.S. for the conservation of migratory birds, including the responsibilities to: conserve and manage migratory birds internationally; sustain healthy migratory bird populations for consumptive and non-consumptive uses; and restore depleted populations of migratory birds. The United States subsequently entered into bilateral conventions with Mexico, Japan, and Russia.

The cormorant taxonomic family, *Phalacrocoracidae*, and 31 other families were added to the List of Migratory Birds in 1972 as a result of an amendment to the 1936 "Convention between the United States of America and the United Mexican States for the Protection of Migratory Birds and Game Mammals" (23 U.S.T. 260, T.I.A.S. 7302). Thus, since 1972, double-crested cormorants have been a trust resource managed by the Service for the American people under the authority of the MBTA.

ANIMAL DAMAGE CONTROL ACT OF 1931 AND RURAL DEVELOPMENT, AGRICULTURE, AND RELATED AGENCIES APPROPRIATIONS ACT OF 1988 (7 U.S.C. §§ 8351-8352; 46 STAT. 1468).

The U.S. Department of Agriculture (USDA) is directed by law to protect American agriculture and other resources from damage associated with wildlife. The primary statutory authority for the USDA Wildlife Services (WS) program is the Animal Damage Control Act of March 2, 1931 (7 U.S.C. §§ 8351-8352; 46 Stat. 1468), as amended in the Fiscal Year 2001 Agriculture Appropriations Bill. This law provides that:

- (a) In general, the Secretary of Agriculture may conduct a program of wildlife services with respect to injurious animal species and take any action the Secretary considers necessary in conducting the program.
- (b) Administration: The Secretary shall administer the program in a manner consistent with all of the Wildlife Services authorities in effect on the day before October 28, 2000.

Since 1931, with the changes in societal values, WS policies and programs place greater emphasis on the part of the Act discussing “bringing [damage] under control,” rather than “eradication” and “suppression” of wildlife populations. In 1988, Congress strengthened the legislative mandate of WS with the Rural Development, Agriculture, and Related Agencies Appropriations Act. This Act states, in part:

That hereafter, the Secretary of Agriculture is authorized, except for urban rodent control, to conduct activities and to enter into agreements with states, local jurisdictions, individuals, and public and private agencies, organizations, and institutions in the control of nuisance mammals and birds and those mammal and bird species that are reservoirs for zoonotic diseases, and to deposit any money collected under any such agreement into the appropriation accounts that incur the costs to be available immediately and to remain available until expended for Animal Damage Control activities.

ENDANGERED SPECIES ACT (ESA), AS AMENDED (7 U.S.C. § 136; 16 U.S.C. §§ 460 ET SEQ.).

It is federal policy, under the ESA, that all federal agencies seek to conserve threatened and endangered species and utilize their authorities in furtherance of the purposes of the Act (Sec.2(c)). In accordance with section 7 of the Act, the Service has prepared a Biological Evaluation and conducted informal consultation with the Service Endangered Species Program to evaluate federally listed species that may be affected by the alternatives analyzed in this FEIS.

ENVIRONMENTAL JUSTICE AND EXECUTIVE ORDER 12898.

Executive Order 12898, entitled “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” promotes the fair treatment of people of all races, income levels, and cultures with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Environmental justice is the pursuit of equal justice and protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status.

EXECUTIVE ORDER 13186.

Executive Order 13186, entitled “Responsibilities of Federal Agencies to Protect Migratory Birds,” directs any federal agency whose actions have a measurable negative impact on migratory bird populations to develop a Memorandum of Understanding (MOU) with the Service to promote conservation of migratory birds. The Executive Order (EO) also requires the Secretary of the Interior to establish a Council for the Conservation of Migratory Birds to oversee implementation of the EO. The Council is composed of representatives from the Departments of the Interior, Commerce, Agriculture, State, Transportation, Energy, and Defense; the Environmental Protection Agency; and other agencies as appropriate.

NATIVE AMERICAN POLICY

The Service’s Native American policy (510 FW 1) provides a framework for government-to-government relationships and furthers the United States’ and the Department of the Interior’s trust responsibility to federally recognized tribes. The Service and tribal governments recognize the need for strong, healthy communication and relationships so all can work together to improve and enhance conservation of fish and wildlife resources and shared natural- and cultural-resource goals and objectives. The policy established a consistent framework nationwide, yet remains flexible to reflect regional and local variations in history, knowledge systems, applicable laws, treaties, and Service–tribal relationships. In developing these alternatives, the Service has worked with the federally recognized tribes across the country to identify ongoing and future opportunities for collaboration consistent with this policy. These opportunities include proactively soliciting, and incorporating into our management, information on traditional ecological knowledge from tribes. As stated in the policy, the Service supports the rights of tribal governments as they exercise their sovereign authorities to manage, co-manage, or collaboratively manage fish and wildlife resources. We also support co-management where there is a legal basis for it. If a federally recognized tribe requests negotiations for a funding agreement under the authority of the Indian Self-determination and Education Assistance Act, as amended, those negotiations will occur as a separate process, along with the steps needed to comply with the NEPA. No tribe has requested such an agreement.

NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (NEPA)

NEPA (42 U.S.C. §§ 4321 et seq.) requires that federal agencies prepare an EIS for major federal actions that significantly affect the quality of the human environment. This FEIS has been prepared consistent with the requirements of the NEPA, the Council on Environmental Quality (CEQ) NEPA regulations (40 Code of Federal Regulations [CFR] part 1500 et seq.), DOI’s NEPA regulations (43 CFR part 46), and the DOI’s NEPA procedures (Department Manual, Part 516). The Service is the NEPA lead agency responsible for the preparation of this FEIS. As a cooperating agency, WS also helped prepare and review this document. The WS program is the lead federal agency responsible for managing conflicts between people and wildlife (USDA 2019). The primary statutory authority for the WS program is the Act of March 2, 1931 (46 Stat. 1468; 7 USC 8351-8352) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 U.S.C. 8353). The WS program assists people who need help with the Service’s depredation permit application by completing a Service Migratory Bird Permit Application or Review form (WS Form 37).

Public Involvement and Tribal Outreach

On January 22, 2020, the Service published an Advance Notice of Proposed Rulemaking (ANPR) and announced its intent to prepare a NEPA document and to establish new regulations regarding the management of double-crested cormorants. The comment period for the ANPR continued through March 9, 2020. The ANPR listed possible alternatives composed of the following:

- (1) Establish a new permit for state and tribal fish and wildlife agencies for authorizing certain cormorant management and control activities;
- (2) Establish an aquaculture depredation order; and
- (3) Both (1) and (2) in combination.

The Service also announced that it would hold several public-scoping meetings, and that specific dates and times for the public meetings would be available on the internet at a designated website for this process. The Service convened a total of four public-scoping webinars, two on February 11, 2020, and two on February 12, 2020. Additionally, the Service conducted two webinars provided only to tribal members on February 19 and 27, 2020. The Service provided attendees of all webinars with information on the following topics regarding cormorants, their management, and the regulations process: (1) biology and population changes; (2) background of the issues and previous management approaches; (3) current management of conflicts; (4) proposed approaches and alternatives; and (5) the planning process for the NEPA.

The Department of the Interior's policy is, whenever possible, to afford the public an opportunity to participate in the rulemaking process. In response to the ANPR, the Service received 1,404 comments.⁵ On June 5th, 2020, the Service published a draft Environmental Impact Statement (DEIS) and draft rule. The comment period for each continued for 45 days, ending on July 20th, 2020. The Department of the Interior's policy is, whenever possible, to afford the public an opportunity to participate in the rulemaking process. The Service received more than 1,400 comments in response to the ANPR and 1,047 in response to the Draft Rule and DEIS. The public may review the comments received at the Federal eRulemaking Portal: <http://www.regulations.gov> in Docket No. FWS-HQ-MB-2019-0103. The Service considered those comments on the ANPR in developing the draft proposed rule, and comments on the DEIS and proposed rule when developing this FEIS. Summaries of both sets of public comments are provided in [Appendix B](#).

⁵ The public record associated with the publication of the ANPR (FWS-HQ-MB-2019-0103-0001) states that 1,406 comments were received; however, two of these comments were actually the notice itself and the supporting documents to the notice. In addition, a total of 17 comments were received after the comment period closed but were accepted as part of the public record. The Service makes every effort to take into consideration all comments and any additional information received.

⁶ Regulations.gov shows 1,052 total comments, which comprise 1,047 public submissions, 2 primary documents (proposed rules), and 3 supporting documents (DEIS, 2003 FEIS, and U.S. Army Corps of Engineers documents).

Proposed Federal Action and Alternatives Considered

This chapter describes the alternatives the Service proposes for managing conflicts associated with cormorants and human activities. Alternatives are different approaches to management of the conflict and achieve the purposes and need for action (page 3). The Service has formulated these alternatives to address the needs for action while also addressing the significant issues identified by the Service, tribes, cooperating agencies, interested groups, and the public during the public-scoping period and throughout the development of this FEIS.

Elements Common to All Alternatives

The Service developed a Potential Take Limit (PTL) model to evaluate allowable take of cormorants in the contiguous 48 states. This model is based on the PTL models described by Runge et al. (2004). The PTL model allows the Service to integrate biological and policy elements into the decision-making process of authorizing the take of cormorants to manage damage and to manage the cormorant population. The PTL model estimates the maximum allowable annual take of cormorants given management objectives and desired population size. The maximum allowable take is not a prescribed take level for cormorants; it is a maximum biologically sustainable level of annual take based on knowledge of cormorant population dynamics, and the current policy relative to the issuance of migratory bird permits. Further, while the Service uses the PTL model to identify maximum allowable take, individual migratory bird permits themselves are not a means to manage cormorant populations.

[Appendix E](#) describes in detail how the Service uses the PTL model to estimate the maximum allowable annual take of cormorants. This estimate was calculated to range up to 126,042 cormorants per year nationally and applies to all alternatives except the no action alternative. The no action alternative estimated the maximum allowable annual take of cormorants using a PTL model as well, but used parameters that are slightly more conservative to ensure over-harvest is not occurring while the Service takes the time to engage with stakeholders to assess the biological, social, and economic significance of conflicts associated with cormorants and wild and publicly stocked fisheries, and to identify a suite of management alternatives. The PTL model used to calculate the maximum allowable take of cormorants for Alternatives A through D results in a higher limit of authorized take than the no action alternative for two primary reasons: (1) the geographic range is larger and encompasses all contiguous 48 states, and (2) management objectives are different between the no action alternative and Alternatives A through D. Under the no action alternative, the Service's objective was to authorize the lethal take of cormorants to alleviate conflicts, but not change cormorant population size. Under Alternatives A through D, the Service's management objective allows for take up to the maximum allowed amount that would result in the cormorant population falling to a slightly lower equilibrium. This means that the Service would manage the cormorant population at a sustainable level by limiting the annual harvest rate to less than one-half of the maximum population-growth potential. Additionally, the PTL model also takes into account how allocation of take within each flyway would impact the different cormorant populations across the contiguous 48 states. To do this, the PTL model uses more conservative parameters for the Florida subpopulation. As a result of this additional level of assessment in the PTL model, Alternatives A through D break down the overall allocation of take in this manner: allocation for the western subpopulation would be managed at 9,077 per year; 1,314 per year would be allocated for the Florida subpopulation; 37,019 per year would be allocated for the Atlantic subpopulation; and 78,632 per year would be allocated to the Interior subpopulation.

However, based on information received during the public comment period, the PTL for the western subpopulation may not have captured complex and changing population dynamics precipitated by cormorant habitat management in the Columbia River Estuary (CRE). To reduce the risk of over-exploiting the western subpopulation the Service would reduce the level of authorized annual take to half the PTL in the DEIS, or 4,539 individuals. Therefore, under all analyzed alternatives in this FEIS (except the no action alternative), maximum allowable take would be 121,504 cormorants nationally per year and not 126,042 cormorants. In the interest of responding to comments received concerning the PTL and western subpopulation, the Service provides a detailed explanation of how the PTL was formulated and considered additional data in [Appendix B](#), Responses to Public Comments.

Monitoring of each cormorant population is an important component of all the alternatives so the Service can compare projected population sizes to actual population sizes. Under each alternative, except the no action alternative, the Service would develop a cormorant population monitoring protocol. The protocol would be developed in partnership and collaboration with the stakeholders relevant to the different regulatory frameworks under each alternative. After publication of a final rule, the relevant stakeholders will be engaged in developing a fully detailed population-monitoring protocol. Upon publication of a record of decision, the Service will formally convene with each flyway and relevant stakeholders to develop a specific cormorant-population-monitoring regime. This regime will be made public within approximately one year of a record of decision.

The Service would require annual reporting of actual take of cormorants under all alternatives. The main differences between alternatives pertain to the burden associated with accurately monitoring the authorized and actual take of cormorants throughout the year. Under all analyzed alternatives in this FEIS (except the no action alternative), maximum allowable take would be 121,504 cormorants nationally per year. This level of take is the aggregated maximum allowable take for each population of cormorants. Standard permit conditions and permitting procedures are included in [Appendix D](#). Under all alternatives, the Service will ensure allowable take is commensurate with population status, monitor reported take to ensure the take threshold is not exceeded for each population, and establish population-monitoring programs that would assess the effects of lethal take on cormorant populations. Monitoring of reported take will inform future decisions regarding levels of allowable take and allocation of that take. States, tribes, and other partners can provide assistance and information regarding monitoring activities and needs. This FEIS refers to populations when referencing cormorant subspecies. These subspecies or populations occur in the Atlantic flyway (*P. a. auritus*), the Mississippi/Central flyway (*P. a. auritus*), the Southern flyway (Florida subspecies, or *P. a. floridanus*), and the Pacific flyway (Western subspecies, or *P. a. albociliatus*, which excludes Alaska and Mexico).

The Service would also produce a report every five years, and additionally as necessary, that provides analyses from population-monitoring efforts and other status information. This report would be provided to the public to promote transparency of decision making and evaluation of the effectiveness of this conflict-management tool. This report would include, but not be limited to: (1) updated cormorant population status and trends; (2) reported lethal take of cormorants nationally and by cormorant population; (3) updated PTL analyses based on new or more current population information; (4) the state of the conflict and need for continued management, as reported by requests for depredation permits (both individually and programmatically by participating states and tribes); and (5) a conflict-management decision and justification for either continued management or a proposed new management approach, if appropriate and needed.

Under each alternative considered, the Service would continue the issuance of depredation permits (50 CFR 21.41), special purpose permits (50 CFR 21.27), and scientific collection permits (50 CFR 21.23) as appropriate. We would require responsible entities conducting activities under these various permits (such as airports or public-health officials) to report annually all take of cormorants under their authorized management activities. The Service would ensure that authorized take resulting from any alternative and all other permit types would not exceed the amount necessary to maintain cormorant populations at sustainable levels.

Alternative A (preferred Alternative): Special Permit for States and Tribes

This alternative would establish a new permit option under 50 CFR part 21 (special double-crested cormorant permit) that would be available to state and tribal fish and wildlife agencies in the 48 contiguous United States. A new permit would allow these agencies to manage conflicts associated with double-crested cormorants specifically on state or tribal-managed lands and waters in their jurisdiction. The Service may issue a permit to reduce conflicts involving depredation at state- and tribal-owned-or-operated aquaculture facilities (including hatcheries); impacts to health and human safety; impacts to federally threatened and endangered species (as listed in under the ESA) and state-listed species identified in their state- or tribal-specific legislation as threatened or endangered; species listed as Species of Greatest Conservation Need in State Wildlife Action Plans, where take activities to prevent depredation on aquatic Species of Greatest Conservation Need may occur only in natural or public waters; damage to state or tribal property and assets; or depredations of wild and publicly stocked fish managed by state fish and wildlife agencies or federally recognized tribes and accessible to the public and all tribal members.

While the federal government has ultimate authority and responsibility for the conservation of migratory birds, the states (through the Flyway Councils) and tribes also are partners in migratory bird management and have considerable input and involvement in regulatory and management issues. The MBTA expressly provides that nothing shall prevent states from making or enforcing laws that give further protection to migratory birds. As an example, the relationship between the Service and the Flyway Councils for setting migratory game bird hunting regulations is well established and documented (Blohm 1989). The Service and the Flyway Councils generally work cooperatively on management issues, particularly regulations issues. States may make their positions and recommendations known for managing specific non-game and game bird species individually, and work collectively through the Flyway Councils. The Flyway Council System is a longstanding and well-established formal process that assures state interests are considered fully in the establishment and promulgation of federal regulations governing migratory game bird hunting and other migratory game bird issues (USDI 1959).

Those states and tribes not wishing to obtain this new permit could apply for depredation permits (50 CFR 21.41) to address conflicts with cormorants within the scope of conflicts established in the no action alternative, which does not apply to wild or publicly stocked fisheries. Commercial aquaculture facilities experiencing conflicts associated with cormorants could continue to apply for individual depredation permits (50 CFR 21.41).

In this alternative, the Service would allocate lethal take to participating states and tribes based on the maximum allowable take for the cormorant population where the state or tribe is located, as well as historical and proposed needs of the state or tribe. Any state or tribe may voluntarily request this permit.

The intent of this alternative is to allow state wildlife management agencies and tribes sufficient flexibility within predefined guidelines to address conflicts caused by cormorants within their respective boundaries. In general for each alternative, aquaculture facilities are those conducting the cultivation of aquatic animals and/or plants in natural or controlled aquatic environments for commercial or conservation efforts. Each alternative makes a distinction between how the Service would authorize take within the boundaries of all types of aquaculture facilities, including commercial aquaculture facilities and state- and tribal-owned-or-operated aquaculture facilities (including hatcheries). In the case of Alternative A, a special permit would apply to any state- and tribal-owned-or-operated aquaculture facility that produces fish, or other aquatic organisms, that are susceptible to cormorant predation or impact during any stage of production, and/or immediately following release into natural or controlled environments. In most cases, states and tribes are better able to assess site-specific conflicts and the need for control efforts than is the Service. Under Alternative A, commercial aquaculture facilities and personal property owners experiencing conflicts associated with cormorants would continue to apply for individual depredation permits (50 CFR 21.41). This permit does not apply to any efforts to prevent depredation or harm to privately owned animals (e.g., hobby animals, pets or similar) that are raised free-range or otherwise released to the wild. Private landowners may apply for a depredation permit (50 CFR 21.41) to alleviate damage to some types of property (i.e., buildings and infrastructure; vehicles and equipment; some types of vegetation; and display animals, such as zoo exhibits).

Under this alternative, the Service would maintain primary authority for the management of cormorant populations but would authorize the individual states and tribes to implement the provisions of this alternative within the guidelines established by the Service. The Service would expect states and tribes issued this new special permit to prioritize their allotted take to entities/instances most in need of conflict resolution, and would encourage them to conduct monitoring to assess the efficacy of control activities. States and tribes would be responsible for compiling all take they and their authorized subpermittees conduct under this special permit and report that take annually to the Service.

Subpermittees may be employees of state and tribal wildlife agencies, WS employees, and employees of federal and state agencies or private companies specializing in wildlife damage abatement and under direct control of the permittee.

Additional conditions would include restrictions on when lethal take can occur, a requirement to use lethal removal only in conjunction with an established nonlethal harassment program, and additional conditions and restrictions similar to all alternatives (use of nontoxic shot, decoys, use of nonlethal methods, protection measures for co-nesting species and non-target species, and additional protection measures for cormorant chicks). In addition, states and tribes applying for the first time must consult with the Wildlife Services for an assessment of the appropriate level of take and provide recommendations of short-term measures to provide relief from depredation and long-term measures to help eliminate or significantly reduce the problem.

Lastly, to minimize risks to co-nesting species that look similar to double-crested cormorants (e.g., neotropic cormorants, great cormorants, and anhingas), the Service would require states and tribes to report any other species of bird taken incidentally due to double-crested cormorant management activities under this permit, along with the numbers of birds of each species taken. The Service would use this data to better track accidental take of these species when take of cormorants occurs, and recommend appropriate actions such as additional training of personnel, or avoiding areas where there is a high concentration of non-target species in the area.

This FEIS includes copies of the application form for states and federally-recognized tribes, as well as the instructions and annual reporting form.

Alternative B: New Aquaculture Depredation Order

This alternative would establish a new aquaculture depredation order (AQDO) that would apply within the boundaries of all types of aquaculture facilities, including commercial aquaculture facilities and state- and tribal-owned-or-operated aquaculture facilities (including hatcheries) in the contiguous lower 48 states. Under this alternative, the Service would authorize these entities, without a federal permit, to take cormorants when found committing or about to commit depredations to aquaculture stocks on or in close proximity to the premises used for the production of such stocks (e.g., nearby roost sites). The order would limit take at each facility to a certain number of cormorants each year.

Additional conditions would include restrictions on when lethal take can occur, a requirement to use lethal removal only in conjunction with an established nonlethal harassment program, a requirement that control occurring at roost sites must reasonably protect fish at nearby facilities, and additional conditions and restrictions similar to those in Alternative A (use of nontoxic shot, decoys, use of nonlethal methods, protection measures for co-nesting species and non-target species, and additional protection measures for cormorant chicks).

Landowners, operators, and tenants acting under a new aquaculture depredation order would be required to comply with monitoring and reporting requirements including monthly reporting and annual reporting to ensure the maximum allowable take of cormorants per year is not exceeded. Population surveys would be conducted at regular intervals collaboratively by the Service, state fish and wildlife agencies, and federally recognized tribes to ensure take is commensurate with population status to ensure the long-term sustainability of the cormorant populations.

This alternative would be limited to control at aquaculture facilities and would not allow the take of cormorants to reduce depredation on wild and publicly stocked fisheries. Therefore, this FEIS evaluates an additional alternative (C) that combines an aquaculture depredation order with Alternative A.

Alternative C: Combination of the Special Permit for States and Tribes and a New Aquaculture Depredation Order.

This alternative combines Alternatives A and B to establish both a new permit option and a new aquaculture depredation order. Each would be established as described above, but differs in how the Service would authorize take at aquaculture facilities. This alternative would establish a new aquaculture depredation order that would apply within the boundaries of all types of aquaculture facilities, including commercial aquaculture facilities and state- and tribal-owned-or-operated aquaculture facilities (including hatcheries), and a new permit option under 50 CFR part 21 (special double-crested cormorant permit) that would be available to state and tribal fish and wildlife agencies in the 48 contiguous United States to manage conflicts specifically associated with double-crested cormorants. Like in Alternative B, the aquaculture depredation order would authorize these entities, without a federal permit, to take cormorants when found committing or about to commit depredations to aquaculture stocks on or in close proximity to the premises used for the production of such stocks (e.g., nearby roost sites). The order would limit take at each facility to a certain number of cormorants each year.

As for the new permit option, the Service would establish a new special permit similar to Alternative A that would authorize states and tribal fish and wildlife agencies to conduct lethal take that is normally prohibited of double-crested cormorants on lands and waters within their respective jurisdictions. This new special permit would differ from the one described in Alternative A in that the special permit would not apply to state- and tribal-owned-or-operated aquaculture facilities (including hatcheries), because those facilities would be managed under a new aquaculture depredation order. The Service would only issue this permit when it is expected to reduce conflicts relating to impacts to health and human safety; impacts to federally threatened and endangered species (as listed in under ESA of 1973) and state-listed species identified in their state- or tribal-specific legislation as threatened or endangered; species listed as Species of Greatest Conservation Need in State Wildlife Action Plans, where take activities to prevent depredation on aquatic Species of Greatest Conservation Need may occur only in natural or public waters; damage to state or tribal property and assets; or depredations of wild and publicly stocked fish managed by state fish and wildlife agencies or federally recognized tribes and accessible to the public. Those states and tribes not wishing to obtain this new permit would need to apply for individual depredation permits (50 CFR 21.41) to address conflicts with cormorants within the scope of conflicts established in the no action alternative, which does not include wild or publicly stocked fisheries stocked by state agencies or federally recognized tribes. Personal property owners experiencing conflicts associated with cormorants would continue to apply for individual depredation permits (50 CFR 21.41). As with Alternative A, this permit does not apply to any efforts to prevent depredation or harm to privately owned animals (e.g., hobby animals, pets or similar) that are raised free-range or otherwise released to the wild. Private landowners may apply for a depredation permit (50 CFR 21.41) to alleviate damage to some types of property (i.e., buildings and infrastructure; vehicles and equipment; some types of vegetation; and display animals, such as zoo exhibits).

As with all alternatives analyzed in this FEIS, take at each facility would be limited to a certain number of cormorants each year. The Service manages allocation of this take, and that allocation largely depends on which states and tribes request a special permit. To comply with the new aquaculture depredation order, the order would require landowners, operators, and tenants acting under it to conduct monitoring and reporting, including monthly reporting and annual reporting, to ensure the maximum allowable take of cormorants per year is not exceeded.

Alternative D: General Depredation Order

Unlike the depredation order described in Alternative B (above), this order would not be limited to aquaculture facilities. This general depredation order would apply to all lands and freshwaters (with appropriate landowner permission) in the contiguous 48 states. While such a broad-scale order can carry some risk for birds, it offers a reduction in administrative burden. Such broad-scale depredation orders, however, are only used when the risk to bird populations from large-scale take is low, and there is a desire to reduce the administrative burdens of applying for and issuing individual depredation permits. A new general depredation order would authorize state fish and wildlife agencies, federally recognized tribes, and WS to take cormorants found committing or about to commit depredations and to prevent them.

This order would apply to conflicts involving depredation at state- and tribal-owned or operated aquaculture facilities (including hatcheries); commercial aquaculture facilities; impacts to health and human safety; impacts to threatened and endangered species (as listed in under ESA of 1973) and state-listed species identified in their state- or tribal-specific legislation as threatened or endangered; species listed as Species of Greatest Conservation Need in State Wildlife Action Plans, where take activities to prevent depredation on aquatic Species of Greatest Conservation Need may occur only in natural or public waters; damage to state or tribal property and assets; or depredations of wild and publicly stocked fish managed by state fish and wildlife agencies or federally recognized tribes and accessible to the public.

Agencies acting under a new general depredation order would be required to comply with monitoring and reporting requirements including monthly reporting and annual reporting to ensure the maximum allowable take of cormorants per year is not exceeded. To accomplish this, the Service would likely develop a new comprehensive monitoring and reporting database intended to track such information and provide a mechanism for agencies to register lethal take authorized under the depredation order. Population surveys would be conducted at regular intervals collaboratively by the Service, state fish and wildlife agencies, and federally recognized tribes to ensure long-term sustainability of the cormorant populations.

Alternative E: No Action (Current Process)

Currently, the Service issues individual depredation permits allowing the lethal take of cormorants that are committing or about to commit depredation or harm/damage to (1) aquaculture facilities (commercial, state, and tribal-owned facilities including hatcheries), (2) federally threatened and endangered species (as listed under the ESA) or their habitats, (3) human health and safety, and (4) personal property. The Service may also issue permits to take cormorants if there is convincing evidence that cormorants are adversely affecting species of high conservation concern (e.g., a regionally important bird population) or rare and declining plant communities at a local scale. The scope of authorization of cormorant take under the status quo is defined by the currently applicable procedures and frameworks. Those procedures and frameworks are specified in the MBTA (16 U.S.C. §§ 703-712), the Depredation Permit Regulation (50 CFR 21.41), the Issuance of Permits Regulation (50 CFR 13.21), the 2015 Final EIS (USACE 2015) for the management of the western population of cormorants, and the 2017 EA for management of cormorants essentially east of the Rocky Mountains (USFWS 2017). The no action alternative would be a continuation of these current procedures and frameworks, which does not include authorization of take through individual depredation permits for wild or publicly stocked fisheries because this was outside the scope of these NEPA analyses.

The Service also issues scientific collecting and taxidermy permits for those activities consistent with approved applications provided to the Service, and special purpose permits in some instances. Specific requirements and conditions for all of these permits are provided in 50 CFR Parts 21.23, 21.24, 21.27, and 21.41. Responsible entities conducting activities under these various permits (such as airports or public health officials) are required to annually report all take of cormorants under their authorized management activities.

The geographical scope of the cormorant framework for the central and eastern states encompasses Alabama, Arkansas, Connecticut, Delaware, the District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Vermont, Virginia, West Virginia, and Wisconsin. The scope of decisions in the central and eastern United States is limited to applications for depredation permits to manage cormorant damage at or near aquaculture facilities, alleviating human health and safety concerns, protecting threatened and endangered species (as listed under the ESA), and reducing damage to property. The Service may also issue permits to take cormorants if there is convincing evidence that cormorants are adversely affecting species of high conservation concern (e.g., a regionally important bird population) or rare and declining plant communities at a local scale.

Under this previous PTL analysis, the Service set the maximum level of authorized take of cormorants to alleviate conflicts, but limited allowable take to a level that would not change cormorant population size. The Service further limited take and minimized potential impacts to cormorant populations by using the lower limit of the 95% confidence interval for allowable take. The PTL analysis for the 2017 EA allowed a take of up to 51,571 cormorants per year. This alternative limited take to amounts well below the lower limit of the PTL model conducted for the 2017 EA. This EA noted that the Service may consider transitioning that take level to the lower limit of the PTL, an annual maximum allowable take of 74,396 cormorants per year. After receiving multiple amendments to increase the authorized take of cormorants in 2018 and 2019, the Service in December 2019 announced that it would be adopting the higher annual take threshold (84 FR 69762). Therefore, the cumulative authorized take of cormorants to reduce damage to aquaculture, human health and safety, federally listed threatened and endangered species, and property in the central and eastern United States cannot exceed the lower limit of the PTL of 74,396 cormorants. In addition, the cumulative authorized take of cormorants cannot exceed 26,226 cormorants from the Atlantic flyway subpopulation, 46,898 cormorants from the Mississippi/Central flyways subpopulation, and 1,272 cormorants from the Florida subpopulation. Under this existing framework, the Service takes a precautionary approach to cormorant management, and implements a lower level of allowable take that is even more conservative than the assessment described in this FEIS.

The geographical scope of the cormorant framework for the Pacific flyway subpopulation encompasses Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. Similar to the allowable take model described for the cormorant populations in the central and eastern United States, the Service developed a Potential Biological Removal (PBR) model that evaluated the cumulative take of cormorants on the Pacific flyway (minus Alaska and Mexico) subpopulation (see Appendix E-1 in USACE 2015). Maximum allowable take under the framework for the Pacific flyway is an adaptive approach that is based on monitoring cormorant abundance and adapting take to meet population objectives for the Pacific flyway. Adjustments in cormorant take are based on thresholds that were developed for a plan to reduce cormorant predation of federally listed juvenile salmonids in the CRE (USACE 2015). The Service adjusts allowable cormorant take based on a two-step evaluation process involving whether observed abundances through monitoring are less than, greater than, or within one standard deviation of predicted abundances from population models developed for cormorants in the Pacific flyway subpopulation (see Table 2-1 and Appendix E-2 in USACE 2015).

In all cases under the current process, practicable and effective nonlethal methods are required as the initial approach before implementing lethal measures. If nonlethal measures are ineffective, lethal methods may be considered in combination with nonlethal methods as a means to reinforce nonlethal measures.

Standard permit conditions and permitting procedures are included in [Appendix D](#). Out of the total allowable harvest calculated using the PTL method ([Appendix E](#)), each DOI Unified Region Migratory Bird Permit Office is allowed to authorize the lethal take of a certain number of cormorants to applicants within its region.

Differences in Regulatory Frameworks that would address Conflicts Across all Alternatives

Because each alternative would employ different proposed regulatory frameworks to address conflicts relating to cormorants, the following table illustrates these differences.

Table 1. How conflicts relating to cormorants would be addressed for each alternative.

Resource topic	Alternative A: State/Tribal Permit	Alternative B: AQDO	Alternative C: State/Tribal Permit + AQDO	Alternative D: General Depredation Order	Alternative E: No Action
<i>Wild and Publicly Stocked Fisheries managed by State fish and wildlife agencies or federally recognized tribes and accessible to the public</i>	<i>Under a special state or tribal permit</i>	<i>Not addressed</i>	<i>Under a special state or tribal permit</i>	<i>Under a new general depredation order</i>	<i>Not addressed</i>
<i>State- and Tribal-owned or Operated Aquaculture Facilities (including hatcheries)</i>	<i>Under a special state or tribal permit</i>	<i>Under a new aquaculture depredation order</i>	<i>Under a new aquaculture depredation order</i>	<i>Under a new general depredation order</i>	<i>Under individual depredation permits (50 CFR 21.41)</i>
<i>Commercial Aquaculture Facilities</i>	<i>Under individual depredation permits (50 CFR 21.41)</i>	<i>Under a new aquaculture depredation order</i>	<i>Under a new aquaculture depredation order</i>	<i>Under a new general depredation order</i>	<i>Under individual depredation permits (50 CFR 21.41)</i>
<i>Protection of Human Health and Safety</i>	<i>Under a special state or tribal permit</i>	<i>Under individual depredation permits (50 CFR 21.41)</i>	<i>Under a special state or tribal permit</i>	<i>Under a new general depredation order</i>	<i>Under individual depredation permits (50 CFR 21.41)</i>
<i>Protection of Federally Threatened and Endangered Species/ or State or Tribal-listed Species</i>	<i>Under a special state or tribal permit</i>	<i>Under individual depredation permits (50 CFR 21.41)</i>	<i>Under a special state or tribal permit</i>	<i>Under a new general depredation order</i>	<i>Under individual depredation permits (50 CFR 21.41)</i>
<i>Damage to State or Tribal Property and Assets</i>	<i>Under a special state or tribal permit</i>	<i>Under individual depredation permits (50 CFR 21.41)</i>	<i>Under a special state or tribal permit</i>	<i>Under a new general depredation order</i>	<i>Under individual depredation permits (50 CFR 21.41)</i>

Resource topic	Alternative A: State/Tribal Permit	Alternative B: AQDO	Alternative C: State/Tribal Permit + AQDO	Alternative D: General Depredation Order	Alternative E: No Action
<i>Damage to Personal Property</i> ⁷	<i>Under individual depredation permits (50 CFR 21.41)</i>	<i>Under individual depredation permits (50 CFR 21.41)</i>			
<i>Scientific Collection</i>	<i>Under scientific collection permits 50 CFR 21.23)</i>	<i>Under scientific collection permits 50 CFR 21.23)</i>			
<i>Special Purpose/Misc</i>	<i>Under Special Purpose permits (50 CFR 21.27)</i>	<i>Under Special Purpose permits (50 CFR 21.27)</i>			

Alternatives Considered but Dismissed from Further Consideration

REMOVAL OF DOUBLE-CRESTED CORMORANTS FROM THE LIST OF SPECIES PROTECTED BY THE MIGRATORY BIRD TREATY

An alternative that removes cormorants from the list of species protected by the MBTA does not meet the purpose and need for action as it would preclude a coordinated approach that would maintain sustainable populations of cormorants and address possible impacts to the environment from the take of cormorants. If cormorants are not protected, unregulated take could lead to significant negative population impacts. This alternative was eliminated from detailed analysis because it does not meet the purpose and need for this action.

Cormorants are protected under the Migratory Bird Treaty Act of 1918 (as amended), which implements International migratory bird treaties with Great Britain (for Canada), the United Mexican States, Japan, and Russia. The treaties expressly protect any migratory bird included in the terms of the various Conventions and prohibit the take of them without proper authorization. All species of cormorants are afforded such protection. To remove cormorants from the protected list of migratory birds would not only be contrary to the intent and purpose of the original treaties but would require amendment of the original treaties. Doing so would be a lengthy process requiring involvement of the U.S. State Department and its counterparts in the other signatory nations, and ratification by the U.S. Senate. The time required to complete this process would result in a lack of relief for those seeking to resolve conflicts with cormorants while the process was undertaken, and there is no guarantee that other nations would support removing them from their bilateral treaties.

⁷ Private landowners may apply for a depredation permit (50 CFR 21.41) to alleviate damage to some types of property (i.e., buildings and infrastructure; vehicles and equipment; some types of vegetation; and display animals, such as zoo exhibits). Exclusions apply to any efforts to prevent depredation or harm to privately owned animals (e.g., hobby animals, pets or similar) that are raised free-range or otherwise released to the wild.

Also, the historical record clearly shows that cormorant populations can and have undergone large fluctuations in abundance due to different natural and anthropogenic factors. Removing them from the list of protected species would preclude the Service's ability to enact protections to restore populations should that be necessary in the future. The MBTA provides adequate flexibility for managing cormorant conflicts within the context of their MBTA protection and, thus, we believe this approach is neither likely to be effective nor in the best interest of the public or the migratory bird resource.

CONSERVATION ORDER

A conservation order alternative does not meet the purpose and need for the action as it would preclude a coordinated approach to address specific areas where action is needed to alleviate conflicts and economic damage, and/or that would maintain sustainable populations of cormorants and reducing possible impacts to the environment with cormorant take. Under a conservation order, cormorants could be taken much more freely, which could lead to significant negative population impacts. Also, under a conservation order, cormorant take may not occur at the specific areas needed to alleviate conflicts. This alternative was eliminated from detailed analysis because it does not meet the purpose and need for this action.

The purpose of a conservation order is to reduce the overall abundance of a species due to large-scale impacts of that species on a natural resource. A conservation order would authorize direct population-control strategies such as nest and egg destruction, nestling/juvenile and adult trapping and culling programs, or other general population-reduction strategies on cormorant populations in the United States. A review of the available literature regarding impacts of cormorants on various natural resources (e.g., threatened and endangered species, wild and publicly stocked fisheries) indicate that such impacts typically occur at relatively small or even localized scales, although impacts at those scales can sometimes be severe. As explained in the *Affected Environment* section, conflicts associated with cormorants are not associated with overall population numbers. Rather, these conflicts vary across the United States and can be attributed to a variety of interacting factors, including: (1) the size of the regional and local cormorant population; (2) the number, size, and distribution of aquatic environments; (3) the size distribution, density, health, and species composition of fish populations in the specific aquatic environment at issue; (4) the number, size, and distribution of natural wetlands in the immediate environment; (5) the size distribution, density, health, and species composition of natural fish populations in the surrounding landscape; (6) the size, and distribution of suitable roosting habitat; and (7) the variety, intensity, and distribution of local damage-abatement activities.

Because site-specific conditions typically influence the degree of conflict with cormorants, there is no guarantee that reducing the overall population abundance of cormorants will reduce those site-specific conflicts. Rather, large numbers of cormorants often occur with little to no impact on resources of concern to humans (e.g., consumption of rough fish not of any sport value). The pattern of impacts suggests that control efforts at these smaller scales are more appropriate than attempts to reduce the overall population of cormorants, and efforts to reduce the overall abundance would kill many birds that cause no specific harm. Because killing large numbers of birds that are not causing harm would be both ineffective at reducing site-specific conflict issues and also would be contrary to the Service's mandate to conserve migratory birds, a conservation order for cormorants would be an inappropriate tool to address the conflicts causing concern.

The Service reviewed public comments in response to the DEIS that were in support of a conservation order. The Service emphasizes that a conservation order is intended to address substantially overabundant populations of birds on a large geographic scale where there are broad-scale and pervasive impacts to other resources. First, there is no evidence indicating that cormorants are substantially overabundant and are resulting in wide-scale destruction of habitats they use or that are used by other species, and the Service has not designated them as overabundant. The Service's best estimate of the continental abundance of double-crested cormorants is about one million birds, which is lower than most species of migratory game birds that are subjected to harvest. Given those issues and population estimates, the Service did not conclude a conservation order (or hunting, which is addressed below) is warranted solely or in combination with other tools. Further, population reduction would not necessarily result in fewer conflicts in areas where take of cormorants is needed, because those areas will continue to attract birds.

REGULATED HUNTING OF CORMORANTS

An alternative to allow regulated hunting of cormorants would not meet the purpose and need for action as it does not provide a coordinated approach to address specific areas where there are conflicts between cormorants and human interests, and economic damage. With regulated hunting of cormorants, the Service anticipates insufficient interest by hunters to hunt cormorants in general, and at areas with the greatest need to alleviate conflicts and economic damage. This alternative was eliminated from detailed analysis because it does not meet the purpose and need for this action.

Under this alternative, frameworks to develop seasons and bag limits for hunting cormorants would be established jointly by federal and state wildlife agencies as well as federally recognized tribes. These seasons would coincide with those for waterfowl hunting. Additionally, population monitoring would be conducted at regular intervals. However, the Service concluded in its 2003 EIS (USFWS, 2003) that the number of cormorants killed by hunters would depend on the length and timing of the hunting season, hunter success, and the number of states participating. Thus, the Service concluded that the increased mortality caused by hunting could, depending on the length of the season and hunter interest in shooting cormorants, be an important tool in reducing the overall size of the cormorant population. However, the number of hunters participating in a cormorant hunting season would probably be low compared to other game species because of two key factors. First, many hunters would not be interested in killing a non-traditional species such as cormorants. Second, most hunters would not wish to consume cormorants because of low palatability.

However, as with a conservation order, because site-specific conditions typically influence the degree of conflict with cormorants, there is no guarantee that reducing the overall population abundance of cormorants will reduce those site-specific conflicts. The pattern of impacts associated with cormorants suggest that control efforts at smaller scales are more appropriate than attempts to reduce the overall population of cormorants, and efforts to reduce the overall abundance would kill many birds that cause no specific harm. Because killing large numbers of birds that are not causing harm would be both ineffective at reducing site-specific conflict issues and also would be contrary to the Service's mandate to conserve migratory birds, regulated hunting of cormorants would be an inappropriate tool to address the conflicts causing concern.

The Service reviewed public comments in response to the DEIS that were in support of a hunting season or hunting as a tool to control damage associated with cormorants. The same concepts listed for a conservation order apply to the comments on hunting as a viable alternative. Like a conservation order, hunting would attempt a general reduction of the population, which does not necessarily address the site-specific nature of most conflicts. Further, the Service questions whether hunting, where the take of a species likely will not be used for a legitimate reason (e.g., food), is ethical or appropriate under the MBTA. The family Phalacrocoracidae is not currently a family defined in the Code of Federal Regulations⁸ as a game species, and thus, the Service would also need to go through a rulemaking process to add them to the list of migratory bird families for which hunting seasons are allowed. Further, having a hunting season would likely require much more monitoring at the same large scale the Service uses for other game species, for which the Service cannot obligate funding. Lastly, the Service emphasizes that hunting cormorants, or reducing the population of cormorants as in any conservation order, would reduce the take available to address site-specific conflicts that are a higher priority (e.g., aquaculture facilities). The Service, therefore, cannot justify implementing a conservation order or hunting seasons, thereby reducing the amount of take available to those entities seeking relief to reduce specific conflicts, which this rule attempts to address as its purpose and need.

NO MANAGEMENT ALTERNATIVE

A “no management” alternative would not meet the purpose and need for action as it would lead to increasing conflicts between cormorants and human interests, including economic damage from cormorants. Under this alternative, we anticipate cormorant populations would increase, leading to an increase in conflicts and greater economic damage. This alternative was eliminated from detailed analysis because it does not meet the purpose and need for this action.

Under this alternative, the federal government would not issue any permits or other authorizations (i.e., depredation permits, depredation orders, control orders, or conservation orders) that would allow the take of cormorants to alleviate depredations or other conflicts. Because mortality of cormorants would occur only from natural causes, incidental take, or illegal intentional take, the continental and regional populations would likely increase to the carrying capacity of the landscapes they inhabit before density-dependent mortality and/or recruitment limit further growth. At that point, the populations would stabilize around a mean value, although annual and periodic fluctuations in abundance around that mean would occur due to extant environmental conditions. Given the growth of cormorant populations in the absence of lethal management efforts, the abundance of cormorants likely would be higher than it is currently. Additional population growth would result in increased conflicts between cormorants and society, exacerbating issues that presently exist. Therefore, this alternative does not meet the purpose and need for action.

⁸ 50 CFR Part 20. MIGRATORY BIRD HUNTING.

Affected Environment

Introduction

This chapter describes the existing physical, ecological, and socioeconomic characteristics and resources relevant to managing conflicts associated with cormorants. The geographic scope applicable to all alternatives in this FEIS and the affected environment includes the lower 48 contiguous United States.

Double-crested Cormorants (population, habitat, Life History)

DESCRIPTION AND LIFE HISTORY

Double-crested cormorants are large, black to dark-brown, colonial-nesting, mainly fish-eating birds. They are often found in close proximity to marine or freshwater foraging sites. Breeding cormorants have a bright orange throat patch (gular pouch) and plumes on either side of the crown (i.e., double-crest). Average adult life expectancy is 6.1 years, and the oldest recorded banded cormorant in the wild was 22 years and 6 months (Van der Veen 1973; Dorr et al. 2014; Bird Banding Laboratory 2019). Mean age at first breeding is 2.74 years, with the majority of females breeding within their third year (van der Veen 1973). Mean clutch size is approximately 2.7 to 4.1 eggs, and fledging success is approximately 1.2 to 2.4 young per nest (Dorr et al. 2014). Cormorants commonly re-nest if clutches fail early in the year, but typically only raise one brood per breeding season.

OVERVIEW OF POPULATIONS

Cormorants are native to North America and range widely across the continent. Habitats supporting breeding, roosting and wintering cormorants include ponds, swamps, freshwater, and saline lakes, reservoirs, lagoons, artificial impoundments, rivers, estuaries, and open coastlines. Cormorants tend to locate breeding colonies on islands and sometimes on cliffs, but may also use artificial structures such as bridges, navigational aids, and utility poles (Wires 2014). Cormorants typically use breeding locations with protection from ground predators and within close proximity of foraging areas (typically less than 10 km; Dorr et al. 2014). Cormorants are found in some human-modified environments including airport airfields and aquaculture ponds.

The bird-management community generally accepts that there are five different breeding populations, variously described by different authors as Alaska, Pacific (Western), Interior, Atlantic, and southern subpopulations (Figure 1). Tyson et al. (1999) estimated that 95% of the breeding cormorants in North America occurred in the Interior, Atlantic, and southern breeding subpopulations with 68% occurring in the Interior subpopulation. Dolbeer (1991) stated, “*There was little intermixing between cormorant populations east of the Rocky Mountains and populations on the Pacific coast of North America.*” Recent population expansion, however, has blurred the boundaries for the Interior, Atlantic, and southern subpopulations (Wires et al. 2001, Dorr et al. 2014). Migratory tendencies of these different breeding populations are highly variable. Birds that breed in Florida and elsewhere in the southeastern United States are essentially sedentary. More recent genetic data suggests the Florida subpopulation is much more restricted than shown here (Kimble et al., 2020). Cormorants along the Pacific coast are only slightly migratory as those breeding in interior states west of the Continental Divide with harsh climates likely migrate to the Pacific Coast for the winter, but precise migration routes have not been documented (Hatch 1995; Mercer 2008). Atlantic and Interior birds show the greatest seasonal movements (Johnsgard 1993). Two primary migration routes appear to be down the Atlantic coast and through the Mississippi and Missouri river valleys to the Gulf Coast (Palmer 1962) with increasing numbers of birds remaining in the Mississippi Delta (Jackson and Jackson 1995) (Figure 2).

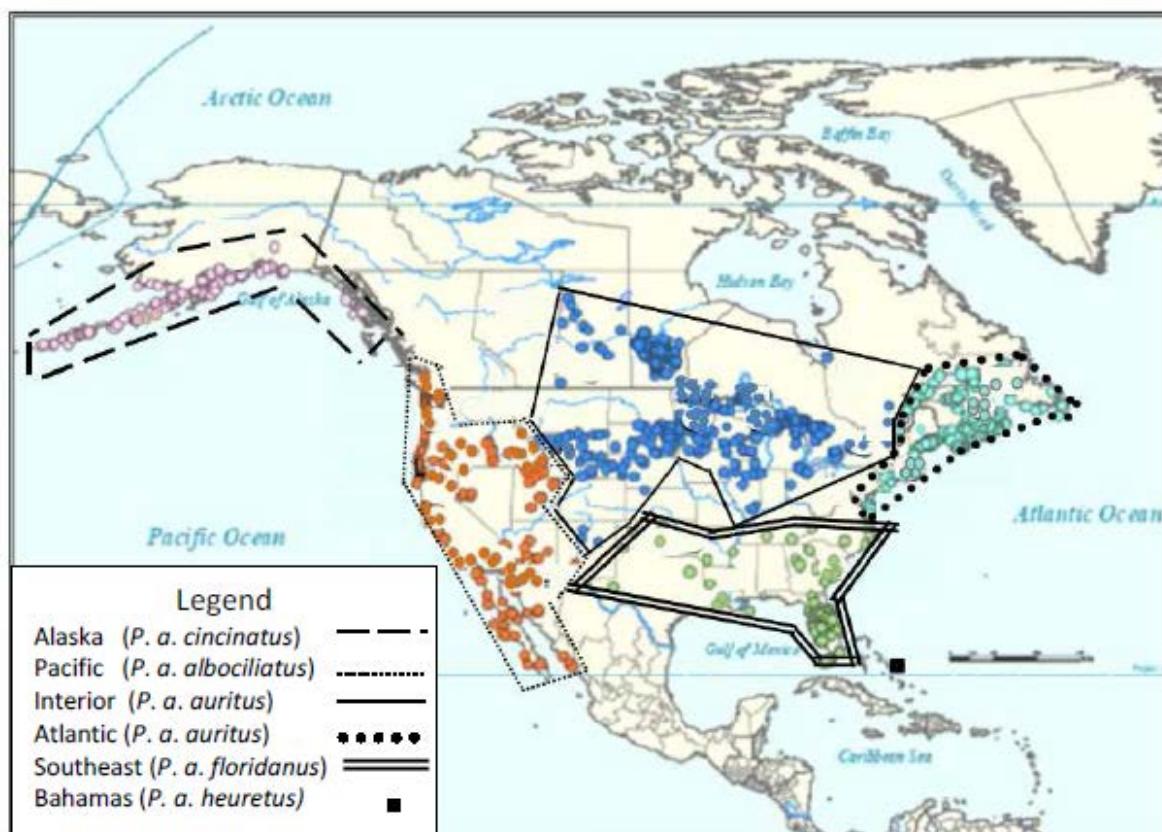


Figure 1. Breeding range of the six double-crested cormorant populations in North America (appended from Mercer 2008).

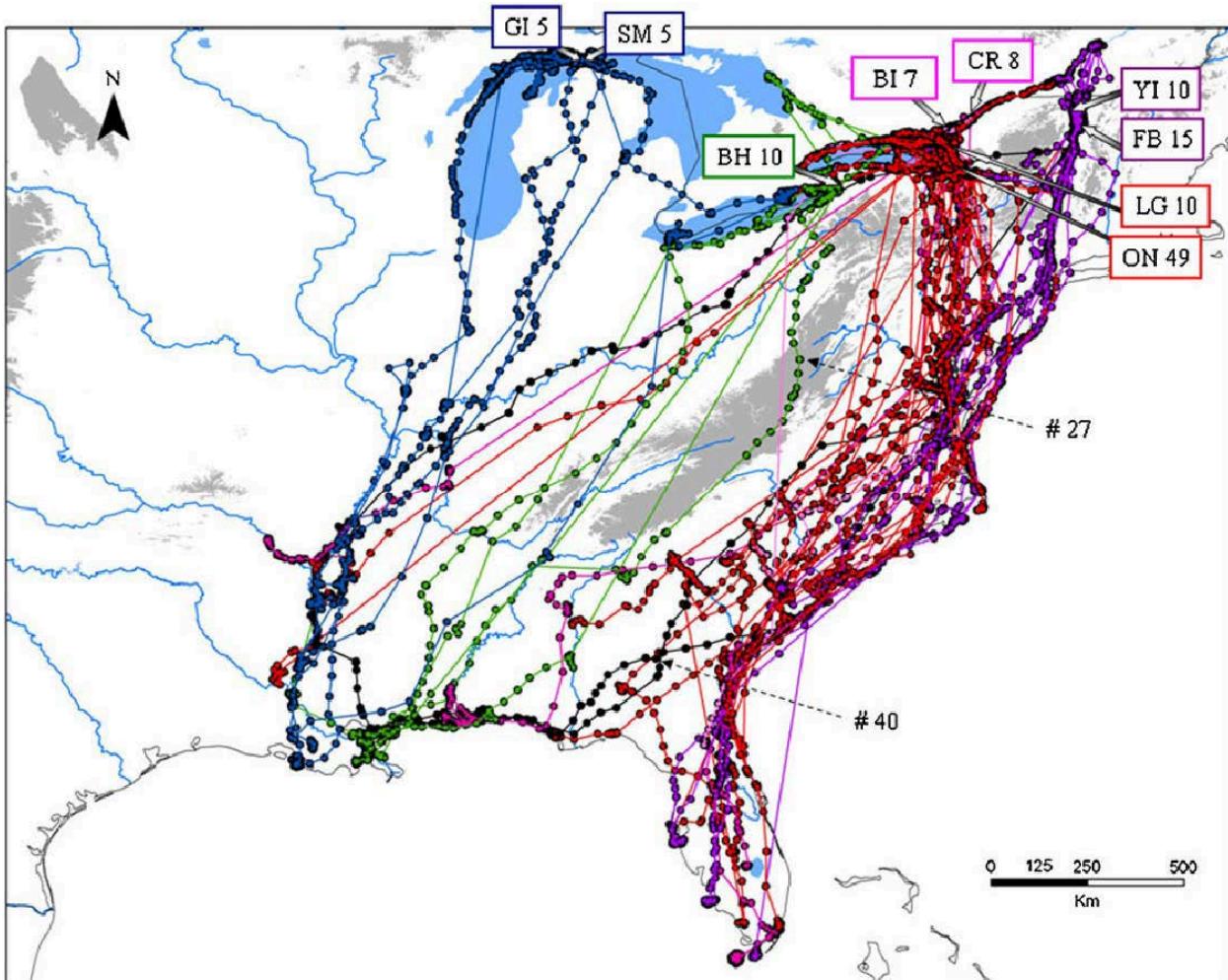


Figure 2. Telemetry tracks of 119 cormorants fitted with Global Positioning System transmitters in 2004–2007 (Guillaumet et al. 2011, used with permission).

Cormorant abundance in North America has increased dramatically since the 1960s and 1970s, mostly due to the growth of the Interior and Atlantic subpopulations. Increases largely have been attributed to better environmental regulations, primarily restricting use of chlorinated hydrocarbons (e.g., DDT), protection under the MBTA in 1972, and decreases in take, compared to the early twentieth century (Dorr et al. 2014).

Systematic monitoring of cormorants has occurred in some regions (e.g., U.S. states in the Great Lakes Region), but has not occurred in other regions with well-known breeding colonies (e.g., Manitoba, Ontario). Recent population data suggest the Great Lakes meta-population may be stable or declining (Guillaumet et al. 2014), having increased until the early 2000s and declining thereafter. This pattern coincides with the onset of widespread cormorant-control measures (largely through the previous Public Resources Depredation Order, or PRDO) in the Great Lakes Region by 2005, but the decline may have been precipitated by cormorant populations reaching carrying capacity in several areas within the region (Wyman et al. 2016). In addition, cormorant abundance in the Great Lakes Region may be affected by widespread management activities on the breeding and wintering grounds (Guillaumet et al. 2014).

From approximately 1987 to 2009, the number of cormorant breeding pairs estimated within British Columbia, Washington, Oregon, and California increased by approximately 72 percent (i.e., 3 percent per year), or 12,000 breeding pairs, and large-scale distributional changes occurred (Adkins et al. 2014; Pacific Flyway Council 2012). The coastal states and provinces account for greater than 90 percent of the western subpopulation (Adkins et al. 2014). Growth of the western subpopulation of cormorants is largely attributed to the increase in size of the cormorant breeding colony at East Sand Island, which accounted for 39 percent of the western subpopulation of cormorants during 2008–2010 (Adkins et al. 2014). Outside of East Sand Island, growth of the western subpopulation of cormorants in other areas has been relatively static over the past two decades. Some isolated areas showed limited cormorant increases (e.g., local sites within Arizona, Idaho, Montana, and Washington) and areas of decline (e.g., Salton Sea, California; Pacific Flyway Council 2012). Recent estimates (2017 and 2019) of the breeding western subpopulation were lower than prior to implementation of the U.S. Army Corps of Engineers Double-crested Cormorant Management Plan to Reduce Predation of Juvenile Salmonids in the CRE (USACE 2015). Although a decrease has been observed, it was less than predicted.

The current estimate of cormorant abundance in the continental U.S. and Canada is 871,001 to 1,031,757 birds (see Table 2). The details regarding procedures used to derive this overall estimate and the population-specific estimates are provided in [Appendix E](#). Briefly, population sizes were calculated for each cormorant population and components of those populations where sufficient data were available. The range of abundance estimates represents high and low observations over a number of years from individual states and provinces, or uncertainty in point estimates provided by surveyors. The *P. a. floridanus* subspecies breeds in Florida and the Caribbean and is considered non-migratory (Dorr et al. 2014). The breeding population size of this subspecies in Florida is much smaller than that of *P. a. auritus*. However, the two subspecies intermix during winter in Florida and are indistinguishable (but see Sheehan 2013). Therefore, an abundance estimate was calculated for the entire state of Florida based only on *P. a. floridanus*. This estimate should be considered conservative because birds killed during the breeding season in Florida are likely the *floridanus* subspecies, whereas birds killed during winter would be of unknown subspecies.

Because nearly all counts of cormorants in the literature are expressed as the number of nests or breeding pairs, these nest/pair counts need to be converted to number of birds. Further, nest/pair counts underestimate actual abundance, because they do not capture the number of unpaired birds and those that do not nest, which is composed of birds that have not reached breeding age and some adults that do not attempt to breed due to various factors (e.g., inability to secure a mate, insufficient food resources). To account for this bias in nest/pair counts, we used two different methods to calculate a multiplier to apply to nest/pair counts ([Appendix E](#)). One method used data from the literature (Dorr et al. 2016), and another used a projection matrix approach (USFWS 2020). Neither the approach based on published literature nor the matrix approach directly account for non-breeding adults. However, the two approaches resulted in multiplier estimates that were similar. The range for the multiplier (2.320–2.567) and the population-specific nest/pair counts were used to calculate the range of abundance estimates for each population. The population-specific estimates were summed to obtain the overall abundance estimates for cormorants.

Table 2. Regional pre-breeding double-crested cormorant population estimates (breeding and non-breeding birds combined). Breeding pair/nest estimates were extrapolated (using a multiplier of 2.320 to 2.567) to include non-breeding birds (see [Appendix E](#)).

Population (subspecies)	Population size	
Region	Low	High
Atlantic (P. a. auritus)		
Atlantic Flyway		
Atl. Canada and Quebec	151,603	171,421
Atlantic United States ¹	102,442	122,439
Subtotal	254,045	293,860
Interior (P. a. auritus)		
Mississippi/ Central Flyway		
Canada	335,115	370,850
United States	213,315	252,236
Miss. /Cent. Subtotal	548,430	623,086
Southern (P. a. floridanus)		
Florida	18,560	20,539
Western (P. a. albociliatus)		
Pacific Flyway (excluding Alaska and Mexico)		
Western	49,966	94,272
Total	871,001	1,031,757

¹does not include Florida.

Authorized Take of Cormorants Through Previous Depredation Orders and Individual Permits

From 2003 to 2016, the Service authorized the take of cormorants under the following regulations: 50 CFR 21.23 (scientific collecting permits), § 21.41 (depredation permits, including those specifically for airports), § 21.47 (previous Aquaculture Depredation Order), § 21.48 (previous Public Resources Depredation Order) and § 21.27 (special purpose permits). After May of 2016, the Service authorized the take of cormorants under 50 CFR 21.23 (scientific collecting permits), § 21.41 (depredation permits, including those specifically for airports) and § 21.27 (special purpose permits).

More recently, from 2007 to 2018, an average of 51,456 cormorants were taken each year (range 14,181 to 84,410) under all available authorities within the 48 states.⁹ On average, 41% were taken annually under the previous public resources depredation order, 30% were taken annually under depredation permits, 27% were taken annually under the previous aquaculture depredation order, and 2% were taken under scientific collecting and special purpose permits.

⁹ Prior to the depredation orders being vacated in 2016, the average annual take in the 48 contiguous states from 2007-2016 was 57,464 cormorants. This take level decreased to 14,181 cormorants in 2017 and 28,646 cormorants

Interactions with and Effects of Cormorants on the Human Environment

THE AQUACULTURE INDUSTRY

The term *aquaculture* broadly refers to the cultivation of aquatic organisms in controlled aquatic environments for any recreational or public purpose (NOAA 2011). The breeding, rearing, and harvesting of plants and animals takes place in all types of water environments including ponds, rivers, lakes, the ocean, and man-made “closed” systems on land (NOAA 2011). Aquaculture producers often identify cormorants as causing the greatest predation threat to farm-raised aquaculture species (Stickley and Andrews 1989, Price and Nickum 1995, Dorr et al. 2012a, Craig et al. 2016). Damage to aquaculture resources occurs primarily from the economic losses associated with cormorants consuming fish and other commercially raised aquatic organisms. Damage can also result from the death of fish and other aquatic wildlife from injuries associated with predation as well as the threat of disease transmission from one impoundment to another or from one aquaculture facility to other facilities as cormorants move between sites.

Traditionally, most inland breeding cormorants of North America migrate south after the breeding season to winter along the coastal areas of the United States and Mexico (Dorr et al. 2014). However, as aquaculture production increased in the southern United States, an increasing number of cormorants began wintering inland near aquaculture facilities (Glahn et al. 2000b, Dorr et al. 2012b, Dorr et al. 2014). The number of cormorants can increase rapidly wherever prey is readily accessible at aquaculture ponds (Wires et al. 2001, Dorr et al. 2012a, Dorr et al. 2014, Wires 2014).

The frequency of occurrence of cormorants at a given aquaculture facility can be a function of many interacting factors, including: (1) the size of the regional and local cormorant population; (2) the number, size, and distribution of ponds; (3) the size distribution, density, health, and species composition of fish populations in the ponds; (4) the number, size, and distribution of natural wetlands in the immediate environment; (5) the size distribution, density, health, and species composition of natural fish populations in the surrounding landscape; (6) the size, and distribution of suitable roosting habitat; and (7) the variety, intensity, and distribution of local damage-abatement activities. As a result, cormorants rarely distribute evenly over a given region, but rather tend to be highly clumped or localized.

Also, damage-abatement activities can shift bird activities from one area to another, thereby reducing damage at one site while increasing it at another (Aderman and Hill 1995, Mott et al. 1998, Reinhold and Sloan 1999, Tobin et al. 2002). Thus, some aquaculture producers in a region suffer little or no economic damage from cormorants, while others experience exceptionally high losses.

in 2018. Although no new or renewed permits were authorized in the central and eastern U.S. from May 2016 to November 2017, under 50 CFR 13.22 any person holding a valid, renewable permit may continue the activities authorized by the expired permit until the Service acts on the application for renewal if all of the following conditions are met: (1) The permit is currently in force and not suspended or revoked; (2) The person has complied with this section; and (3) The permit is not a CITES document that was issued under part 23 of the subchapter.

Cormorants are opportunistic feeders with diets consisting largely of fish. Thus, there is a great deal of variation in prey composition, both geographically and seasonally. Most of the research on diet composition of wintering cormorants at aquaculture facilities has occurred near catfish farms in the southeastern United States where the average proportion of commercial catfish in the diet of cormorant ranges from 50% to 55% of the diet. The proportion of commercial catfish in the cormorant diet can vary seasonally from less than 30% in October and November to more than 80% in February, March, and April due to differences in prey availability (e.g., see Bivings et al. 1989, Conniff 1991, Glahn et al. 1995, Glahn and Brugger 1995, Glahn et al. 1999).

Cormorants are capable of taking catfish up to 42 cm (16 inches) in length (Campo et al. 1993). However, the majority of catfish caught by cormorants average about 10 to 15 cm (4 to 6 inches) (Schramm et al. 1984, Stickley 1991, Stickley et al. 1992, Glahn et al. 1995). This range is similar in size to prey eaten by cormorants in natural freshwater habitats, which average about 12 cm (5 inches) (Durham 1955, Hirsch 1986, Hobson et al. 1989, Campo et al. 1993, Glahn et al. 1998).

Besides the predation issues at aquaculture facilities, there is also the concern about the transmission of disease by cormorants between impoundments and from facility to facility. Given the confinement and high densities of aquatic organisms inside impoundments, the introduction of a disease could result in substantial economic losses. Birds may also be capable of passing bacterial pathogens through fecal droppings and on their feet (Price and Nickum 1995). Taylor (1992) detected a bacterial fish pathogen (*Edwardsiella ictaluri*) in the intestines of cormorants, great blue herons (*Ardea herodis*), great egrets (*Ardea alba*) and snowy egrets (*Egretta thula*), in Mississippi. Taylor (1992) also found the bacterial pathogen for enteric septicemia of catfish within the intestines and rectal areas of cormorants collected from aquaculture facilities in Mississippi. However, since enteric septicemia of catfish is endemic in the region, Taylor (1992) did not consider birds as a primary vector of the disease. Birds can also pose as primary hosts to several cestodes, nematodes, trematodes, and other parasites that can infect fish. Birds can also act as intermediate hosts of parasites that can infect fish after completing a portion of their life cycle in crustaceans or mollusks (Price and Nickum 1995).

PREDATION-RELATED LOSSES AT AQUACULTURE FACILITIES

There have been several studies focused on the economic impacts associated with double-crested cormorant depredations. These are summarized in Table 3.

Table 3. Overview of Research Examining the Economic Effects of Cormorant Depredation at Aquaculture Facilities.

Study	Authors	Year	Approach	Findings
The Impact of Double-Crested Cormorants on the Mississippi Delta Catfish Industry: A Bioenergetic Model	James F. Glahn and Kristin E. Brugger	1995	Considered how cormorant depredations on Mississippi Delta catfish farms translated into losses (defined as replacement cost only) on the industry.	Estimated that depredations were equivalent to 4% of the standing crop at a total replacement cost of \$2 million/yr.
Cormorant Depredation Losses and their Prevention at Catfish Farms: Economic Considerations	James F. Glahn Scott J. Werner, Terry Hanson, Carole R. Engle	2000	Reviews results of controlled experiments on cormorant predation effects on catfish farms to estimate the impacts on the profitability on farming operations based on common enterprise budgets that consider the entire operations of the business and not just replacement costs for catfish.	Determined that a 20% production loss at harvest associated with 30 cormorants feeding on a 6-ha catfish pond for 100 days (500 cormorants days/ha) resulted in a 111 % loss in profits.
Catfish Losses to Wildlife	National Agricultural Statistics Service	2003	Surveyed producers in the 13 largest catfish producing states.	69 percent of producers reported incurring wildlife-caused damages that resulted, on average, in a loss of \$17,200 per operation.
Economic Impact of Double-Crested Cormorants, <i>Phalacrocorax auratus</i> , Depredation on Channel Catfish, <i>Ictalurus punctatus</i> , Aquaculture in Mississippi, USA	Brian S. Dorr, Loren W. Burger, Scott C. Barras, and Kristina Casscles Godwin	2012	Used aerial surveys of numbers and distribution of cormorants in the Yazoo Basin of Mississippi on commercial catfish ponds during winters 2000-2001 and 2003-2004 to refine estimates of regional economic losses due to cormorant depredation.	Depredations were estimated to result in economic losses of \$11.56 and \$0.48 million for foodfish and fingerling ponds, respectively in the first period and \$5.22 and \$0.40 million in the second period. These estimates correspond to 4.6 percent of total catfish sales in the State of Mississippi in 2000-2001 and 2.3 percent of total sales in 2003-2004.

Study	Authors	Year	Approach	Findings
Influence of Simulated Double-crested Cormorant, <i>Phalacrocorax auratus</i> , Predation on Multiple-batch Production of Channel Catfish, <i>Ictalurus punctatus</i>	Brian S. Dorr and Carole R. Engle	2015	Simulated the potential loss at harvest due to cormorant predation at the individual pond level in a multiple-batch production system.	Found that the costs of production increased with increasing predation levels with the highest levels of predation resulting in a cumulative maximum increase in breakeven price of \$0.143/kg
Economics of Bird Depredation: A Catfish Case Study	Shraddha Hegde and Ganesh Kumar	2019	Conducted a controlled depredation study on commercial scale catfish farms at the Thad Cochran National Warmwater Aquaculture Center in 2017.	Found that economic losses ranged between - \$1,737/acre and - \$6,754/acre for a 10,000 fish/acre and a 15,000 fish/acre commercial sized pond, respectively under ineffective cormorant control.
Total Economic Effects of Catfish Losses to Birds	Carole R. Engle, Terrel Christie, Brian Dorr, Ganesh Kumar, Luke Roy, Brian Davis, and Anita Kelly	2020	A two-year study was conducted on the effect cormorants have on catfish producers. The study estimated both the value of fish lost directly due to depredation on catfish farms as well as estimated the cost incurred by catfish farmers to scare depredating birds from their ponds.	Estimated the annual cost of cormorant depredation on catfish farms to be \$64.7 million on the entire industry, on an annual basis. Farmers estimated to spend roughly \$250/ac on bird scaring efforts during the season.

WILD AND PUBLICLY STOCKED FISHERIES, INCLUDING FEDERALLY LISTED FISH SPECIES

The Service, in cooperation with WS, hosted a series of four regional meetings (Little Rock, AR, East Lansing, MI, Atlantic City, NJ, and Portland, OR) in August 2018 with federal, state, and tribal fish and wildlife partners to discuss management issues and conflict-driven concerns over interactions between cormorants and wild and publicly stocked fisheries. Representatives from 27 states attended these meetings and of those states, the following indicated concern about conflicts associated with cormorants where wild and/or publicly stocked fisheries occur: Arkansas, Arizona, Georgia, Idaho, Indiana, Michigan, Minnesota, New York, New Jersey, Nevada, North Dakota, Oregon, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Vermont, Virginia, and Washington. Further, an additional three states (North Carolina, Tennessee, and Wyoming) indicated that these conflicts are an emerging concern for their state. Only four (Kansas, Maryland, Missouri, and Oklahoma) of the 27 states indicated cormorants are not currently associated with conflicts in their state.

Cormorants are opportunistic feeders with diets consisting largely of fish (generally slow-moving or schooling species), with some occurrence of aquatic animals such as insects, crustaceans, reptiles, and amphibians (Johnsgard 1993, Dorr et al. 2014). Reviews of diet studies carried out between 1923 and 1994 were conducted by Trapp et al. in 1999 and Wires et al. in 2001. Both of these reviews found that important commercial and sportfish species made up a very small proportion of the cormorant diet. The studies reviewed identified 75 different fish species in the stomachs of cormorants indicating that they utilize a wide diversity of prey. Only 29 of those 75 species comprised more than 10 percent of the diet at a specific site. Only five species consistently comprised greater than 10 percent of the diet: alewife, brook stickleback, ninespine stickleback, yellow perch, and slimy sculpin.

In general, cormorant diet varies highly among locations and tends to reflect the fish species composition for each location, making it necessary to examine diet on a site-specific basis (Belyea et al. 1999, Wires et al. 2001, DeBruyne et al. 2013). To continue to better understand site-specific variability, changing population dynamics, and also the effects of cormorant management on fish populations, many new diet studies have been conducted since the Service's 2003 FEIS was completed. The majority of these studies continue to conclude that economically important sport or commercial fish species are an insignificant portion of the cormorant diet (Table 4). However, there are important exceptions to this rule (Burnett et al. 2002, Lantry et al. 2002, VanDeValk et al. 2002, Rudstam et al. 2004, Fielder 2008, Göktepe et al. 2012) because site-specific differences in fish-community structure can affect prey selection by cormorants (DeBruyne et al. 2013). Despite the overall low proportion of economically important fish species found in cormorant diets, predation can affect fish populations in other ways. For instance, cormorants do not randomly consume prey in proportion to the availability of their age class. Instead, they consume a limited range of prey age and size classes resulting in a cropping effect that reduces recruitment to older age classes (Rudstam et al. 2004, Dorr et al. 2010, Fielder 2010), which has the potential to depress local sportfish populations. Similarly, fishing pressure can also truncate the size structure of fish population and result in localized depletions (Berkeley et al. 2004).

Some regional generalizations can be made about fish consumed by cormorants. On the Pacific coast, no single species has emerged as the most important prey item in past diet studies conducted in that flyway, although some species were very important in certain regions within that flyway. In the CRE, diet composition differed at the two main colonies. At Rice Island, salmonids were the most important prey item with stickleback and peamouth also being important; at East Sand Island, shad, herring, and sardine were the most important prey items in addition to salmonids and starry flounder (Collis et al. 2000). In other areas, fish such as shiner perch, sculpin, gunnel, snake prickleback, sucker, and sand lance proved important components of the cormorant diet (Wires et al. 2001). Several of the Pacific salmonids are federally listed as threatened or endangered. Other species have important commercial (sardine, herring, sand lance) or recreational (herring, shad) value.

Table 4. Studies conducted examining double-crested cormorant diet and/or their impact on economically important fish species that were not included in the 2003 FEIS.

Study	Location	Economically important fish consumed?	Consequential effect?
Burnett et al. 2002	Eastern basin, Lake Ontario	Yes	Possibly
Lantry et al. 2002	Eastern basin, Lake Ontario	Yes	Yes
VanDeValk et al. 2002	Oneida Lake, NY	Yes	Yes
Fenech et al. 2004	Lake Chicot, AR	No	No
Rudstam et al. 2004	Oneida Lake, NY	Yes	Yes
Meadows 2007	Green Bay, WI	Yes	Not Reported
Fielder 2008	Les Cheneaux Islands, Lake Huron	Yes	Yes
Seefelt & Gillingham 2008	Beaver Archipelago, Lake Michigan	Yes	Not Reported
Dalton et al. 2009	Bride Lake, CT	Yes	No
Eisenhower & Parrish 2009	Lake Champlain	Yes	No
Johnson et al. 2002	Eastern basin, Lake Ontario	Yes	Unlikely; diet shift to goby
Doucette et al 2011	Saskatchewan lakes	Yes	No
DeBruyne et al. 2012	Lake Champlain	Yes	Undetermined; diet shift to alewife
Göktepe et al. 2012	Leech Lake, MN	Yes	Yes
DeBruyne et al. 2013	Oneida Lake, NY	Yes	Unlikely; diet shift to shad
Van Guilder & Seefelt 2013	Beaver Archipelago, Lake Michigan	No	No

In the Great Lakes, the alewife population collapsed in 2003 and has not recovered since (Dunlop and Riley 2013, Environment & Climate Change Canada et al. 2017). This is an important observation because prior to the population collapse, alewife were considered to be one of the most important prey items in the cormorant diet (Madura and Jones 2016) and were thought to act as a prey buffer for other economically important fish species. Where alewife are still abundant (e.g., parts of Lakes Michigan), they remain an important prey item during the cormorant chick-rearing season when they are most readily available as a food source (Van Guilder & Seefelt, 2013). The round goby, a relatively new invader of the Great Lakes basins and tributaries (Charlebois et al. 2001), seems to have replaced alewife as the most prominent species found in the cormorant diet and can constitute up to 85% of the biomass during periods of the breeding season (Johnson et al. 2002, Coleman et al. 2012, Van Guilder & Seefelt 2013, Johnson et al. 2015). In some aquatic areas in the Great Lakes region, gizzard shad also continues to be an important prey item. In fact, in years when age-0 gizzard shad are abundant, they tended to dominate the diet in locations such as Oneida Lake (DeBruyne et al. 2013). Other studies have shown that stickleback, sculpin, cyprinids, yellow perch, walleye, and, at some localities, burbot, freshwater drum, lake/northern chub, and even crayfish are important prey species (Wires et al. 2001, DeBruyne et al. 2013, Schultz et al. 2013, Van Guilder & Seefelt, 2013, Environment & Climate Change Canada et al. 2017, J. Ludwig, personal communication 2019). While at one time cormorants consumed large quantities of smallmouth bass and yellow perch in the waters near Little Galloo Island in Lake Ontario (Johnson et al. 2002), more recent studies indicate that cormorants at this island now feed primarily on round goby (Johnson et al. 2015).

In the southeastern U.S., the diet of coastal nesting and/or wintering birds includes gulf toadfish, mullet, grunt, parrot fish, and pinfish (Withers and Brooks 2004, Dorr et al. 2014). In freshwater sites, the diet consists primarily of shad, catfish, sunfish species, and crappie (Campo et al. 1993, Wires et al. 2001). Many lakes of the southeastern United States are thought to have abundant forage fish populations that are limited by intraspecific competition rather than by predation (S. Lamprecht, personal communication 2020). In the Atlantic region, diet varies to a great extent, with no single species emerging as most important. In coastal habitats, cod, sculpin, cunner, and gunnel are important as well as sand lance, which can be variable, but make up as much as 70% of the diet (Staudinger et al. *In Press*). Where cormorants are found inland or at estuaries, alewife, rainbow smelt, stickleback, smallmouth bass, yellow perch, pumpkinseed, cyprinids, and salmonids (mainly Atlantic salmon) are important prey items (Wires et al. 2001). Of these species, Atlantic salmon are federally listed as threatened, smallmouth bass and yellow perch are important sport fish, and cod, alewife, and rainbow smelt are commercially fished. Concern about impacts of cormorant predation on these fish has been expressed.

While there are many examples of cormorants depleting prey around colonies, to date, no studies show that cormorants have ever depleted fish populations severely enough to pose an extinction risk (Wires 2014). Where populations have already declined due to overharvest, habitat degradation, hydropower development, and other anthropogenic causes, cormorant predation can be a factor limiting the recovery of some ESA-listed populations (NOAA 2014a). However, the need to manage conflicts associated with cormorants does not arise because they threaten the survival of fish populations, but because avian predators like cormorants can affect local fishery yields and economically important fisheries are often prioritized as conservation targets by natural resource agencies (Wires 2014). The distinction between cormorant impacts to fish populations and cormorant impacts to a fishery is an important one because there has been much controversy regarding whether cormorants, in and of themselves, have the ability to affect an entire fish population. A fishery is defined not only by the particular species or stock of fish, but also by the human users, the harvest gear, and the geographic scope. Therefore, it is possible for cormorant predation to lower fish harvests within an area, but to be unimportant to, or even improve, the overall health of the fish population (Wires 2014). In other words, resource agencies can achieve their fish population goals (especially when the population resides in a large water body such as a Great Lake) and still be unable to attain localized fishery-centric objectives where large numbers of cormorants exist.

Another criticism of cormorant conflict management has been that resource agencies have failed to show that avian-suppression measures have had an appreciable impact on the fish populations that such measures were supposed to protect (see Pub. Employees for Envtl. Responsibility v. United States Fish & Wildlife Serv., 177 F. Supp. 3d 146 (D.D.C. 2016)). Public comments and input from stakeholders unsupportive of lethal removal of cormorants argue that without this information, it is impossible to show that the “need” to manage cormorant populations still exists. However, it is important to note that assessing the influence of predation on a fishery is a complex endeavor that requires vast amounts of data. For instance, to definitively evaluate predation effects, at a minimum, the following site-specific data requirements would be necessary:

1. An estimate of fish population size to evaluate the proportion of fish being consumed by cormorants and the magnitude of the effect of predation on the population;
2. Knowledge about the spatial and temporal distribution of fish in order to measure the variability in predation pressure during different life stages, such as spawning;
3. Information about fish population metrics that affect recruitment to the fishery, such as age composition, mortality, and survival and growth rates;
4. Site-specific information such as predator and/or competitor populations, and abiotic metrics such as temperature or local weather patterns that might make a species more or less vulnerable to predation; and
5. An understanding of site-specific cormorant diet, age-specific consumption rates of the birds, and the number of birds feeding over a certain spatial extent.

Though there is the lack of consistent data from every site as limited funds and capacity of most organizations make it impossible to attain comprehensive site-specific information, the Service is still able to make reasonable conclusions on the impacts of cormorants on various fisheries. Numerous studies have shown that, while many other environmental and human-induced factors affect fish populations, cormorants may have an impact at a localized scale and it is also not biologically justified to assume that cormorants have no negative impacts on local fisheries. The following are summaries of several case studies that have been able to illustrate localized fishery declines resulting from cormorant predation and have also been able to demonstrate a positive fishery response following cormorant management.

Fishery Case Studies

Les Cheneaux Islands, Michigan

The Les Cheneaux Islands in Lake Huron saw an exponential increase of cormorants during the 1980s and 1990s. During this time, the yellow perch fishery in the area was also declining and finally collapsed by 2000 (Fielder 2004, Fielder 2008). While there were likely several contributing factors to this fishery collapse, research indicated an annual mortality rate of 88% despite an absence of recreational fishing. It was concluded that high cormorant predation was the explanatory factor (Fielder 2008). Cormorant management in the Les Cheneaux Islands was implemented in 2004 with the goal of reducing nesting adults by 90%. Concurrent with this management, the Michigan Department of Natural Resources continued to sample seven key metrics of yellow perch populations annually to determine the effect management might have on the perch population. Creel surveys and gillnet assessments indicated that as cormorant abundance declined, perch abundance increased, total mortality rate decreased, angler catch rate and harvest improved, perch growth rate declined, mean age increased, and age class longevity (survival) increased (Fielder 2010).

Drummond Island and Brevoort Lake, Michigan

Drummond Island and Brevoort Lake lie to the east and west of the Les Cheneaux Islands, respectively. Both locations are impacted by high numbers of foraging cormorants during spring migration. Fish-community assessments made adjacent to Drummond Island, from 1975 to 2006, indicated that beginning in 2002, yellow perch and walleye abundance had declined relative to previous surveys (Fielder et al. 2003, Fielder et al. 2007). Similarly, monitoring conducted in Brevoort Lake between 1994 and 2005 documented declines in the walleye population (Dorr et al 2010, Dorr et al. 2012). Declines of fish species in both areas were consistent with potentially higher mortality caused by increased predation by foraging cormorants during the fish spawning period.

In response to these declines, a program of nonlethal management combined with limited lethal shooting was initiated in 2004 at Drummond Island and in 2005 on Brevoort Lake with the goal of improving the yellow perch and walleye fisheries. Concurrently, fish assessments, including trap-netting and electrofishing to estimate spawner abundance and spawning success, and a mark-recapture program to determine walleye abundance and age-specific growth and mortality were conducted (Fielder 2010, Dorr et al. 2010). Post-management fishery metrics indicated that both walleye and yellow perch abundance increased significantly at Drummond Island (Dorr et al. 2010) and walleye abundance of the 3-year age class increased to near record levels at Brevoort Lake (Dorr et al. 2012). The increase of fully recruited walleye during the management period provided further evidence of a link between cormorant predation and walleye survival in Brevoort Lake.

Eastern Lake Ontario Basin, New York

In the eastern basin of Lake Ontario, an assessment of the relationship between cormorant and smallmouth bass abundance in 1989 indicated that the high number of cormorant pairs nesting on Little Galloo Island seemed to be depressing smallmouth bass survival (Lantry et al. 2002). Despite production of strong year classes in 1987 and 1988, abundance of smallmouth bass measured from gill net surveys declined to its lowest level by 1995. Stable or increasing catch and harvest rates in other local fisheries suggested that smallmouth bass abundance was not being affected by other issues such as water quality or food limitation. Instead, the increased mortality on young smallmouth bass could be explained by cormorant predation (Lantry et al. 2002). During this same time period, Johnson et al. (2002) found that cormorants consumed large numbers of yellow perch during the pre- and post-chick nesting periods and while smallmouth bass made up a smaller proportion of the diet, consumption of this species increased as the season advanced. Overall, it was estimated that cormorants consumed more biomass of smallmouth bass and yellow perch annually than was taken by sport (bass and yellow perch) and commercial (perch) fishermen together.

A control program was implemented in 1999 to mitigate impacts to the smallmouth bass and perch fisheries. In eight years of intensive control, cormorant numbers declined, and there was a 2.5-fold increase in the abundance of smallmouth bass abundance indicating improved recruitment to the fishery following control (Farquhar et al. 2012). In more recent years, Johnson et al. (2010) found that cormorants occupying the eastern basin have switched to eating the more abundant invasive round goby. This, in addition to continued control of cormorant colonies on the island, has resulted in continued reduction in predation pressure on both yellow perch and smallmouth bass fisheries.

Oneida Lake, New York

In New York's Oneida Lake, a 40-year dataset indicated higher mortality of age 1–2 year perch and age 1–3 year walleye in the late 1990s compared to the three previous decades (Rudstam et al. 2004). This unusual mortality increase occurred concurrently with a dramatic increase of cormorants using the lake. A cormorant-control program aimed at reducing nests via egg oiling and reducing migrants via fall hazing was implemented on Oneida Lake beginning in 1998. This program was shown to reduce predation pressure on fish populations by approximately 47% and this reduction coincided with an increase in the abundance of adult populations of both walleye and yellow perch (Coleman 2009). Yellow perch survival increased from age-1 to age-3, and walleye survival increased from age-1 to age-4 during this time of predator reduction (Coleman 2009).

Leech Lake, Minnesota

Cormorants recolonized Leech Lake in the early 1990s and the area rapidly became host to one of the largest breeding concentrations in Minnesota with more than 2,500 nesting pairs in 2004 (Mortensen and Ringle 2007). Concurrent declines in gill-net catch rates of walleye and yellow perch along with associated recreational fishing pressure, catch, and harvest were also documented by the Minnesota DNR.

In 2005, the Leech Lake Band of Ojibwe received approval to take cormorants on the lake, with a goal to reduce the population to a target of 500 breeding pairs, with an anticipated total annual consumption goal below 3.85 kg/ha. Fish abundance, fishing pressure, and harvest all increased following the implementation of control (Schultz et al. 2013). While walleye fry stocking somewhat complicated analysis, most of the positive population changes and changes in fishing pressure and harvest noted post-control were associated with changes in cormorant feeding pressure (Schultz et al. 2013).

Localized effects of cormorants on stocked hatchery fish

Stocking efforts are an important tool in the maintenance of sportfish populations in most states at some level. In the Great Lakes region alone, state, federal, and tribal hatcheries raise and stock up to 21 million trout, salmon, and cisco each year, and millions of walleye are also stocked annually in inland waters within the region, at a cost of millions of dollars annually (Environment and Climate Change Canada and the U.S. Environmental Protection Agency 2017). Newly stocked fish, however, are vulnerable to predation during and immediately following stocking, and cormorants can have a direct impact on survival. As cormorant populations have recovered, agencies involved in stocking fish have noticed increased predation by cormorants on recently stocked fish across the country (Fish and Wildlife Service 2018). Cormorant predation is particularly problematic when stocking efforts occur during the day at boat landings or in harbors where cormorants are more abundant. While stocking at night and/or offshore stocking likely reduce these negative impacts, safety, cost, and labor issues can be problematic for many, especially state and tribal partners.

Federally listed Fish Species

The majority of ESA-listed fish species in the subregions of the affected environment belong to the salmon and trout family, *Salmonidae*. Pacific salmon and trout are an important biological, cultural, and economic resource in the Pacific Northwest. Many populations have been declining since the late nineteenth century, with documented losses from overharvest, habitat degradation, hydropower development, and other anthropogenic causes (Gresh et al. 2000, Lichatowich 2001, NOAA 2014a). More recently, avian predation has been identified as a factor limiting the recovery of ESA-listed salmonid populations in the Columbia River Basin. Before industrialized development occurred, numbers of adult salmon in the Columbia River Basin were estimated to be around 10 to 16 million adult fish per year (Gresh et al. 2000). Currently, less than two million adult salmon return to the Columbia River Basin annually to spawn (Fish Passage Center 2014).

The maximum-sized fish a cormorant can consume depends on the weight and length of the fish, but is generally no greater than about 17 inches (Dorr et al. 2014). Thus, predation concerns are primarily associated with the consumption of juvenile-sized fish, as most adult-sized fish, particularly anadromous salmonids, exceed 17 inches in length (Groot and Margolis 1991). Anadromous salmonids generally exhibit two principal life-history types: stream- and ocean-type. Stream-type salmonids typically rear in fresh water for a year or more (referred to as “yearlings”) before beginning their downstream migration to the ocean. Ocean-type salmonids typically migrate downstream within days to months following hatching (referred to as “subyearlings”). Both stream and ocean life histories are susceptible to cormorant predation. The timing of the run and abundance of fish that exhibit these life histories, however, can vary substantially by species, population, and location (Groot and Margolis 1991).

Many of the fish species within the affected environment are found in the Columbia River Basin. The southern distinct population segment (DPS) of Pacific eulachon (*Thaleichthys pacificus*), which ranges

from the Mad River in California to the Elwha River in Washington, was ESA-listed in 2011. Similar to ocean-type salmonids, these anadromous fish migrate to the ocean shortly after hatching. Unlike most anadromous salmonids, however, both juvenile and adult Pacific eulachon are susceptible to cormorant predation due to the small size of adult eulachon (approximately 9 inches). Known threats to Pacific eulachon recovery include habitat loss and degradation, hydroelectric dams and dam operations, and adverse environmental conditions (NOAA 2014b).

Three species of rockfish (bocaccio [*Sebastodes paucispinis*], canary rockfish [*Sebastodes pinniger*], and yelloweye rockfish [*Sebastodes ruberrimus*]) found in the Salish Sea subregion were ESA-listed in 2010. These species live strictly in marine waters. Adult rockfish are generally found in deep water (greater than 80 feet) and are often too large to be consumed by cormorants. Juvenile rockfish, however, inhabit shallower water near kelp beds, rocky tidal areas, and other structures where they could potentially be susceptible to cormorant predation. Known threats to bocaccio, canary, and yelloweye rockfish include overharvest in targeted fisheries, by-catch in non-target fisheries, and adverse environmental conditions (NOAA 2014a).

Six fish species, representing fifteen different ESA-listed evolutionarily significant units (ESUs) or DPSs, occur in the Lower Columbia River Basin and are potential prey to cormorants within the subregions of the affected environment. Many of these fish populations originate upstream of the Lower Columbia River Basin but use the Lower Columbia River during the migratory portion of their life. Because cormorant predation primarily affects small fish, information presented in this section focuses on the juvenile life stage of each ESA-listed fish species or ESU or DPS.

Data regarding cormorant impacts to ESA-listed fish in the Lower Columbia River Basin are primarily based on studies conducted by Oregon State University and Real Time Research at the East Sand Island cormorant colony. This includes estimates of juvenile salmonid consumption based on cormorant diet samples and bioenergetics modeling and ESU or DPS-specific predation rates based on recoveries of salmonid Passive Integrated Transponder (PIT) tags. Empirical data are provided when available. However, data are not available for all ESA-listed ESU or DPS salmonid groups that occur in the Lower Columbia River Basin. For those species lacking empirical data, potential impacts are primarily based on spatial or temporal overlap with the cormorant nesting season at East Sand Island and critical habitat designations for ESA-listed fish in the Lower Columbia River Basin.

Federally-listed fish species that occur within the subregions of the affected environment described in this draft EIS can be found below in Table 5. Additional details on all federally listed ESU or DPS fish species found within the affected environment can be found in [Appendix F](#).

Table 5. ESA-listed Fish Species that Occur within the Subregions of the Affected Environment.

Species - ESU, DPS	ESA Status	Presence in Subregions of Affected Environment
Bocaccio rockfish	Endangered	Salish Sea
Bull trout	Threatened	Salish Sea/Washington Coast/Lower Columbia River
Canary rockfish		
Puget Sound/Georgia Basin	Threatened	Salish Sea
Chinook salmon		
Lower Columbia River	Threatened	Lower Columbia River
Snake River Fall-run	Threatened	Lower Columbia River
Snake River Spring/Summer-run	Threatened	Lower Columbia River
Upper Columbia River Spring-run	Endangered	Lower Columbia River
Upper Willamette River	Threatened	Lower Columbia River
Puget Sound	Threatened	Salish Sea
Chum salmon		
Columbia River	Threatened	Lower Columbia River
Hood Canal	Threatened	Salish Sea
Coho salmon		
Lower Columbia River	Threatened	Lower Columbia River
Oregon Coast	Threatened	Oregon Coast
Southern OR/Northern CA	Threatened	Oregon Coast
Pacific eulachon	Threatened	Salish Sea/Washington Coast/Lower Columbia River/Oregon Coast
Sockeye salmon		
Ozette Lake	Threatened	Washington Coast
Snake River	Endangered	Lower Columbia River
Steelhead		
Lower Columbia River	Threatened	Lower Columbia River
Middle Columbia River	Threatened	Lower Columbia River
Snake River Basin	Threatened	Lower Columbia River
Upper Columbia River	Threatened	Lower Columbia River
Upper Willamette River	Threatened	Salish Sea
Puget Sound	Threatened	Salish Sea
Yelloweye rockfish	Threatened	Salish Sea

RECREATIONAL FISHERIES AND CORMORANTS

Recreational, consumptive use of wildlife associated with cormorants and associated conflicts addressed in this FEIS center on fish stocking for angling. For example, many states throughout the West stock multiple fish species for recreational consumptive use (e.g., rainbow and cutthroat trout, catfish, largemouth bass, walleye, bluegill, and Arctic grayling). Western states often manage rainbow trout as a recreational fishery through stocking catchable-sized fish annually into lakes and rivers. In addition, rainbow trout are now wild breeding in many areas throughout the west. Recently, substantial levels of predation of hatchery-reared trout by cormorants in Idaho have been documented (Idaho Department of Fish and Game 2015; Meyer et al. 2016). Efforts to stock fish also center on recovery efforts for native fish species (e.g., chub and sucker species). In addition, colonial waterbird predation on juvenile salmonids tagged with PIT tags in the Columbia River estuary have occurred. (Collis et al., 2001)

With regard to recreational stocked fisheries, in 2016, 30.1 million residents 16 years and older enjoyed a variety of freshwater fishing opportunities throughout the United States. Freshwater anglers fished 383 million days and took 322 million fishing trips. They spent \$29.9 billion in fishing-related expenses during the year. Table 6 below summarizes the findings of the 2016 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (NSFHWAR) for freshwater anglers. Cormorants are believed to have an impact on recreational freshwater anglers because of the amount of freshwater fish they consume, which can put them into direct competition with anglers regarding catch rates and subsequent angler enjoyment.

Table 6. Freshwater Fishing in the U.S., 2016.

Anglers	30.1 million
Days	383 million
Trips	322 million
Expenditures	29.9 billion

Source: 2016 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, U.S. Fish and Wildlife Service. p. 10.

Freshwater anglers target a variety of species in their angling pursuits. The NSFHWAR reported that in 2016 black bass were targeted by 9.6 million anglers over 117 million days, making black bass the most commonly pursued species in the country. Panfish were the second most commonly targeted species, pursued by 8.4 million anglers spending 110 million days on the water. Table 7 below summarizes, by species targeted, the total number of anglers and associated fishing days in 2016, as reported by NSFHWAR.

Table 7. Selected Fish by Type of Fishing (millions), 2016.

Type of Fish	Anglers	Days
Black bass ^a	9.6	117
Panfish ^a	8.4	110
Trout ^a	7.8	63
Catfish/bullhead ^a	8.1	74
Crappie ^a	7.8	107
White bass, striped bass ^a	5.0	72
Walleye/sauger ^b	0.5	3
Salmon ^b	0.9	6
Steelhead ^b	0.4	2

^a Denotes freshwater fish except Great Lakes fishing.

^b Denotes freshwater fishing in the Great Lakes.

Source: 2016 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, U.S. Fish and Wildlife Service. P. 14.

To date, there has been limited research on the direct effect cormorants have had on recreational fisheries. However, in 2015, Shwiff, et al. conducted a study that attempted to model the effect that cormorants had on a recreational fishery in the Oneida Lake Region in Upstate New York.¹⁰ They defined the economic impact of cormorants as the value of the diminished nonresident angler tourism to the region. They estimated that the potential economic loss to be on average \$5 million to \$66 million annually with a corresponding 66 to 929 job-years lost. Their estimate assumes that an observed decline in nonresident license sales is correlated with a growing cormorant population. However, the authors were not able to control for other influences, such as an overall decline in angling numbers, as reported in NSFHWAR, or on primary sampling methods on recreational anglers, and they recognize the desirability to do so in future work.

In 2010 Caudill and Charbonneau assessed the economic contributions from fisheries and aquatic resource conservation associated with the Service's programs.¹¹ They found that in 2006, the estimate of the stocking of 123.1 million fish by the Service generated over 13 million angling days, \$554 million dollars in retail sales, \$903 million dollars of industrial output, \$256 million dollars of job income and 8,000 jobs. Additionally, over \$37 million dollars of federal tax income and \$34 million dollars of state and local tax revenue were generated.¹² Table 8 below shows a breakdown of the types of fish species stocked by the Service.

¹⁰ Modelling the Economic Impacts of Double-Crested Cormorant Damage to a Recreational Fishery, Stephanie A. Schwiff, Katy N. Kirkpatrick, Travis L. DeVault, and Steven S. Schwiff, Human-Wildlife Interactions 9(1):36-47, Spring 2015.

¹¹ Conserving America's Fisheries, An Assessment of Economic Contributions from Fisheries and Aquatic Resource Conservation. Joseph Charbonneau and James Caudill. U.S. Fish and Wildlife Service, Division of Economics. September 2010. <https://www.fws.gov/home/feature/2011/pdf/FisheriesEconomicReport.pdf>.

¹² Ibid. p. 4.

Table 8. 2006 National Fish Hatchery Recreational Stocking by Major Species.

Species	Number Stocked (millions)	Percent of Total
Chinook	43.1	35.0
Walleye	20.9	17.0
Rainbow trout	11.6	9.4
American shad	9.9	8.1
Lake trout	5.6	4.5
Steelhead	4.9	4.0
Bluegill	4.1	3.3
Coho	4.0	3.3
Northern pike	3.1	2.5
Yellow perch	2.8	2.3
Striped bass	2.5	2.0
Sauger	2.1	1.7
Cutthroat trout	1.6	1.3
Largemouth bass	1.0	0.8
Other species	5.8	4.8
Total Stocked	123.1	100

Source: Fishery Information System Database (2006). Charbonneau and Caudill, 2010.

EFFECTS OF CORMORANTS ON VEGETATION

The effects cormorants have on vegetation are direct and relatively easy to document. Through physical and chemical means, cormorants over time often kill shrubs and trees where they breed, nest, and loaf. Cormorants at nesting colonies and roost sites can have a negative impact on vegetation by both chemical (cormorant guano) and physical (stripping leaves and breaking tree branches) means (Boutin et al. 2011, Koh et al. 2012, McGrath and Murphy 2012, Ayers et al. 2015, Lafferty et al. 2016). The loss of vegetation may also result in changes in soil characteristics as well as problems with erosion. While this is a natural occurrence in habitats for several bird species, colonies of cormorants can potentially create a localized problem for vegetation in protected areas such as parks, refuges, and islands. Thus, an important issue for consideration is the reduction of tree cover and plant diversity on the islands they colonize (Chapdelaine and Bédard 1995, Rippey et al. 2002).

Cormorants often congregate together when nesting, feeding, roosting, and loafing. This often leads to accumulations of fecal droppings in these areas, which can have a negative impact on vegetation because fecal droppings can contribute to excessive amounts of ammonium nitrogen, phosphorus, and metals in the soil. These changes in the soil from fecal droppings can affect the composition of plant species and often leads to a reduction in the number of species and provides an opportunity for non-native species to establish (Boutin et al. 2011, Craig et al. 2012). In addition, cormorants often strip leaves for nesting material and the weight of nests can break branches, which often kills the tree (Lemmon et al. 1994, Boutin et al. 2011, Koh et al. 2012, McGrath and Murphy 2012, Ayers et al. 2015, Lafferty et al. 2016).

In a survey conducted by Wires et al. (2001) respondents from Alabama, Arkansas, Connecticut, Florida, Iowa, Maine, Maryland, Michigan, New Hampshire, New York, North Carolina, Ohio, Oklahoma, Rhode Island, Vermont, and Wisconsin reported impacts to trees, while the States of Iowa, Maine, Maryland, Michigan, New Hampshire, Ohio, Oklahoma, Vermont, Virginia, and Wisconsin reported impacts to herbaceous layers. An important issue for consideration is the reduction of tree cover and plant diversity on the islands cormorants colonize (Chapdelaine and Bédard 1995, Rippey et al. 2002).

Cormorant damage is particularly concerning when it occurs to vegetation or plant communities of special management importance. For example, cormorants may affect the Carolinian forest vegetation type, which is the northernmost geographic extension of the eastern deciduous forest ecosystem. In Canada, even though the Carolinian forest vegetation zone in the Lake Erie Region makes up only 1% of Canada's total land area, it boasts a greater number of species of flora and fauna than any other ecosystem in Canada, many of which are considered rare (Kamstra et al. 1995, Boutin et al. 2011). Research conducted on Middle Island in Lake Erie, which encompasses a portion of the Carolinian forest vegetation type, found the vegetation greatly modified by cormorant habitation (Hebert et al. 2005).

Cormorants affected not only the tree canopy, but also the understory vegetation, decreasing species richness and increasing the abundance of exotic plant species (Boutin et al. 2011). The United States portion of the Lake Erie area also contains Carolinian forest vegetation supporting rare species. Therefore, cormorant management was implemented at Green Island in Lake Erie to prevent destruction of habitat for six state-listed plant species, including the state-threatened rock elm (*Ulmus thomasii*), which is particularly sensitive to cormorant damage (Ohio Division of Wildlife et al. 2012).

Degradation of vegetation due to the presence of cormorants can also reduce nesting habitat for other birds (Jarvie et al. 1997, Shieldcastle and Martin 1999) and habitat used by wildlife, including threatened or endangered species (Korfanty et al. 1999). In tree-nesting colonies, high concentrations of nesting cormorants can compete with other bird species, such as great blue herons, great egrets, snowy egrets, and black-crowned night-herons, for limited nesting space (Weseloh and Ewins 1994, Weseloh and Collier 1995, Wires et al. 2001). Additionally, cormorant droppings into nests situated in lower trees can cause nest abandonment (Moore et al. 1995). Cormorant eggs can occur in other species' nests, suggesting that some level of species displacement can occur (Somers et al. 2011). This often leads to displacement of other native bird species and a decrease of species diversity on islands that host high concentrations of cormorants. In some cases, the establishment of colonial waterbird nesting colonies on islands has led to the complete denuding of vegetation within three to 10 years of areas being occupied (Lewis 1929, Lemmon et al. 1994, Weseloh and Ewins 1994, Bédard et al. 1995, Weseloh and Collier 1995, Weseloh et al. 1995, Korfanty et al. 1999, Hebert et al. 2005). Although loss of vegetation can have an adverse effect on many species, some colonial waterbirds, such as pelicans and terns, prefer sparsely vegetated substrates for nesting.

EFFECTS OF CORMORANT PRESENCE ON HUMAN HEALTH AND SAFETY

The primary risk to human health and safety from cormorants is the risk of a cormorant collision with aircraft. Collisions between aircraft and wildlife are a concern throughout the world because they threaten passenger safety (Thorpe 1996), result in lost revenue and costly repairs to aircraft (Linnell et al. 1996, Robinson 1996), and erode public confidence in the air transport industry as a whole (Conover et al. 1995). The magnitude of the hazard depends on the physical, biological, and behavioral characteristics of each bird. Cormorants are a particular hazard to aircraft because of their body size (wingspan of 45-48 inches [114-123 cm]) and mass (2.8-5.5 lbs. (1,200-2,500 g), slow flight speeds, and their natural tendency to fly in flocks (Cornell Lab of Ornithology 2010; Dolbeer and Eschenfelder 2003). Blockpoel (1976) states that birds with slow flight speeds can create increased hazards to aircraft because they spend relatively greater lengths of time in aircraft movement areas.

Cormorants were rated as the 8th most hazardous wildlife species to aircraft (DeVault et al. 2011). According to the Federal Aviation Administration's (FAA) Bird Strike Database, there were 187 reported wildlife strikes involving cormorants to civil aircraft in the United States from 1990 to December 2019 (FAA 2020). Forty-six of 77 strike reports that provided information on damage indicated that the aircraft had sustained minor to substantial damage. Twenty-one reports indicated that the aircraft had sustained substantial damage and one aircraft was destroyed. Thirty-five of the 46 reported strikes with damage had a negative effect on the flight (e.g., need to abort takeoff or return to airport) and four reported cormorant strikes resulted in injuries to five people (Dolbeer et al. 2016). Twenty-one of the 46 strikes involved more than one bird, which poses hazards of concurrent damage to multiple portions of the aircraft/engine(s).

Pathogens originating from cormorants are another risk to human health. This is primarily associated with fecal contamination of water used for recreation (e.g., beaches) or community water supplies. Concentrations of colonial waterbirds can impact water quality through runoff of fecal material from areas where they congregate to roost, loaf, or nest (Hatch 1995, Klett et al. 1998). Although this impact has not been documented specifically for cormorants, it has been documented in other colonial waterbirds, including great cormorants (*Phalacrocorax carbo*) (Klimaszyk and Rzymski 2016, Han et al. 2017, Telesford-Checkley et al. 2017). Water contamination can include increased levels of fecal nitrogen and phosphorus as well as disease-causing organisms such as *Escherichia coli*. Risks to human health associated with fecal contamination of water are likely very low. There is a general perception among the public and a concern among resource-management personnel that cormorants do have the ability to transmit diseases to humans, but a direct link is difficult to establish due to the expense of testing and the difficulty of tracing the disease back to cormorants. Therefore, no such links have been identified in the United States.

EFFECTS OF CORMORANTS ON PROPERTY

Property losses associated with cormorants include damage from fecal accumulation on infrastructure such as boats and marinas, bridges, buildings, and other structures used by cormorants as breeding, loafing, or roosting sites (Wires 2014). Corrosion caused by fecal uric acid from nesting or roosting congregations of cormorants may damage vehicles and structures (Dorr et al. 2014). Accumulated bird droppings can reduce the functional life of some building roofs by 50% (Weber 1979). The accumulations of feces on walkways, ladders, and equipment can lead to slippery surfaces and health and safety concerns. Over the period of fiscal years 2014-2016, WS employees took various actions involving cormorants to reduce risks of property damage to boat docks, marinas, and watercraft (average of 24 work tasks per year), to buildings (73 work tasks per year), to roads and bridges (34 work tasks per year), general property damage (183 work tasks per year), damage at recreational areas (20 work tasks per year), vegetation damage (12 work tasks per year), and damage to utilities (32 requests per year). Damage is determined by information provided in WS form 37 and is addressed through the issuance of depredation permits by the Service with technical input from WS. Other types of damage that were relatively infrequent (5 or less work tasks per year) included predation on ornamental fish, dikes/dams/water impoundments, damage to equipment, and conflicts at landfills.

Lethal Removal of Cormorants and the Human Environment

CORMORANTS AND CO-NESTING BIRD SPECIES

Information on cormorants and co-nesting bird species can be found two NEPA documents developed by the Service, which include pages 35-38 of the 2003 FEIS and pages 27-30 of the 2017 EA concerning avian associates of cormorants. We incorporate this information by reference in this FEIS, and expand upon this analysis below.

Over the course of their life cycle, individual cormorants may interact with other species of birds in a variety of ways. These interactions may involve competition for nest sites, competition for food, reducing available nesting space and nesting material for co-nesting species, habitat degradation, and nest abandonment resulting from habitat degradation. Nest management is used to reduce local breeding populations of cormorants and associated impacts on habitat and co-nesting species. Nest management is typically authorized under depredation permits. Egg oiling, egg addling, and destruction of nests are management techniques used to minimize cormorant colonies and therefore local impacts. Cormorants are likely to continue to incubate oiled and addled eggs for a time after treatment, which reduces the likelihood of re-nesting. Cormorants are more likely to re-nest at the project site or abandon the site for another location when nest destruction is used, so this method is used less often than egg oiling/addling. Therefore, nest destruction is typically considered to be less effective at controlling cormorant populations.

Cormorant management activities that occur within a colony of nesting cormorants could disturb other co-nesting colonial waterbirds. If these activities occur in cormorant nesting colonies where co-nesting species also occur, measures used to take cormorants could disturb those co-nesting species when an entity conducts take within the nesting colony of cormorants or as an entity approaches a nesting colony of cormorants. If adults of co-nesting species are startled from their nest for too long or at the wrong time of day, there is the potential for increased mortality of eggs and chicks. However, in most instances, co-nesting birds may temporarily leave the immediate vicinity of scaring, but usually return after conclusion of the action. Moore et al. (2005) evaluated the impact on co-nesting great blue herons and great egrets on Lake Ontario from activities to remove cormorants. For both great blue herons and great egrets, there was no impact on the proportion of time that great blue herons and great egrets spent attending nests between control and treatment sites for the interval prior to the removal of cormorants, the intervals between cormorant removal efforts, and the period after cormorant removal was completed. However, nest attendance by great blue herons and great egrets declined for both species during removal periods (35 ± 20 min). Great blue herons disturbed during the removal of cormorants returned to the nest in 11 to 14 minutes (longest unattended= 50 ± 30 min) and all egrets returned to nests before the removal of cormorants had ended (longest unattended= 6 ± 4 min). In addition, there was no difference in the nest success of great blue herons or great egrets between treated and untreated sites.

A study of common tern response to cormorant management activities and research disturbance conducted on an island within Lake Oneida in New York found that the greatest levels of disturbance in the common tern colony were from human activities within the colony (Mattison 2006). Disturbance of common terns included researchers monitoring common tern reproduction, the banding of birds within the colony, and from activities to install Mylar tape on one side of the island to deter cormorants from nesting at the location. However, the Mylar tape itself did not appear to be particularly alarming to the common terns. Noise disturbance from other locations on the lake, including that from the use of pyrotechnics, was less disruptive than visits to the colony. Birds appeared to acclimate to the use of the devices quickly and some pyrotechnics appeared to be less disruptive to terns than other types of pyrotechnics. Terns did not leave nests when using pyrotechnics that produce a loud bang after firing when using those pyrotechnics within observable distance of the colony. The common terns did lift off nests in three of the seven instances when using pyrotechnics that produce a whistling noise after firing when using those types of pyrotechnics at similar distances from the common tern colony.

At nesting colonies that support a high number of co-nesting gulls, predation by gulls has become an increasing concern when conducting cormorant control activities at those colonies. Human activities including research, population surveys, and activities to disperse or remove cormorants that cause adult birds to leave their nests create opportunities for gulls to prey on eggs and chicks of other gulls and co-nesting species (Kury and Gochfeld 1975, Ellison and Cleary 1978, DesGranges and Reed 1981, Duerr et al. 2007). As an example, modeling by Wyman et al. (2018) found that colony growth of herring gulls and ring-billed gulls responded positively to cormorant abundance and to activities to manage cormorants, meaning that herring gulls and ring-billed gulls were able to take advantage of the cormorant management actions and prey more easily on the available cormorant eggs and chicks.

In the Great Lakes, Wyman et al. (2018) found that colony growth of great blue herons co-nesting with cormorants showed little response to cormorant abundance and activities to manage co-nesting cormorants. However, Wyman et al. (2018) found the growth of black-crowned night-heron colonies responded negatively to both increasing cormorants co-nesting at a location and from activities associated with managing cormorants at a location.

The unintentional take of a nontarget animals while conducting activities to alleviate damage caused by cormorants is a concern. The primary method to take cormorants is the use of a firearm. The use of firearms would essentially be selective for cormorants because the user would identify an animal prior to shooting. However, there is potential for misidentification of other bird species, especially bird species with a similar appearance to a cormorant that are also fish-eating bird species that occur in aquatic habitats, such as the neotropic cormorant (*Phalacrocorax brasilianus*), great cormorant, and the anhinga (*Anhinga anhinga*). Those species often intermix with cormorants. The misidentification of a bird species that appears similar to a cormorant can occur, especially when those species mix with cormorants in flight and low-light conditions. However, the Service anticipates the unintentional take of nontarget species to occur infrequently and involve very few individuals of a particular species.

Another common concern among members of the public and wildlife professionals, including Service and WS personnel, is the impact of lethal cormorant damage management methods and activities on bald eagles. The bald eagle (*Haliaeetus leucocephalus*) is protected from harmful action and impacts by the Bald and Golden Eagle Protection Act (Eagle Act) and the MBTA. For more information see pages 30-31 of the 2017 EA concerning impacts of lethal removal of cormorants on eagles. A variety of human activities can potentially interfere with bald eagles, affecting their ability to forage, nest, roost, breed, or raise young. Therefore, the Service developed the National Bald Eagle Management Guidelines to advise landowners, land managers, and others who share lands with bald eagles when and under what circumstances the protective provisions of the Eagle Act may apply to their activities.¹³

FEDERALLY LISTED CO-NESTING SPECIES (OTHER THAN FISH)

Section 7 of the ESA, as amended (16 U.S.C. §§ 1531-1543; 87 Stat. 884), provides that:

"The Secretary shall review other programs administered by him and utilize such programs in furtherance of the purposes of this Act" (and) shall "ensure that any action authorized, funded or carried out ... is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of (critical) habitat."

An Intra-Service ESA Section 7 consultation Biological Evaluation (ESA BE) was developed to assess if any proposed, threatened, or endangered species or associated critical habitat would be affected by cormorant control. The Service added specific conditions for piping plover (*Charadrius melanotos*), interior least tern (*Sterna antillarum*), and wood stork (*Mycteria americana*) to all of the alternatives in order to protect these specific listed and candidate species.

¹³ The National Bald Eagle Management Guidelines help people to minimize impacts to bald eagles, particularly where they may constitute "disturbance," which is prohibited by the Eagle Act. A variety of human activities can potentially disturb bald eagles, affecting their ability to forage, nest, roost, breed or raise young. The Service strongly encourages adherence to these guidelines to ensure that bald and golden eagle populations will continue to be healthy. The Service realizes there may be impacts to some birds even if all reasonable measures are taken to avoid such impacts.

To protect piping plovers, interior least terns, and wood storks that nest or have colonies in or near areas where cormorant damage management could occur, the following conservation measures are implemented within any geographic area where ESA protection applies:

- All control activities must occur more than 1500 feet from active wood stork nesting colonies, more than 1000 feet from active wood stork roost sites, and more than 750 feet from feeding wood storks.
- Discharge or use of firearms (without noise suppression) to kill or harass cormorants or use of other harassment methods must occur more than 1000 feet from active piping plover or interior least tern nests or colonies; occur more than 1500 feet from active wood stork nesting colonies, more than 1000 feet from active wood stork roost sites, and more than 750 feet from feeding wood storks.
- Other control activities such as egg oiling, CO₂ asphyxiation, egg destruction, or nest destruction must occur more than 500 feet from active piping plover or interior least tern nests or colonies; occur more than 1500 feet from active wood stork nesting colonies, more than 1000 feet from active wood stork roost sites, and more than 750 feet from feeding wood storks.

Listed species assessed are included in the [attached ESA BE](#) with their accompanying assessment of effect.

USE OF LEAD AMMUNITION IN THE HUMAN ENVIRONMENT

There is often concern about the deposition of lead into the environment from ammunition used in firearms, including the use of firearms to lethally remove and/or haze birds, including cormorants. The take of cormorants would occur primarily using shotguns. In most cases, ammunition for shotguns contain many small round shot, which are easily picked up by birds when sifting through debris or picked up as grit for their crop to aid in digestion.

The Service conducted an extensive review of the impact of lead shot used for waterfowl hunting and concluded that the use of shot could have substantial impacts on waterfowl and predators/scavengers of waterfowl, primarily through the consumption of lead shot (USFWS 1986). Based on that finding, the Service Migratory Bird Permit Program subsequently implemented the requirement to use nontoxic shot as defined under 50 CFR 20.21(j) as part of the standard conditions of migratory bird permits issued pursuant to the MBTA for the lethal take of birds, including depredation permits (50 CFR 21.41). Under the alternative approaches considered to address the need for action, the Service would continue to require the use of nontoxic shot when people use shotguns.

However, the Service may allow the use of rifles or pellet guns that use lead ammunition to take cormorants when the use of a shotgun is inadequate to resolve damage or the threat of damage. For example, an entity may choose to use suppressed rifles or pellet guns to minimize noise because the blast of a shotgun could disturb non-target species nearby or the need to minimize risks to nearby non-target species through precise shot placement (e.g., when shooting in mixed species colonies). In most cases, the ammunition for rifles, pellet guns, and handguns contain a single bullet instead of many small shot. The amount of lead contained in a bullet likely varies among manufacturers but Tanskanen et al. (1991) indicated that jacketed bullets (i.e., bullets where the lead is covered by a jacket of other metals, usually copper) generally contain 90% lead, 9% copper, and 1% zinc.

The primary risk of using lead ammunition to take cormorants is the potential ingestion of a bullet containing lead or a bullet fragment (i.e., a bullet may break into smaller pieces when striking something hard or a bullet designed to break into smaller pieces when hitting the target) containing lead by a scavenger. However, the standard conditions of depredation permits require the retrieval of carcasses to the extent possible, which would limit the availability of cormorant carcasses for scavenging by other animals. In addition, the standard conditions require the proper disposal of carcasses, which would further reduce the availability of carcasses and any lead bullets or lead fragments contained in the carcasses. Entities may dispose of carcasses through burial (including composting), incineration, donation for use in research, educational projects, or for use by Native American tribes.

Although entities are unable to recover all carcasses (e.g., some birds shot over water and some birds shot in tree nests or in heavy vegetation), the majority of all cormorants taken are recovered and the methods of disposal generally render the bird inaccessible to scavengers. When composting is used, it must include provisions for preventing scavengers from accessing the carcasses (e.g., physical barriers for mammalian scavengers, burial in compost material to prevent detection by scavenging birds). Practices including deep burial and burial in landfills also help to ensure that recovered carcasses are not available to scavengers.

In most cases where burial is used for carcass disposal, birds are taken to a commercial landfill approved for animal disposal. These landfills are strictly regulated by the EPA and local authorities and environmental risks are mitigated by the landfill operator. Landfill operators are required to collect and treat leachate to protect groundwater, cover waste to protect air quality and reduce scavenging, and implement other measures to protect other environmental resources and minimize risks to public health. Environmental risks from carcass disposal in commercial landfills are likely to be very low.

Carcasses may also be buried on site or in a nearby location. Cultural resource laws (e.g., National Historic Preservation Act, Native American Graves and Repatriation Act), endangered species/critical habitat considerations, and uses, climate, soil type and depth, vegetation and proximity to ground and surface water must be considered when selecting burial sites. Compliance with applicable regulations pertaining to on-site burial is the responsibility of the permittee and is an existing standard requirement of depredation permits. With risks of lead exposure occurring primarily from ingestion of bullets or bullet fragments, the retrieval and proper disposal of cormorant carcasses would greatly reduce the risk of scavengers ingesting lead contained within the carcasses.

However, deposition of lead into soil could occur if, during the use of a firearm, the projectile passes through a target, misses occur, the carcass was not retrieved, or the carcass was buried outside of a landfill. The use of rifles is an exception to usual permit requirements and would generally only be used by state, federal, and tribal personnel who must meet high firearms proficiency standards. The use of trained personnel reduces the likelihood of missed shots and associated deposits of spent ammunition in soil. In an ecological risk assessment of lead shot exposure in non-waterfowl birds, ingestion of lead shot was identified as the concern rather than just contact with lead shot or lead leaching from shot in the environment (Kendall et al. 1996). Laidlaw et al. (2005) reported that, because of the low mobility of lead in soil, all of the lead that accumulates on the surface layer of the soil generally stays within the top 20 cm (about eight inches).

In addition, concerns occur that lead from bullets deposited in soil from shooting activities could lead to contamination of ground water or surface water. Stansley et al. (1992) studied lead levels in water that had high concentrations of lead shot accumulation because of intensive target shooting at several shooting ranges. Lead did not appear to “transport” readily in surface water when soils were neutral or slightly alkaline in pH (i.e., not acidic), but lead did transport more readily under slightly acidic conditions.

Although Stansley et al. (1992) detected elevated lead levels in water in a stream and a marsh that were in the shot “fall zones” at a shooting range, the study did not find higher lead levels in a lake into which the stream drained, except for one sample collected near a parking lot. Stansley et al. (1992) believed the lead contamination near the parking lot was due to runoff from the lot, and not from the shooting range areas. The study also indicated that even when lead shot was highly accumulated in areas with permanent water bodies present, the lead did not necessarily cause elevated lead levels in water further downstream. Muscle samples from two species of fish collected in water bodies with high lead shot accumulations had lead levels that were well below the accepted threshold standard of safety for human consumption (Stansley et al. 1992).

Craig et al. (1999) reported that lead levels in water draining away from a shooting range with high accumulations of lead bullets in the soil around the impact areas were far below the “action level” of 15 parts per billion as defined by the EPA (i.e., requiring action to treat the water to remove lead). The study found that the dissolution (i.e., capability of dissolving in water) of lead declines when lead oxides form on the surface areas of the spent bullets and fragments, which reduces the transport of lead across the landscape and naturally serves to reduce the potential for ground or surface water contamination (Craig et al. 1999). Those studies suggest that, given the very low amount of lead deposited and the concentrations that would occur using firearms, as well as most other forms of hunting in general, lead contamination from such sources would be minimal.

Affected Cultural and Tribal Resources

As of the 2010 census, 1.7% of the United States population identified themselves as Native American/Alaska Natives (U.S. Census Bureau 2010). There are a total of approximately 56.2 million acres of tribally administered lands in the United States, making up approximately 1.3% of the total land area (Bureau of Indian Affairs). While many tribal lands do not have significant amounts of water/lakes within their borders, several do, especially in the Great Lakes Region, North and South Dakota, and the Pacific Northwest (U.S. Census Bureau 2010).

“Cultural Resources” are not defined in the NEPA or any other federal law. However, the NEPA regulations do require that agencies consider the effects of their actions (in this case, cormorant lethal take) on all aspects of the environment, including the human environment, under which cultural resources would fall.

The National Preservation Institute defines culturally valued aspects of the environment to “generally include historic properties, other culturally valued pieces of real property, cultural use of the biophysical environment, and such intangible sociocultural attributes as social cohesion, social institutions, lifeways, religious practices, and other cultural institutions.”

For the purposes of the 2003 Final Environmental Impact Statement related to Double-crested Cormorant Management in the United States, the Service noted that cultural resources could include the following, among others:

- Historic sites, buildings, districts, structures, and objects with historic, architectural, archeological, engineering, and cultural values.
- Historical objects such as equipment that might be found in a surplus industrial facility, objects found or excavated from an archeological site, and objects associated with the history and culture of an Indian Tribe or Native Hawaiian group.
- Documents with historic, folkloric, or archeological significance.
- Places of traditional religious or cultural importance to an Indian Tribe or Native Hawaiian organization.
- Locations regarded by a community of neighborhood, or others, as contributing to its “sense of place.”
- The traditional religious and cultural practices of a community, neighborhood, Indian Tribe, or Native Hawaiian group.

DOUBLE-CRESTED CORMORANTS AND TRIBAL AND CULTURAL RESOURCES

The cultural importance of recreational fisheries was recognized in 1995 through Executive Order 12962. Additionally, the Service’s responsibility to stock fish for tribes, as outlined in Executive Order 12898, requires federal agencies to make environmental justice part of their mission and to address effects of federal programs on minority and low-income persons or populations.

Tribes manage several public fish hatcheries across the United States. For example, Great Lakes Indian Fish and Wildlife Commission member tribes stock millions of fry and fingerlings in waters both on and off tribal lands. The costs associated with managing these hatcheries can be substantial.

In August 2018, regional meetings were held at four locations (Atlantic City, NJ, East Lansing, MI, Little Rock, AR, and Portland, OR) with federal, state, and tribal partners to discuss concerns with management and interactions between cormorants and fisheries. While these meetings were focused on wild and publicly stocked fisheries, the tribal input gathered during these meetings was helpful in illustrating the diverse views and concerns that tribes have with impacts from cormorant-related depredation losses and management across the United States.

In the Great Lakes region, tribal participants expressed concern over cormorant impacts on fisheries (particularly commercial fisheries); however, several noted that the management that they have done to date seems to have alleviated those conflicts, at least from a social standpoint. Even where larger numbers of nesting cormorants are present, workshop participants noted that many of their members preferred to “let nature take its course” over active cormorant management.

In the western region of the United States (excluding Alaska), several tribal participants at the workshop noted concern about cormorant impacts on fisheries—especially on hatchery-raised salmonids. Those present expressed concerns about how cormorants may add to an already challenging environment for salmonids, as well as cormorant damage to habitat/trees. They expressed a desire for making additional permits available to address issues at multiple scales.

According to early archaeological records, certain Alaska Native and Native American middens indicate that tribes utilized cormorants as a food source. This is based on cormorant skeletal remains found in middens located on the Pacific and North Atlantic coasts (Wires & Cuthbert 2006). This suggests that historically, cormorants had a culturally significant tie to those tribes that utilized the bird for subsistence/sustenance purposes. It is unclear, however, whether certain tribes still consume cormorants as a food source. Additionally, many tribes across the country have kinship systems based on animal names for their respective patrilineal or matrilineal clan names. In the Midwest, many Ojibwe (or Anishinaabe) Tribes use the name “Mukudashib” (Black duck or cormorant) as one of their patrilineal clans name, suggesting that the cormorant continues to serve as a culturally significant species for them.

Also, the 2003 FEIS mentioned three issues of concern relating to cormorants and cultural resources: (1) cormorants are considered “sacred” to some Native American Tribes, (2) the religious practice of abstaining from work on specific days of the week (i.e., observing the “Sabbath”) is inhibited by the need to patrol aquaculture ponds seven days a week to protect them from cormorant depredation, and (3) popular fishing areas could be considered an important part of a specific area’s “sense of place” and cormorants are viewed by some members of the public as inhibiting that value. Presumably, some tribes may disagree with killing cormorants, while the latter two cultural concerns would be addressed by control actions that alleviate conflicts with cormorants. In 2003, due to lack of empirical information, a full analysis of these concerns was not possible; the Service is not aware of new empirical information on these concerns.

Comments received in response to the January 22, 2020, ANPR from individuals and tribal agencies generally indicate support for a conflict-management approach from the Service, especially related to alleviating negative impacts from cormorants on co-nesting species (e.g., tern species).

Environmental Justice

Executive Order 12898—Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations - requires federal agencies to make environmental justice part of their mission and to identify and address disproportionately high and adverse human health and environmental effects of federal programs, policies, and activities on minority and low-income persons or populations. States and tribes manage numerous public fish hatcheries across the country, and the Service’s responsibility to provide fish stock to tribes continues to raise environmental justice concerns. The Service has a responsibility to conserve, restore, enhance, and manage the nation's fishery resources and aquatic ecosystems for the benefit of future generations. Since 1871, the National Fish Hatchery System (NFHS) has worked collaboratively with tribes, states, landowners, partners, and stakeholders to promote and maintain healthy, self-sustaining populations of fish and other aquatic species. The NFHS consists of (70) National Fish Hatcheries, one historic National Fish Hatchery, eight Fish Health Centers, seven Fish Technology Centers, and the Aquatic Animal Drug Approval Partnership Program. The conservation efforts of this system not only enhance fishes and their habitats, but also angling opportunities for the nation’s 58 million recreational anglers and associated economies.

NFHS propagation addresses top priorities such as enhancement of recreational fishing and public use of aquatic resources, recovery of federally listed threatened or endangered species, restoration of imperiled species, and fulfillment of tribal partnerships and trust responsibilities. In order to ensure healthy fisheries, Service professionals closely monitor the health, status, and trends of aquatic populations; measure the quantity and quality of important aquatic habitat to support strong fisheries; and limit the outbreak and spread of invasive species and disease-causing pathogens. In Fiscal Year 2018, (70) NFHS facilities, (1) Historical NFH, and (1) Fish and Wildlife Conservation Office distributed (released and transferred) 230,583,112 juveniles, adults, and eggs of (6) different taxonomic groups, encompassing (94) different species into (46) states.

Environmental Consequences

This chapter describes the potential environmental consequences of implementing the No Action Alternative and the four other conflict-management alternatives. It is organized by resource topics, as described in Chapter 3. According to CEQ regulations, NEPA directs the Service to study potential affects to the human environment, as described below (40 CFR 1508.14):

Human environment shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment. This means that economic or social effects are not intended by themselves to require preparation of an environmental impact statement. When an environmental impact statement is prepared and economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment. NEPA requires that agencies include in their EISs a detailed statement of, among other things, the environmental impact of the proposed action and a description of unavoidable, adverse, environmental effects should the proposed action be implemented (42 U.S.C. § 4332).

Potential cumulative effects for the resources presented below, including past, present, or reasonably foreseeable actions that may provide impacts related to the implementation of a conflict-management alternative, are described at the end of this chapter.

Impacts to resources are discussed in terms of the context, intensity, duration, and type of impact. NEPA regulations identify three types of effects: direct, indirect, and cumulative (40 CFR 1508.8). Direct effects are “caused by the action and occur at the same time and place.” Indirect effects are “caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable [and] may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems” (40 CFR 1508.8). Cumulative effects are those resulting from “the incremental environmental 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).

The geographic scale includes 48 states and the District of Columbia. The duration of impacts is also considered. In this case, all alternatives describe a conflict-management approach considering long-term effects. Altered conditions and/or new information may persuade the Service to revisit the analysis, and perhaps modify decisions in the future. Therefore, short-term effects are those that would occur immediately following the implementation of a conflict-management approach and up to about one year afterward.

The intensity of effects is also described on a scale of severity that can range from negative (adverse) to beneficial:

- Negligible—effects would be barely detectable, and resource conditions would not appreciably change.

- Minor—effects would be detectable but of little consequence to the resource as a whole.
- Intermediate—effects would be readily detectable and localized in consequences to the resource; mitigation could be needed to offset negative impacts.
- Major—effects would be obvious and result in substantial consequences to the resource; mitigation would be required to offset negative impacts.

Regulatory Effects

As described in Chapter 1, the Service must follow federal laws, administrative orders, and policies in the development and implementation of management actions and programs. The implementation of any of the alternatives described in this draft EIS would not lead to a violation of these or other mandates (refer to [Appendix C](#)).

Direct and Indirect Effects of the Alternatives on Cormorants

The Service assessed the impacts of the proposed action and the alternatives on cormorant populations. The geographic scale includes 48 states and the District of Columbia, and in part to the scale of each of four managed populations (from the five populations identified above): the Atlantic, the Interior, southern, and western subpopulations.

MAXIMUM ALLOWABLE TAKE OF CORMORANTS UNDER THE PROPOSED ACTIONS

The Service developed PTL models to estimate the maximum allowable sustainable take of cormorants and the impact of various levels of lethal take on four cormorant populations ([Appendix E](#)). PTL models make use of population abundance and demographic information to estimate annual take levels that meet a management objective to ensure the long-term sustainability of a population. The minimum information needed is an estimate of the maximum population-growth potential and the minimum known-population size. The cormorant population is managed at a sustainable level by limiting the annual harvest rate to less than one-half of the maximum population-growth potential.

Based on information received during the public comment period, the PTL for the western subpopulation may not have captured complex and changing population dynamics precipitated by cormorant habitat management in the CRE. To reduce the risk of over-exploiting the western subpopulation the Service would reduce the level of authorized annual take to half the PTL in the DEIS, or 4,539 individuals. In the interest of responding to comments received concerning the PTL and western subpopulation, the Service provides a detailed explanation of how the PTL was formulated and considered additional data in [Appendix B](#).

POTENTIAL TAKE LEVEL AND POPULATION SIZE

A discrete logistic growth model was used to project the impact that the proposed and current actions (authorizations through other permit types) could have on the size of each cormorant population (see description of the logistic growth model under ' r_{max} ' in [Appendix E](#)).

A number of parameter estimates had to be assumed or derived in order to use the discrete logistic model. The maximum population-growth potential (r_{\max}) estimated using data from Lakes Erie, Huron, and Ontario ($r_{\max}=0.3577$, SE=0.0933) was used for all populations. It was assumed that the western cormorant subpopulation was at equilibrium with the average annual take during 2013–2018, and the other populations were at equilibrium with the average annual take during 2013–2016. Annual take data was incomplete prior to 2013. The different time periods between the western versus the other subpopulations for estimating take was because 2019 was the last population-size estimate for the Western while 2017 was the last estimate for the other populations. The annual harvest rate (h_{observed}) at the observed equilibrium was estimated as the average annual take in each population divided by the range in population sizes (Table A-2): $h=0.0722–0.0835$ for the Atlantic; 0.0658–0.0747 for the Mississippi plus Central; 0.0226–0.0413 for the Western; and 0.0086–0.0096 for Florida.

The discrete logistic equation was recast to estimate equilibrium population size (N_{eq}) at various harvest rates i : $N_{\text{eq},i} = K * (r_{\max} - h_i) / r_{\max}$. Assuming the population sizes in [Appendix E](#) are at equilibrium ($N_{\text{eq,observed}}$) with the harvest rates above (h_{observed}), carrying capacity (K) can be estimated for each population as: $K = N_{\text{eq,observed}} / (r_{\max} - h_{\text{observed}}) / r_{\max}$: $K = 351,264$ for the Atlantic; 732,611 for the Mississippi plus Central; 80,275 for the Western; and 20,087 for Florida. If take of cormorants is at PTL each year then the populations should equilibrate at numbers listed in Table 9, below:

Table 9. Current cormorant population size estimates and projected population estimates (N_{eq} [lower 95 percent confidence interval; upper 95 percent confidence interval]), based on simulation for Proposed Actions and Potential Take Level.

Population (subspecies)	Current Population Size		Projected Population Size
	Low	High	N_{eq} [lower 95%CI; upper 95% CI]
Atlantic (P. a. auritus)	254,045	293,860	248,854 [223,134; 276,077]
Interior (P. a. auritus)	548,430	623,086	512,358 [462,892; 559,686]
Southern (P. a. floridanus)	18,560	20,539	16,318 [13,920; 17,738]
Western (P. a. albociliatus)	49,966	94,272	52,755 [28,404; 76,044]
Total	871,001	1,031,757	830,285 [Not calculable]

If annual take results in a smaller level than what is specified in the PTL, then the population size should be somewhere between K and the above estimates of equilibrium population size. Estimates of equilibrium population size for the Western population exhibit the most uncertainty because annual estimates of abundance varied widely, and a management plan was implemented in the middle of the population-data collection period when a large number of cormorants were lethally removed. Due to this variability in take, it is likely that the estimate of K and the equilibrium population are highly biased for the western subpopulation because the population had not approached equilibrium. Monitoring for the western subpopulation is planned for 2021 and 2023. Estimates of K and expected equilibrium population size would be recalculated for the western subpopulation after a planned 2023 monitoring effort.

EFFECTS OF LETHAL TAKE ON CORMORANT POPULATIONS AS DESCRIBED IN THE ALTERNATIVES

The effects of lethal take on cormorant populations as described in the Alternatives have many similarities (Table 10). The main differences between alternatives pertain to the burden associated with accurately monitoring the authorized and actual take of cormorants throughout the year. Additional impacts to cormorant populations under each alternative stem from the ability of the Service to ensure

the level of take does not exceed that described in the PTL. This is important because exceeding the allowable PTL level of take can have differential effects on cormorant populations due to differences in population size and the location and magnitude of take. Southern and western subpopulations are much smaller and therefore may be more vulnerable to adverse population effects if take levels are exceeded. This is the case even if the level of take is similar to other populations. As a simple example, if the allowable PTL level of take is exceeded by 10,000 cormorants, that level of exceedance would constitute 2% of the Interior subpopulation, 4% of the Atlantic subpopulation, but 19% of the western subpopulation and as much as 63% of the southern subpopulation. This amount is an example only to demonstrate potential impacts when considering projected population sizes. This section analyzes the differences in the ability of the Service to ensure the level of authorized take specified in the PTL is not exceeded. Table 10 below summarizes these analyses.

Under Alternative A—a special permit for states and tribes (the preferred alternative)—the maximum allowable take limit of cormorants, or cap, would be enforced by the Service, WS, states and tribes for each population, rather than under a combination of states, tribes, commercial and private entities. Even though authorized take would be allowed up to 121,504 cormorants nationally per year, nationally, it is unknown how many states or tribes may seek a special permit. Therefore, the Service does not expect take of the cormorants to be evenly distributed across areas where conflicts are occurring. Populations may experience more concentrated levels of take in certain areas, which may result in varying effects on the different populations. Population sizes are expected to decline slightly below the lowest current population estimate and then stabilize for the Atlantic, Interior, and southern subpopulations. The western subpopulation, however, it is expected to stabilize at or just above the current low population estimate (Table 9). In order to ensure sustainability of each of the cormorant populations, the Service would allocate authorized take in all populations according to population levels in the PTL model. Allocation for the western subpopulation would be managed at 4,539 per year (see [Appendix E](#)) and 1,288 per year for the Florida (southern) subpopulation. This level of authorized take was accounted for when projecting cormorant populations in Table 9 above. Managing authorized take up to these levels would not result in negative impacts to the projected cormorant western and southern subpopulations.

If high levels of take occur within a breeding colony that contributes to the overall growth of a subpopulation, then it may result in negative long-term effects to that subpopulation. This connection between specific breeding colonies and population growth is not well known except at East Sand Island. Growth of the western subpopulation of cormorants is largely attributed to the increase in size of the cormorant breeding colony at East Sand Island, which accounted for 39 percent of the western subpopulation of cormorants during 2008–2010 (Adkins et al. 2014). If the breeding colony at East Sand Island were to experience high mortality (in this case from authorized take), negative impacts to the western subpopulation as a whole would likely occur. It is not known if there is another breeding colony in the southern subpopulation that contributes similarly disproportionately to that subpopulation's overall growth, or if concentrated lethal take in any localized area there would adversely impact the southern subpopulation. For the Atlantic and Interior subpopulations, the Service does not expect significant long-term negative effects from higher levels of take within breeding colonies. In all cases where states or tribes apply for a special permit under Alternative A, however, the Service would require a permit application. In this application, states and tribes would be required to provide, among other topics, the number of cormorants, including eggs and nests, the state or tribe proposes to take annually, and a statement indicating what information is available and what information will be collected to assess whether the management and take of cormorants would alleviate the damage or conflict. Prior to

issuance of a special permit, the Service would review this information and would assess if high levels of take within a breeding colony would occur.

Monitoring of each cormorant population is an important component of all the alternatives so that the Service can compare projected population sizes to actual population sizes. However, population monitoring has not occurred consistently or comprehensively across multiple federal, state, tribal, commercial, or private partners in the past. In addition, population monitoring, tracking authorized take, and the reporting of actual take become increasingly difficult as the number of entities taking cormorants increases. However under Alternative A, tracking authorized and actual take would be less burdensome than in other alternatives analyzed in this FEIS. Systematic monitoring of cormorants has occurred in some regions (e.g., U.S. states in the Great Lakes Region), but has not occurred in other regions with well-known breeding colonies (e.g., Manitoba, Ontario). Population sizes were calculated for each cormorant population where sufficient data were available, but each monitoring regime at the population level varies due to several factors. For example, as explained in the Affected Environment section, range of abundance estimates represent high and low observations over a number of years from individual states and provinces, or uncertainty in point estimates provided by surveyors. The *P. a. floridanus* subspecies, which breeds in Florida, intermixes during winter in Florida with the subspecies *P.a. auritus* (Atlantic and Interior subspecies), and the abundance estimate for the Florida subpopulation was calculated for the entire state of Florida based only on *P.a. floridanus*. The Pacific Flyway Council developed a separate monitoring strategy for the western subpopulation in 2013 (PFC 2013).

While the Service has not yet developed population-monitoring programs for the alternatives presented in this FEIS, one developed under Alternative A would likely result in less burden. Under Alternative A, the Service would only issue this permit when it is expected to reduce conflicts involving depredation at state- and tribal-owned-or-operated facilities and hatcheries. Flyway Councils could assist in the development of a coordinated monitoring program for cormorants. The Flyway Council system is a longstanding and well-established organization that already works in partnership with the Service. This existing organizational structure assures the states' constituents are considered fully in the establishment and promulgation of federal regulations governing migratory game bird hunting and other migratory game bird issues (USDI 1959). The Service and the Flyway Councils can work collaboratively to develop comprehensive monitoring programs that would serve as the basis for any necessary adjustments to authorized take should any population unexpectedly decline. As mentioned earlier, upon publication of a record of decision, the Service will formally convene with each Flyway and relevant stakeholders to develop a specific cormorant population monitoring plan.

The Service would track authorized and actual reported take each year through annual reporting requirements. The Service has a history of requiring annual reports of take from other state permits as well, such as the reporting system used for the Resident Canada Goose Egg and Nest Depredation Order (50 CFR 21.50), in which a report is required before the person(s) is/are authorized to continue during the subsequent year, and is a condition of the online registration for any renewals. Though Alternative A is not a depredation order, it is an existing framework of reporting many states are already familiar with. In the past, state and federal agencies have had the highest level of compliance in annual reporting. Under Alternative A, a condition for future permits would be the requirement of the state and tribes to submit annual reports of cormorant take.

Under an AQDO in Alternative B, take would be allocated and tracked by the Service through individual depredation permits and under the AQDO itself. This would result in a higher regulatory burden for the Service, as enforcement of the authorized level of take per year would be more difficult; the Service

cannot track take under a depredation order until the take has already occurred. Further, the history of reporting take accurately under depredation orders has been inconsistent and can differ markedly among states and regions. Despite this, the potential for exceeding the cap, or maximum allowable take, is probably less than or equal to alternative A because the AQDO would only be implemented in states with a large number of aquaculture facilities where conflict with cormorants exist. While aquaculture facilities occur throughout the United States, the largest amount of cormorant take associated with aquaculture is in the Southeastern states. This overlaps with the year-round range of the southern subpopulation, which is the smallest and most vulnerable. Exceeding the allowable take would have the greatest effect on the southern subpopulation, with the western subpopulation being the next most vulnerable. Due to the larger immediate effects, take-tracking programs may not occur within a timeframe that would allow the Service to be able to adjust management actions to avoid significant declines in the southern and western subpopulations.

To minimize significant negative impacts to the southern and western subpopulations, the Service would need to develop a more comprehensive take-tracking program that would entail participation of monitoring from WS, states, tribes, and commercial aquaculture facilities to ensure authorized take levels are not exceeded. As stated above under Alternative A, monitoring populations and tracking authorized and reported take become increasingly difficult for the Service as the complexity and scale of authority of entities taking cormorants increases. In the past, state and federal agencies have had the highest level of compliance in annual reporting. The history of reporting take accurately under the previous depredation orders from private and commercial entities, however, has been inconsistent. Some commercial aquaculture facilities may under-report or over-report in an effort to manipulate how many cormorants they may be authorized to take in future years. To bolster more accurate reporting, the Service would need to develop an online reporting system similar to that used for the Resident Canada Goose Egg and Nest Depredation Order (50 CFR 21.50), in which a report is required before the person(s) is/are authorized to continue during the subsequent year and is a condition of the online registration for any renewals. There is less of a chance of negative impacts to the Atlantic and Interior subpopulations under this alternative, however, due to their larger population sizes. Developing monitoring programs for these populations would likely be adequate for adjusting in a timely manner if the Atlantic and Interior subpopulations decline.

Under Alternative C (State/Tribal Permit + AQDO, the Service expects similar effects of Alternatives A and B. However, the Service also expects additional complexity with allocation and the ability of the Service to be able to adequately track take authorized by all current permit types (scientific collection, special purpose miscellaneous, and depredation), the State/tribal Permit, and an AQDO. It may also be difficult to ensure that the authorized take level within the PTL is not exceeded. Potential for exceeding the allowable take is greater in this alternative than with Alternative A or Alternative B because of the increased complexity and burden associated with timely and accurate reporting of take under a new aquaculture depredation order. Exceeding the allowable take would have the greatest effect on the southern subpopulation, with the western subpopulation being the next most vulnerable. As with Alternative B, the Service cannot track actual take under a depredation order until the take has already occurred. In the past, state and federal agencies have had the highest level of compliance in annual reporting. The history of reporting take accurately under the previous depredation orders from private and commercial entities, however, has been inconsistent. Therefore, to reduce this uncertainty as with Alternative B, the Service would need to develop an online reporting system similar to that used for the Resident Canada Goose Egg and Nest Depredation Order (50 CFR 21.50), in which a report is required before the person(s) is/are authorized to continue during the subsequent year, and is a condition of the online registration for any renewals to ensure more accurate reporting. In addition, take may not occur

within a timeframe that would allow the Service to be able to adjust management actions accordingly. As a result, the Service would need to develop a more comprehensive take-tracking system that would entail participation of monitoring from WS, states, tribes, and commercial aquaculture facilities to ensure authorized take levels are not exceeded. This may be necessary to avoid significant declines in the southern and western subpopulations. The Atlantic and Interior subpopulations, however, would likely not be negatively affected due to their large population sizes. Take-tracking programs would likely be adequate for adjusting in a timely manner should the Atlantic and Interior subpopulations decline.

The Service would have the greatest burden and the greatest challenge ensuring levels of authorized take stay within the allowable limit of the PTL under Alternative D (General Depredation Order). This alternative is expected to have greatest effect on all cormorant populations. This is due to the increased difficulty of tracking and enforcement of a cap on authorized take. The history of reporting take accurately under depredation orders has been inconsistent. Depredation orders are typically used for large populations where there is little concern over staying within the level of take to maintain the sustainability of the populations. Both the Florida and western subpopulations are smaller, so accurate tracking and enforcement that are not in place are needed. Exceeding the allowable take would have the greatest effect on the southern subpopulation, with the western subpopulation being the next most vulnerable. Due to the larger immediate effects, population-monitoring programs may not occur within a timeframe that would allow the Service to be able to adjust management actions to avoid significant declines in the southern and western subpopulations. The Atlantic and Interior subpopulations likely would not be negatively affected due to their large population sizes. Take-tracking programs would likely be adequate for adjusting in a timely manner should the Atlantic and Interior subpopulations decline.

Alternative E (No Action): The No Action alternative is the most conservative of all the alternatives and would not affect any of the populations more than previously analyzed in current regional EAs and EISs. The potential for exceeding the allowable take is the lowest in this alternative compared to the other alternatives. This is because the PTL used in this alternative specifies allowable take levels above the level of current operations. Under this alternative, the Service currently tracks the effects of take on the cormorant population accurately through annual reporting required under the individual depredation permit program. Additionally, existing take-monitoring programs allow for adjustments of authorized take in a timely manner if individual populations unexpectedly decline.

Table 10. Summary of Effects on Cormorant Populations from Lethal Take as Described in the Alternatives.

Summary of Effects on Cormorant Populations from Lethal Take as Described in the Alternatives				
Alternative A: State/Tribal Permit	Alternative B: AQDO	Alternative C: State/Tribal Permit + AQDO	Alternative D: General Depredation Order	Alternative E: No Action
This alternative provides states the flexibility they need to be able to make the best decisions for managing allowable take of cormorants. Population sizes are expected to decline slightly below the lowest current population estimate and then stabilize for the Atlantic, Interior, and Southern populations. The western subpopulation is expected to stabilize at or just above the current low population estimate. A monitoring and take-reporting program would likely result in less of a burden on the Service than in other alternatives analyzed in this FEIS and would allow for adjusting management actions in a timely manner if any individual population unexpectedly declines.	This alternative would result in a greater burden for the Service. The potential for exceeding maximum allowable take is less than or equal to alternative A. Exceeding the allowable take would have the greatest effect on the southern subpopulation and western subpopulations. Monitoring and take-tracking programs may not occur within a timeframe that would allow the Service to be able to adjust management actions to avoid significant declines in the southern and western subpopulations. The Atlantic and Interior subpopulations likely would not be negatively affected due to their large size. Monitoring programs would likely be adequate for adjusting in a timely manner if the Atlantic and Interior subpopulations decline.	This alternative would result in similar effects as Alternatives A and B. Potential for exceeding the allowable take is greater in this alternative than with Alternative A or Alternative B.	This alternative is expected to have greatest effect on cormorant populations compared to the other alternatives. The Service will have the greatest burden to implement monitoring and ensure accurate reporting. As a result, this alternative presents the greatest challenge to ensuring allowable levels of take are not exceeded.	The potential for exceeding the allowable take is the lowest in this alternative compared to the other alternatives. Monitoring programs allow for adjustments of authorized take in a timely manner if individual populations unexpectedly decline.

Direct and Indirect Effects of the Alternatives on Fisheries

The effect of lethal take of cormorants under Alternative A is expected to have positive effects at a variety of sites. These include sites that have economically important wild (not stocked) fish species (e.g., yellow perch) that are seasonally vulnerable to both migratory and nesting cormorant predation during their spawning runs. This also includes sites that have economically important species where cormorants prey on younger age classes thereby reducing overall recruitment to the fishery (e.g., walleye, bass). Additionally, this alternative would have beneficial effects on sites that have ESA-listed fish populations that are seasonally vulnerable to roosting, nesting, and migratory cormorant predation, typically during the outmigration of juvenile fish. Hatchery release sites where newly stocked fish are highly vulnerable to cormorant predation during and immediately following a stocking event until the fish are able to acclimate and disperse (e.g., brown trout) would also likely have positive impacts from lethal removal of cormorants. Lastly, reservoirs and/or urban lakes that are publicly stocked to create or enhance existing recreational angling opportunities may also see benefits from this alternative. Many of these water bodies are small, and high numbers of foraging cormorants can decimate stocking efforts, especially in states with few lakes where cormorants are more likely to congregate in large numbers (e.g., AZ, ID, NV, and UT).

While there is high potential to see positive effects on fish populations under this alternative, the Service recognizes that the magnitude of the effect of cormorant management may differ from site to site because of the complexity of aquatic systems. Both biotic (fish-community structure) and abiotic (temperature, weather patterns, nutrient regime, etc.) factors affect fish communities, as well as the interactions between fish and cormorants. Therefore, it is possible that a reduction in cormorant foraging (via take) may not improve or even stabilize a declining fishery because fish populations could be affected by something other than cormorants (e.g., predation by other fish predators, inter- or intra-specific competition, invasive species, overharvest, declines in system productivity, etc.).

Despite the uncertainty of the result of cormorant management on fish communities, the Service concludes that this alternative provides states and tribes with the most flexibility for managing their unique fishery issues so they can apply actions where they are most needed to resolve conflicts. The cormorant/fish conflicts differ from state to state and even within fisheries in the same state, and a one-size-fits-all solution mandated by the Service will not always provide an optimal result. While a fishery may not always respond to cormorant management in the direction that is expected, state and tribal managers need to have a range of tools available to be able to determine what may be limiting their particular fishery of concern. Under this alternative, adaptive-management processes should allow managers to adjust their strategy if they find that cormorant control is not resulting in the desired fishery outcome. The Service would encourage states and tribes to conduct their own investigations to assess the efficacy of their nonlethal control actions. These independent investigations would enable states and tribes to better identify specific control actions and areas that maximize the benefits of cormorant-management conflict resolution.

An AQDO as specified under Alternative B does not directly impact wild and publicly stocked fish, as this alternative would only allow take of cormorants at aquaculture facilities. Under this alternative, the Service expects continued or enhanced conflict between cormorants and some locally important fisheries, as well as at hatchery release sites. However, the take authorization of up to 121,504 cormorants across the U.S for other purposes (e.g., AQDO under this alternative as well as depredation permits) would likely provide some secondary benefit to local fish populations via reduced cormorant predation pressure. Further, nonlethal management could still be used to minimize damage to a fishery. Under Alternative C (State/Tribal Permit & AQDO), the Service expects the lethal effect of cormorants on fish populations under this alternative would be the same as under alternative A.

A general depredation order, as specified in Alternative D, has been partially successfully implemented in the past and the Service expects that it would have a similar impact to wild and publicly stocked fisheries as alternative A. However, under the vacated AQDO, aquaculture facilities were required to annually report lethal cormorant control activities. This system of limited-accountability self-reporting with a year time lag was not adequate to consistently track authorized take on a national scale. In addition to timing, the lack of reliable information on annual take from the previous depredation orders complicated assessment of the impacts of the orders on cormorant populations. Plaintiffs in the vacated AQDO case argued that there was a lack of accountability regarding take, and the lack of a robust assessment; without addressing accountability of take the Service could be vulnerable to future lawsuits on a general depredation order.

The implementation of the No Action alternative could potentially have a negative effect on wild and publicly stocked fish because it would not allow for take of cormorants found to be heavily depredating a fishery. Under this alternative, the Service expects continued or enhanced conflict between cormorants and some economically important fisheries across the nation, as well as at some hatchery release sites. However, there may be some relief to fisheries at places where nonlethal management is effective. For instance, studies (Dorr et al. 2010, R. Claramunt, personal communication 2019) have shown that harassment at hatchery release sites is often sufficient to reduce cormorant foraging until fish are able to disperse. Likewise, nonlethal measures are sometimes effective at deterring migrating cormorants from foraging on local fish stocks as they are moving through an area. Additionally, under this alternative, the Service could still authorize the take of as many as 76,000 cormorants nationwide under depredation permits for other purposes (e.g., human health and safety, property, aquaculture, vegetation, co-nesting species damage). A secondary benefit of issuing these permits is that reduced local cormorant populations should result in reduced foraging on some economically important fish populations.

Table 11. Summary of Effects on Wild and Publicly Stocked Fisheries from Take of Cormorants.

Summary of Effects on Wild and Publicly Stocked Fisheries from Take of Cormorants				
Alternative A: State/Tribal Permit	Alternative B: AQDO	Alternative C: State/Tribal Permit + AQDO	Alternative D: General Depredation Order	Alternative E: No Action
This alternative meets the need of reducing fishery losses at (1) hatchery release sites, (2) publicly stocked reservoirs and/or urban lakes, and (3) sites with economically important fisheries or ESA-listed species that may be vulnerable to cormorant predation during susceptible life stages. There is uncertainty about the magnitude of the effect of cormorant management on fish populations since fisheries can be (and often are) affected by things other than cormorants.	This alternative does not meet the need of reducing losses to wild and publicly stocked fisheries EXCEPT at sites where nonlethal management is successful or where locally reduced cormorant populations resulting from take under depredation permits and the AQDO reduces foraging pressure.	Expect the same result as alternative A.	This alternative is expected to have a similar impact to wild and publicly stocked fisheries as alternative A.	This alternative does not meet the need of reducing losses to wild and publicly stocked fisheries EXCEPT at sites where nonlethal management is successful or where locally reduced cormorant populations resulting from take under depredation permits reduces foraging pressure.

Impacts from Lead Deposition via Take of Cormorants

Under all alternatives, authorized entities would be able to take cormorants using firearms. Shotguns are the most widely used firearm for cormorant control. Service studies at waterfowl hunting areas have shown that lead shot can get into the environment and be ingested by wildlife, including eagles (see Eagles below) leading to substantial adverse impacts. In order to prevent these impacts, nontoxic shot as defined under 50 CFR 20.21(j) would be required as a standard condition of migratory bird permits issued pursuant to the MBTA for the lethal take of birds. However, this prohibition of lead ammunition would not apply if an air rifle or an air pistol is used.

This condition would be in place in order to avoid disturbance to other species. However, standard depredation permit conditions also require retrieval and proper disposal of carcasses, which would limit the availability of lead in the environment. Given the very low amount of lead deposited and concentrations that would occur using firearms under this alternative, lead contamination to soil and waterways is also expected to be negligible under all alternatives.

Under Alternative C, the scale of this alternative is expected to be broader than alternatives A or B alone, as permits would be issued to manage a greater number of impacts. However, as with all other alternatives, this alternative is not expected to result in substantial lead deposition in the environment due to depredation permit requirements that prohibit use of lead shot, and require retrieval and proper disposal of dispatched cormorants. Therefore, adverse effects on wildlife, soil, and waterways are expected to be negligible.

The geographic scale in Alternative D is expected to be broader than any other, with management potentially being implemented in all the lower 48 states. However, as with other alternatives, this alternative is not expected to result in substantial lead deposition in the environment due to depredation permit requirements that prohibit use of lead shot, and require retrieval and proper disposal of dispatched cormorants. Therefore, adverse effects on wildlife, soil, and waterways are expected to be negligible

Under the No Action alternative, the scale of implementation of management will remain unchanged. As with other alternatives, this alternative is not expected to result in substantial lead deposition in the environment due to depredation permit requirements that prohibit use of lead shot, and require retrieval and proper disposal of dispatched cormorants. Therefore, adverse effects on wildlife, soil, and waterways are expected to be negligible.

Impacts from Take of Cormorants on Co-nesting Migratory Bird Species and Eagles

Cormorants are known to have negative impacts on co-nesting species, through habitat destruction, nest sequestration, or reduction of available nesting space. Alternative A would enable states and tribes to reduce impacts on co-nesting migratory birds of management concern where conflicts exist. In localized areas, there is a small chance that this alternative could impact species of similar appearance (e.g., anhinga, and great and neotropic cormorants) if control measures inadvertently target them.

Under Alternative A, to minimize risks to co-nesting species that look similar to cormorants, states and tribes would be required to report any other species of bird taken incidentally due to double-crested cormorant management activities under this permit, along with the numbers of birds taken of those species. The Service would use this data to better track accidental take of these species when take of cormorants occurs, and recommend appropriate actions such as additional training of personnel, or avoiding areas where there is a high concentration of non-target species in the area. In response to the DEIS, several public comments expressed concern for non-target species and the impacts that would occur in response to take of cormorants. Specifically, commenters stated that the Service should provide clarity pertaining to the ability of the Service to ensure subpermittees are trained to recognize species that look like double-crested cormorants. The Service notes that there are many levels of training that vary widely across the country that may be appropriate to distinguish between species that look like double-crested cormorants. The Service will not identify specific training requirements necessary to become a trained subpermittee.

Rather, we expect that the individuals will have the skills, or could readily acquire the skills, to accurately identify double-crested cormorants and differentiate other look-alike species to avoid taking them. Further, by virtue of their positions, we expect that all such employees of a state or tribe or their subpermittees will operate in a humane, accountable, and lawful manner.

To provide added clarity, the Service included as part of the application for a new permit, that permittees must agree that, "(e) Anyone taking birds under this permit must be skilled in double-crested cormorant identification. Non-target take of any other avian species must be reported to your permit office with your annual report including species, number, and description of events." The draft application for this permit can be found in [Appendix H](#) of this FEIS.

Commenters also stated a need to include provisions for addressing impacts from cormorants on listed as Species of Greatest Conservation Need in State Wildlife Action Plans. The Service includes provisions for this in the revised final rule, stating that (1) subpermittees can be employees of state and tribal wildlife agencies, WS employees, and employees of other federal, state, or tribal agencies or private companies specializing in wildlife damage abatement and under direct control of the permittee; and (2) take activities to prevent depredation on aquatic species listed as Species of Greatest Conservation Need may occur only in natural or public waters. Additional information on these provisions can be found in the conditions within [Appendix D](#).

Similarly to Alternative A, Alternative B may result in benefits to many co-nesting species where efforts to reduce impacts on co-nesting migratory birds from cormorant-related conflicts exist. In these situations, individual permits would be used to authorize such take to benefit co-nesting species. In other localized areas, there is a small chance that this alternative could impact species of similar appearance (e.g., anhinga, and great and neotropic cormorants) if control measures inadvertently target them around commercial aquaculture operations.

Under Alternative C, the benefits and risks to co-nesting migratory birds would be similar to that of Alternative A. Under Alternative D, the benefits and risks of a general depredation order to co-nesting migratory birds would be similar to those identified in Alternatives A and B, but likely across a broader geographic scale than any other alternative, with management potentially being implemented in all of the lower 48 states.

Under the No Action alternative, benefits and risks to co-nesting species are expected to be similar to those in Alternative A, and would be assessed on a case-by-case basis by the Service and remain unchanged.

A common concern would be the negative effects of control activities that occur within a colony of nesting cormorants, which could disturb other co-nesting colonial waterbirds. As stated in the Affected Environment, activities to take cormorants over time could disturb those co-nesting species when an entity conducts activities within the nesting colony of cormorants or as an entity approaches a nesting colony of cormorants. If adults of co-nesting species are startled from their nest for too long or at the wrong time of day, there is the potential for increased mortality rates of eggs and chicks. However, in most instances, co-nesting birds may temporarily leave the immediate vicinity of scaring, but usually return after conclusion of the action.

Activities to address habitat damage from cormorants and nest-site competition between cormorants and co-nesting species would require a permit under Alternative A, Alternative B, Alternative C, and Alternative E. Under those alternatives, the Service would consider potential effects to other colonial waterbirds when evaluating applications for permits. Although the Service would establish an AQDO under Alternative B and Alternative C, activities to address habitat damage from cormorants and nest-site competition between cormorants and co-nesting species would require a separate depredation permit. When issuing this permit, the Service could require measures to minimize disturbance to other co-nesting species, such as requiring that an entity conduct activities at night to reduce the likelihood that co-nesting species would move off nests. For example, Duerr et al. (2007) found that gulls did not prey on cormorant eggs when egg oiling occurred at night. In addition, entities conducting activities to take cormorants are conducting those activities to benefit co-nesting species. Therefore, the entity receiving a permit is likely to take measures to minimize disturbance to co-nesting species. For example, an entity may minimize the number of site visits, maintain appropriate distances from other co-nesting species to minimize adults flushing from nests, and/or conduct activities later in the nesting season when co-nesting species have eggs and nestlings and are less likely to leave their young. An entity could also use a suppressed firearm to take cormorants to minimize noise disturbance.

Adverse effects on co-nesting species could be higher if the Service implemented Alternative D because cormorant take could occur without the need for a permit. Under this alternative, the Service would not be able to require specific measures to minimize disturbance of co-nesting species at a specific site. However, the Service could impose general measures to minimize disturbances as part of the implementation of a general depredation order.

Bald and golden eagles could also be affected locally where cormorant take activities occur. The National Bald Eagle Management Guidelines would help minimize impacts to eagles, particularly where they may constitute "disturbance," which is prohibited by the Eagle Act. The Service strongly encourages adherence to these guidelines to ensure that bald and golden eagle populations will remain healthy. The Service realizes there may be impacts to some eagles even if all reasonable measures are taken to avoid such impacts. Nonetheless, under each alternative, impacts to eagles are expected to be minor if authorized entities that carry out lethal removal of cormorants follow the National Bald Eagle Management Guidelines.

Table 12. Summary of Effects on Migratory Bird Species and Eagles from Take of Cormorants

Effects on Migratory Bird Species and Eagles from Take of Cormorants					
Lead Deposition	Alternative A: State/Tribal Permit	Alternative B: AQDO	Alternative C: State/Tribal Permit + AQDO	Alternative D: General Depredation Order	Alternative E: No Action
	negligible	negligible	negligible	Broader, but negligible	Unchanged, negligible
Co-nesting Migratory Birds	Alternative A: State/Tribal Permit	Alternative B: AQDO	Alternative C: State/Tribal Permit + AQDO	Alternative D: General Depredation Order	Alternative E: No Action
	Beneficial where efforts to reduce impacts on co-nesting migratory birds from cormorant-related conflicts exist; possible negative impact to species of similar appearance.	Similar to that of A	Similar to that of A	Similar to that of A, but across a potentially larger geographic scale	Similar to that of A
Eagles	Alternative A: State/Tribal Permit	Alternative B: AQDO	Alternative C: State/Tribal Permit + AQDO	Alternative D: General Depredation Order	Alternative E: No Action
	Minor	Minor	Minor	Minor, but across a potentially larger geographic scale	Minor, unchanged

Impacts from Take of Cormorants on Threatened and Endangered Species (non-fishery)

The management of conflicts associated with cormorants described in all alternatives would not authorize the take of any species protected by the ESA. Entities operating under any of the alternatives must immediately report the take of species protected under the ESA to the Service. Standard conditions common to all alternatives are outlined below and will result in minimal effects.

The geographic scope of the alternatives encompasses the lower contiguous 48 states. As a result there are several species considered in this assessment under the ESA. Three species are highlighted here in the FEIS because of their higher potential to be impacted by lethal take of cormorants. To protect piping plovers, interior least terns, and wood storks that nest or have colonies in or near areas where cormorant damage management could occur, conservation measures specified in the [Affected Environment section of this FEIS](#) are implemented within any geographic area where ESA protection applies. With these conditions in place, these species may be affected but will not likely be adversely affected by any of the alternatives. Listed species assessed are included in the [attached ESA BE](#) with their accompanying assessment of effect.

Socioeconomic Impacts from Take of Cormorants (Aquaculture and Recreational Fisheries)

Environmental consequences of the alternatives described in this FEIS to the aquaculture industry and recreational fisheries are largely tied to socioeconomic impacts. This section describes those potential impacts.

There are multiple economic factors affecting the aquaculture industry at any particular point in time. The industry is influenced heavily through both supply- and demand-side factors. Examples include the influence of consumer tastes, foreign supplies, and costs of production. As Dorr (2015) found, depredations from cormorants had some offsetting effects that benefited non-depredated fish. Lacking any specific information regarding the number and types of facilities that will benefit from a special permit as described in Alternative A, a broad assessment of the overall economic impacts to the aquaculture industry is uncertain.

However, Dorr et al. (2012) indicated that cormorant depredations resulted in losses between 2.3 percent and 4.6 percent of total catfish sales in Mississippi. This analysis assumes that a rate of lethal take of cormorants between 14 percent and 21 percent of the cormorant population will affect 0.32 percent and 0.97 percent of total industry sales at these types of facilities. The total economic contribution of commercial catfish production in the United States in 2016 amounted to \$871.1 million (Posadas 2017). Industry sales in 2018 were \$4,377,800,000. A new special permit under Alternative A could result in a benefit to industry between \$1.22 million and \$3.65 million in total sales. It should be noted, however, that the Dorr et al. (2012) depredation-loss estimates were made when the previous AQDO was in effect, and were likely conservative for a number of reasons.

Burr (2019) found that the proportion of cormorants found at surveyed aquaculture facilities in 2015 (under the previous AQDO) was 55%, and climbed to 88% in 2016 (after the previous AQDO was vacated), and was intermediate at 79% in 2017 (under the current framework or No Action alternative). This research suggests that increased lethal control may be influencing how cormorants distribute themselves between the two available foraging options (aquaculture vs. natural water bodies). Reduced losses on aquaculture farms are therefore represented by the number of cormorants removed lethally plus the number of birds shifting to other sites and foraging elsewhere. In the Burr (2019) case, 24% of the cormorants in the Mississippi delta region shifted foraging to natural waterbodies under the AQDO relative to the year with only depredation permits.

In addition, recent research using updated bioenergetics information (Christie 2019) and economic models for current production systems suggest industry-wide losses may be much greater than previously estimated. Christie et al. (2020) and Engle et al. (in review) estimated that industry-wide, the annualized value of all catfish sales revenue losses averaged \$47.2 million (range of \$25.8 million to

\$65.4 million). An AQDO as described in Alternatives B and C, or addressing aquaculture as part of a general depredation order in Alternative D, would yield similar results as in Alternative A. Because aquaculture facilities may currently request authorization for the take of cormorants through individual permits, as in Alternative E or the No Action Alternative, the aquaculture industry would likely experience similar results as in other alternatives, but may have an added burden to request individual permits each year where necessary.

It is challenging to estimate the economic effect of a special permit on recreational fisheries. Although Schwiff et al. (2015) estimated the effects of cormorant depredations on a recreational fishery in upstate New York, it is likely that any associated lost angler-fishing-day activities were simply offset through engaging in angling opportunities elsewhere. Further research would be necessary in order to assume that any of the losses estimated by Schwiff actually translated into an overall net loss experienced nationwide. While it is feasible that a special permit outlined in Alternative A could have localized effects on recreational fisheries, data do not exist to predict where that could occur or which states or tribes would seek a special permit. Therefore, this analysis assumes that recreational fisheries will benefit from the additional controls of the cormorant populations associated with the proposed rulemaking. Recreational fishing provides food for people in many parts of the United States, and is particularly important for indigenous and other minority populations as a food source, as well as low-income populations. Where take of cormorants provides benefits to recreational fisheries, people may benefit from an increase in available fish for recreation and as a food source. Due to lack of empirical information, a full analysis of this issue is not possible.

Alternatives B and E (an AQDO and the No-Action alternative, respectively) would not address conflicts associated with cormorants and wild and publicly stocked recreational fisheries. Under these two alternatives, this type of conflict would continue and likely increase based on this assumption. The Service expects Alternative C (a combination of A and B) to yield similar economic impacts to recreational fisheries as Alternative A. Under a depredation order (Alternative D), the Service expects similar economic impacts to occur as in Alternative A but on a broader a scale, because a general depredation order would encompass the scope of all of the contiguous 48 states. In contrast, under a special permit program under Alternative A, the Service assumes some states and tribes may not seek a special permit, thus reducing the geographic scope of impacts relating to Alternative A.

Table 13. Summary of Socioeconomic Effects at Aquaculture Facilities and Recreational Fisheries

Alternative A: State/Tribal Permit	Alternative B: AQDO	Alternative C: State/Tribal Permit + AQDO	Alternative D: General Depredation Order	Alternative E: No Action
Broadly beneficial to aquaculture industry and recreational fisheries, though variability would occur due to cormorants shifting from site to site.	Similar to A, however recreational fisheries would be excluded from this scope and socioeconomic losses may continue in these areas.	Similar to A	Similar to A, but across a potentially larger geographic scope.	Similar to B.

Effects to Tribal and Cultural Resources and Environmental Justice

Lethal take of cormorants is likely to have negligible adverse impacts to cultural resources in most cases, although some individual circumstances could theoretically involve minor impacts depending on the alternative. Under most cases in each alternative, tribes would likely also experience overall benefits in increased flexibility to address conflicts associated with cormorants at hatcheries and where wild and tribal-stocked fisheries occur.

Under Alternative A, tribes opting to obtain a special permit may experience an increase in the regulatory burdens associated with annual reporting to the Service, tracking lethal take, and any monitoring of cormorant populations on tribal lands. This regulatory burden may increase due to the need to coordinate with states also seeking a special permit and where tribal and state boundaries may abut. However, a full analysis of these effects is not possible due to a lack of information and understanding of how many tribes and states may seek this special permit. This would be similar in Alternative C, which combines a special permit with an aquaculture depredation order.

Under Alternative B, lethal take of cormorants is likely to have moderate impacts to cultural resources in most cases, as tribes would not be able to address conflicts associated with cormorants in areas with wild and tribally stocked fisheries. Tribes needing to address conflicts associated with cormorants and salmonid fish would not be able to do so. Conflicts in these areas may continue and even increase in areas where cormorant control has been effective. Where these conflicts occur, tribes would rely on nonlethal management to address conflicts. Tribes operating under an AQDO may also experience an increase in the regulatory burdens associated with annual reporting to the Service, tracking lethal take, and any monitoring of cormorant populations on aquaculture and hatchery facilities on tribal lands.

Effects to tribal and cultural resources under a general depredation order as specified in Alternative D would be similar to those identified in Alternative A. However, the geographic scope of this alternative is potentially much broader, as this alternative would authorize take of cormorants in all 48 states and not just those tribes seeking a special permit. Although this alternative would allow more regulatory flexibility to all tribes experiencing conflicts associated with cormorants, the potential increase in the number of sites where predation losses to fish would need to be monitored, tracked, reported, and enforced to ensure that the maximum allowable take of cormorants is not exceeded would place a large administrative burden on the Service and tribes addressing conflicts associated with cormorants.

The No Action Alternative presents similar impacts to Alternative B. Tribes needing to address conflicts associated with cormorants and salmonid fish would not be able to do so. Conflicts in these areas may continue and even increase in areas where cormorant control has been effective. Where these conflicts occur, tribes would rely on nonlethal management to address conflicts.

Table 14. Summary of Effects on Cultural Resources and Environmental Justice from Take of Cormorants.

Alternative A: State/Tribal Permit	Alternative B: AQDO	Alternative C: State/Tribal Permit + AQDO	Alternative D: General Depredation Order	Alternative E: No Action
This alternative provides tribes the flexibility to be able to manage allowable take of cormorants. However there may be an increased regulatory burden associated with annual reporting to the Service, tracking lethal take, and any monitoring of cormorant populations on tribal lands. This regulatory burden may increase due to the need to coordinate with states also seeking a special permit, and where tribal and state boundaries may abut.	Tribes would not be able to address conflicts associated with cormorants in areas with wild and tribally stocked fisheries. Tribes needing to address conflicts associated with cormorants and salmonid fish would not be able to do so. Conflicts in these areas may continue and even increase in areas where cormorant control has been effective. Where these conflicts occur, tribes would rely on nonlethal management to address conflicts.	Similar to A	Similar to A, but across a potentially larger geographic scope.	Similar to B.

Health and Human Safety Impacts from Take of Cormorants

The primary risk to human health and safety from cormorants is the risk of cormorant collisions with aircraft. However, the Service issues individual depredation permits for migratory birds where human health and safety may be impacted. Alternative A would allow cormorants to be taken in specific situations, or on a case-by-case basis by state wildlife agencies and tribal authorities, allowing sufficient flexibility for effective control where human health and safety might be at risk. One type of health risk, direct bacterial contamination associated with fecal waste from fish eating birds, could be reduced, but not eliminated. Since cormorants are not a direct source of toxic contaminants, but rather bioaccumulate toxins through ingestion of fish, reduction in cormorant abundance is not expected to reduce overall contaminant levels. Human safety issues associated with cormorant–aircraft collisions would continue to be addressed through management by airport operations and WS. States and tribes not seeking a special permit would continue to address human health and safety concerns through issuance of individual depredation permits. Alternative B would allow for human health and safety concerns to continue through issuance of individual depredation permits. Environmental effects would be similar to that under the No Action Alternative. As Alternative C combines Alternatives A and B, regulatory mechanisms to address human health and safety would be similar and no overall reduction to contaminant levels would be expected.

Effects to human health and safety under a general depredation order as specified in Alternative D would be similar to those associated with Alternative A, but would likely occur across a broader geographic scale than any other alternative, with management potentially being implemented in all of the lower 48 states.

Impacts to Existence and Aesthetic Values from Take of Cormorants

As described in the 2003 EIS, aesthetic and existence value benefits are much more difficult to quantify than are economic impacts. In 2003, no studies had been carried out to estimate the dollar value that Americans assign to cormorants, and the Service is currently not aware of any new studies on the matter (and if there were, this value would certainly vary considerably from person to person). Although we found no studies quantifying the aesthetic or existence value of cormorants to various stakeholders, the Service recognizes that cormorants are not devoid of value.

For existence values, under Alternatives A through D, more cormorants would be killed than under the No Action Alternative (Alternative E) and thus, to some people, existence value would be compromised. However, overall populations of cormorants would not be significantly reduced, though population equilibrium levels may be lowered, so effects on existence value would be minimal. Effects on aesthetic values associated with the various alternatives would vary depending on individual perspective. For those who find cormorants aesthetically displeasing, reduced presence associated with control actions carried out under any alternative would be viewed positively. For those who appreciate the sight of cormorants, aesthetic value would be compromised the least under the No Action Alternative (Alternative E) compared to the other alternatives. Effects to existence and aesthetic values under a general depredation order as specified in Alternative D would be similar to the other alternatives, but would likely occur across a broader geographic scale than any other alternative, with management potentially being implemented in all of the lower 48 states, and thus greater impacts to cormorants and their existence and aesthetic values. Similarly, as Alternative C incorporates the elements in both Alternatives A and B, the Service expects greater impacts to cormorants, and greater impacts to their existence and aesthetic values, under Alternative C compared to Alternatives A or B.

Cumulative Impact Analysis

Cumulative impacts, or cumulative effects, are defined in CEQ regulations as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions” (40 CFR § 1508.7). Reasonably foreseeable future activities are actions and activities that are independent of the action alternatives but could result in cumulative effects when combined with the effects of the alternatives. These activities are anticipated to occur regardless of which alternative is selected. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time. This section analyzes cumulative effects of the alternatives when combined with the effects of other relevant past, present, and reasonably foreseeable future activities.

CORMORANT POPULATIONS

The Service has developed PTL models to ensure the cumulative allocation of cormorant take across all permit types and across all of the alternatives meets the need to maintain sustainable cormorant populations. As discussed, the main differences between alternatives pertain to the burden associated with accurately monitoring the authorized and actual take of cormorants throughout the year. Cumulative impacts to cormorant populations under each alternative stem from the ability of the Service to ensure the level of take does not exceed that described in the PTL. This is important because exceeding the allowable PTL level of take can have differential effects on cormorant populations due to differences in population size and the location and magnitude of take. Southern and western subpopulations are much smaller and therefore more vulnerable to experiencing adverse population effects if take levels are exceeded.

The Service would take adequate measures to ensure all populations remain sustainable in its allocation of allowable lethal take under Alternative A, Alternative B, Alternative C, and Alternative D on the maximum allowable take of the cormorant population. The Service would also minimize significant cumulative adverse impacts to all populations by developing population-monitoring programs and enforcing accurate tracking of authorized take. This is especially important to the western and southern subpopulations, which may be more vulnerable to negative impacts if authorized take is exceeded. In all analyzed alternatives in this FEIS (except the No Action Alternative), maximum allowable take would be authorized up to 121,504 cormorants nationally per year. Allocation for the western subpopulation would be managed at 9,077 per year; 1,314 per year would be allocated Florida subpopulation; 37,019 per year would be allocated for the Atlantic subpopulation; and 78,632 would be allocated to the Interior subpopulation. To reduce the risk of over-exploiting the western subpopulation, the Service would reduce the level of authorized annual take to half the PTL in the DEIS, or 4,539 individuals.

The annual cumulative take of cormorants if the Service implemented an AQDO pursuant to Alternative B could be lower than Alternative A and Alternative C because the Service would not authorize the take of cormorants to reduce depredation on wild and publicly stocked fisheries. However, the authorized take for other purposes (e.g., to protect human health and safety and property) and the take pursuant to the AQDO could still occur at the limit established by the PTL model.

If the Service implements a general depredation order pursuant to Alternative D, ensuring annual cumulative take occurs within the allowable take limit predicted by the PTL model would be more difficult; therefore, there would be a higher likelihood that annual cumulative take could exceed maximum allowable take predicted by the model. If the Service continued implementing Alternative E, the cumulative effects on the cormorant population could likely be lower than the other alternatives because the current maximum allowable take limit of 76,696 cormorants in the eastern United States (74,396 cormorants) and the Pacific flyway (approximately 2,300) is lower than the maximum allowable take limit of 121,504 cormorants predicted by the current PTL model.

As discussed previously, cumulative effects include reasonably foreseeable future actions. Many factors can influence changes in the cormorant population, including economic factors and biological ones. Changes in aquaculture acreage due to consumer demand, market prices, tariffs, trade embargos, and similar parameters may contribute to industry changes over time. Biological changes may include changes in breeding habitat, changes in aquatic prey bases, contaminants, and predation. In addition, mortality to cormorants can occur from external sources, such as collisions and electrocutions from power lines, predation, impacts from oil spills, and through effects from climate change. Climate change may affect breeding habitat and may shift the range of cormorant populations. Extreme flooding or droughts associated with climate change could cause a loss in breeding habitat, which could have adverse effects on the cormorant population. King and Finch (2013) describes potential direct and indirect effects on bird species as a result of climate change, and explains that the distributions of birds are closely associated with both winter and summer temperatures. Increased temperatures due to climate change may directly affect birds by forcing them to use more energy for thermoregulation, which can impact their abilities to maintain basal energy levels, reproduction, timing and breeding, migration timing, and survival rates. As a result of changing temperatures and the need to respond to these impacts, birds may shift their ranges over time to areas with more suitable temperature conditions. Altered ranges may or may not provide suitable habitat or necessary resources to meet the needs of a particular species. Increased drought conditions, wildfire severity, or other disturbances can cause nest and habitat destruction, and habitats may be altered from potential invasion of vegetation following a localized destructive event. Localized effects from climate change can impact wildlife directly and may result in benefits to some species and negative impacts to others. Because responses to climate change are largely species-specific, it is challenging to estimate if these responses will result in benefits at the local level, though it is possible within some microhabitats. Some localized areas may experience more flooding, or more widespread drought, from climate change. However, based on the scientific literature, the Service generally anticipates negative impacts on most fish species, as temperatures rise fish populations are projected to decrease and possibly disappear in some regions, which could possibly have some negative impacts to cormorant populations.

Effects on cormorant populations that could occur if the Service implemented each of the alternatives depends largely on the ability of the Service to ensure and enforce levels of take within the allowable PTL level. Effects from climate change at localized levels, however, may have indirect effects on cormorant populations. As stated above, if the level of authorized take is exceeded, then the effects on the cormorant populations will vary depending on population sizes and locations authorized take occurs under each alternative. Because the southern and western subpopulations are smaller in population size, they may be more sensitive to localized impacts from climate change over time, which may intensify effects on these populations from authorized take in these regions.

Contaminants could also have adverse effects on the cormorant population. As discussed previously, the cormorant abundance in many regions of North America has increased since the 1960s and 1970s. The resurgence might be, at least in part, a population recovery following years of reproductive suppression from chlorinated hydrocarbon contaminants (e.g., DDT) and unregulated take prior to protection under the MBTA (Jackson and Jackson 1995, Wires et al. 2001, Dorr et al. 2014).

If the Service implements Alternative A, Alternative B, Alternative C, or Alternative D, population sizes of cormorants are expected to slightly decrease and stabilize for the Atlantic, Interior and southern subpopulations. Population sizes are expected to stabilize near the current low population for the western subpopulation (Table 9). Therefore, under any alternative, the Service will need to enforce accurate annual reporting and develop a robust monitoring strategy collaboratively with federal, state and tribal partners to allow for any needed adjustments in authorized take of cormorants, should individual populations unexpectedly decline.

To account for those reasonable foreseeable events and the increased take predicted by the current PTL model, the Service would implement several measures to ensure the cumulative take of cormorants occurs within allowable limits to maintain sustainable populations. The Elements Common to All Alternatives section of this FEIS discusses many of the measures the Service would implement to monitor cumulative take and the cormorant population. The Service would ensure allocation of take across all permit types is within the PTL limits to maintain sustainable populations and would require reporting of take to allow for accurate tracking. The Service would implement monitoring requirements that would be used to assess the effects of lethal take on cormorant populations and to ensure take is commensurate with population status. Monitoring can also improve future decisions regarding allowable take and how that allowable take could be determined. Monitoring both reported take and cormorant population sizes ensures the ability to adjust take limits in a timely manner, if populations unexpectedly decline. An unexpected decline could occur from cumulative adverse effects, such as drought or flooding caused by climate change, contaminants, change of aquatic prey bases, or increased predation.

In addition, the Service would also produce a report every five years, and additionally as necessary, that provides analyses from population monitoring efforts and other status information. This report would be provided to the public to promote transparency of decision making and the evaluation of cumulative effects on the cormorant population. This report would include, but not be limited to: (1) updated cormorant population status and trends; (2) reported lethal take of cormorants nationally and by cormorant population; (3) updated PTL analyses based on new or more current population information, (4) the state of the conflict and need for continued management, as reported by requests for depredation permits (both individually, programmatically by participating states and tribes; (5) a conflict-management decision and justification for either continued management or a proposed new management approach, if appropriate and needed.

WILDLIFE, THREATENED AND ENDANGERED SPECIES, AND CO-NESTING SPECIES

Under each alternative, environmental effects on wildlife and species that nest or occupy the same habitat as cormorants are primarily related to the action of taking cormorants but can include effects on co-nesting species associated with human presence and damage-management activities. Cormorants often exhibit gregarious roosting, loafing, feeding, and nesting behavior (i.e., found together and often in large numbers).

Repeated disturbance of co-nesting colonial waterbirds from cormorant take activities is unlikely to have significant cumulative effects to co-nesting species. If cormorant take activities startle adults of co-nesting species from their nest for too long or at the wrong time of day, there is the potential for increased mortality of eggs and chicks. However, in most instances, co-nesting birds usually return after conclusion of the action. Furthermore, the entity conducting the cormorant take is likely to take measures to minimize disturbance to co-nesting species (e.g., minimizing number of site visits), especially if the activity is to benefit co-nesting species.

All of the alternatives except Alternative D would require the appropriate entities to seek a permit to take cormorants to reduce habitat damage associated with nesting cormorants, including reducing nest-site competition between cormorants and other co-nesting species. Therefore, the cumulative effects associated with implementing those alternatives would be similar. Cumulatively, reducing habitat damage from cormorants and nest-site competition would be beneficial to those co-nesting species. Limited adverse effects could occur to other co-nesting species from disturbance when activities occur in cormorant nesting colonies where co-nesting species are present, but the Service and the entity conducting activities can take measures to minimize those adverse effects. Cumulative adverse effects could be higher if the Service implemented Alternative D because cormorant take could occur without the need for a permit. Therefore, the Service would not be able to require specific measures to minimize disturbance of co-nesting species at a specific site. However, to minimize additive cumulative effects of cormorant control measures on co-nesting species, the Service could impose general measures to minimize disturbances as part of the implementation of a general depredation order.

Another concern would be the cumulative impact of long-term unintentional take of a nontarget animals while conducting activities to alleviate damage caused by cormorants. As explained in the Environmental Consequences section, there is potential for misidentification of other bird species, especially species with a similar appearance and/or habits as cormorants, and that occur in aquatic habitats, such as the neotropic cormorant, great cormorant, and the anhinga. The Service anticipates the unintentional take of nontarget species to occur infrequently and involve very few individuals of a particular species; therefore, the Service does not anticipate cumulative adverse effects to occur from unintentional take of nontarget species under any of the alternatives.

As discussed in Table 12, permits issued to lethally take cormorants would also adhere to the National Bald Eagle Management Guidelines to ensure that cormorant damage management activities do not affect eagles. If the Service implemented an alternative that would establish a depredation order (Alternative B, Alternative C, Alternative D), the Service could require entities that take cormorants pursuant to the depredation order to follow the National Bald Eagle Management Guidelines. Protection measures specific to activities involving off-road vehicles, motorized watercraft use, recreation and human entry, discharge or use of firearms, and avoidance measures at foraging areas and communal roosts would help prevent the actions described in the alternatives from impacting eagles. Based on adherence to the National Bald Eagle Management Guidelines, the Service does not anticipate cumulative adverse effects to occur from implementation of any of the alternatives.

The Service has also developed a Biological Evaluation and conducted an intra-Service consultation pursuant to Section 7 of the ESA to assess if any proposed, threatened, or endangered species or associated critical habitat would be affected by activities to manage cormorant damage. The Service added specific conditions for piping plover, interior least tern, and wood stork to all of the alternatives in order to protect these specific listed and sensitive species. The Service does not anticipate cumulative adverse effect to occur from implementation of any of the alternatives to the plover, tern, and stork with the added specific conditions, and generally to any ESA-listed species based on the intra-Service consultation.

A potential reasonable foreseeable event that could influence interactions between cormorants and other wildlife species is climate change. King and Finch (2013) notes that increased temperatures due to climate change may directly affect birds by forcing them to changing habitats, food availability, reproductive success, timing and breeding, migration timing, survival rates, and possible shifts in ranges over time. Altered ranges may or may not provide suitable habitat or necessary resources to meet the needs of a particular species. Because cormorants have been shown to have negative impacts on co-nesting species, through habitat destruction, nest sequestration, or reduction of available nesting space, actions taken to reduce damage associated with cormorants would benefit impacted species that may experience changes due to climate change.

WILD AND PUBLICLY STOCKED FISHERIES AND AQUACULTURE

As noted, impacts of the alternatives to the aquaculture industry and recreational fisheries are largely tied to socioeconomic analyses. Under all alternatives, there would be long-term beneficial cumulative effects to aquaculture facilities, as the scope of each alternative includes these areas. There would likely be some long-term beneficial cumulative effects to wild and publicly stocked fisheries under Alternatives A (special state and tribal permit), C (special permit + AQDO), and D (general depredation order), which include these types of aquatic systems in their scope of action. This overall benefit to both aquaculture facilities and wild and publicly stocked fisheries, however, would vary from localized site to site because the complexity of aquatic systems; a reduction in cormorant foraging (via take) may not directly improve or stabilize a declining fishery at every site, as fisheries can be impacted by factors other than or in addition to cormorants.

Where take is shown to be effective at specific sites, this may provide cumulative benefits to fisheries adjusting to the effects associated with climate change. Short-term climate-change impacts on aquaculture can include losses of production and damage to infrastructure arising from extreme events such as floods, increased risks of diseases, parasites and harmful algal blooms. Long-term impacts can include reduced availability of wild seed used to feed fish stocks, leading to increasing competition for freshwater food sources for these fish stocks (Food and Agriculture Organization of the United Nations 2018). Biodiversity reductions in sensitive areas, such as northern latitudinal basins, are also expected in freshwater ecosystems where states and tribes manage hatcheries and publicly stocked fish for recreational purposes. These areas would benefit from the ability to address conflicts associated with cormorants while also adjusting to negative impacts from climate change.

HUMAN HEALTH AND SAFETY

Under all alternatives, cumulative effects to resources associated with human health and safety would include the continued ability to address conflicts associated with cormorants where human health and safety might be at risk. Each of the alternatives would allow activities to address cormorants in areas where their fecal droppings were a concern, which could reduce risks to human health and safety. All alternatives would allow entities to address human-safety issues associated with cormorant-aircraft collisions at airports and military facilities.

Under each alternative, authorized entities would be able to take cormorants using firearms. This FEIS discusses environmental consequences from lead deposition as it relates to wildlife and human health and safety. Long-term use of lead shot can result in continued exposure of lead in the environment over time. This lead can be ingested by wildlife leading to substantial adverse cumulative impacts such as biomagnification and lead poisoning to some species. In order to prevent these impacts, nontoxic shot as defined under 50 CFR 20.21(j) would be required as a standard condition of migratory bird permits issued pursuant to the MBTA for the lethal take of birds. In addition, if the Service established an aquaculture depredation order or a general depredation order, the Service could require the use of nontoxic shot as a condition of taking cormorants pursuant to those orders. Where lead bullets are used (under special circumstances in order to avoid disturbance to other species), conditions in these permits require retrieval and proper disposal of carcasses, which would reduce the availability of lead in the environment. Given the very low amount of lead deposited and concentrations that would occur using firearms, cumulative impacts from lead contamination to soil and waterways is expected to be negligible.

CULTURAL RESOURCES

Under Alternatives A (special state and tribal permit), C (special permit + AQDO), and D (general depredation order), cumulative effects to cultural resources would primarily be minor, long-term, and beneficial. These three alternatives would provide more flexibility to tribes to address conflicts associated with cormorants in areas with wild and tribally stocked fisheries. Where take is shown to be effective in specific sites where wild and stocked fisheries occur, this may provide cumulative benefits to tribal-managed fisheries over time. Where tribes operate hatcheries and aquaculture facilities, there would be long-term beneficial cumulative effects under each alternative.

Summary of Analysis

Environmental consequences of the No-Action Alternative and the four other alternatives are summarized in Table 14.

Table 15. Summary of Environmental Consequences across all Alternatives.

Resource topic	Alternative A: State/Tribal Permit	Alternative B: AQDO	Alternative C: State/Tribal Permit + AQDO	Alternative D: General Depredation Order	Alternative E: No Action
Cormorant Populations	Negligible adverse impacts; projected population would remain sustainable with use of PTL and maximum allowable take limit and consistent monitoring of populations	Similar to A should the Service develop necessary cormorant take tracking and monitoring systems.	Similar to A should the Service develop necessary cormorant take tracking and monitoring systems.	Minor to moderate adverse impacts; the Service will have the greatest challenge ensuring authorized levels of take stay within the allowable PTL limit.	Similar to A
Wild & Publicly stocked Fisheries	Primarily minor to moderate benefits depending on site variability	No benefits	Similar to A	Same as A, but with a potentially larger geographic scope	No benefits
Aquaculture Industry	Primarily minor to moderate benefits depending on site variability	Similar to A	Similar to A	Same as A, but with a potentially larger geographic scope	Similar to A
Co-nesting Species and Wildlife	Beneficial where efforts to reduce impacts on co-nesting migratory birds from cormorant-related conflicts exist; negligible negative impact to species of similar appearance.	Similar to A	Similar to A	Similar to A, but across a potentially larger geographic scale	Similar to A
Human Health and Safety	Primarily minor to moderate benefits depending on site variability	Similar to A	Similar to A	Similar to A	Similar to A

Resource topic	Alternative A: State/Tribal Permit	Alternative B: AQDO	Alternative C: State/Tribal Permit + AQDO	Alternative D: General Depredation Order	Alternative E: No Action
<i>Threatened and Endangered Species</i>	Beneficial where efforts to reduce impacts on threatened or endangered species from cormorant-related conflicts exist	Similar to A	Similar to A	Similar to A, but across a potentially larger geographic scale	Similar to A
<i>Cultural Resources</i>	Primarily minor to moderate benefits depending on site variability	Tribes would not be able to address conflicts where wild and tribally stocked fisheries occur	Similar to A	Similar to A, but across a potentially larger geographic scope.	Similar to B

APPENDIX A. List of Preparers and Consultants

Name	Agency	Contributions
Charles Bronte, Senior Fish Biologist, and Director Great Lakes Fish Tagging and Recovery Lab	U.S. Fish and Wildlife Service	Assistance with development of vision, goals, alternatives and environmental consequences; reviewer; fisheries expertise
Linus Chen, Attorney	Department of the Interior, Office of the Solicitor, Solicitor	Legal advisor to the Service, document review
Tina Chouinard, Natural Resource Planner	U.S. Fish and Wildlife Service	Assistance in threatened and endangered species consultation and document sections
Kim Clapper, Wildlife Biologist	USDA Wildlife Services	Assistance with development of vision, goals, alternatives and environmental consequences; reviewer
Randy Claramunt Lake Huron Basin Coordinator	Michigan Department of Natural Resources	Expertise in fisheries management and biology
Rick Clawson, Project Manager	DJ Case and Associates	Document layout, editing, and production; Section 508 compliance
Tom Cooper, Chief, Migratory Birds, Interior Region 3	U.S. Fish and Wildlife Service	Assistance with development of vision, goals, alternatives and environmental consequences; reviewer
Chris Deets, Outreach and Education Coordinator, Migratory Bird Program	U.S. Fish and Wildlife Service	Communications, outreach and public engagement
Brian Dorr, Research Wildlife Biologist, USDA/WS/National Wildlife Research Center	USDA Wildlife Services	Expertise in aquaculture, socioeconomics, cormorant populations; assistance with development of vision, goals, alternatives and environmental consequences; reviewer
James Dubovsky, Central Flyway Representative, Division of Migratory Bird Management	U.S. Fish and Wildlife Service	Assistance with development of vision, goals, alternatives and environmental consequences; reviewer
Chris Dwyer, Wildlife Biologist	U.S. Fish and Wildlife Service	Assistance with development of vision, goals, alternatives and environmental consequences; reviewer; expertise in permit processes and authorization of take of migratory birds

Andrew Forbes, Deputy Chief, Migratory Birds, Interior Region 3	U.S. Fish and Wildlife Service	Cultural and historical resources expertise, writer, reviewer
Jerome Ford, Assistant Director	U.S. Fish and Wildlife Service	Overall planning coordination, organization, and review
Scott Johnston, Chief of Populations Branch, NE Regional Office	U.S. Fish and Wildlife Service	Assistance with development of vision, goals, alternatives and environmental consequences; reviewer; human health and safety, wildlife, aquaculture expertise
Steve Kendrot, Deputy Director, Wildlife Operations	USDA Wildlife Services	Assistance with development of vision, goals, alternatives and environmental consequences; reviewer
Eric Kershner, Chief, Branch of Conservation, Permits and Regulations	U.S. Fish and Wildlife Service	Assistance with development of vision, goals, alternatives and environmental consequences; planning process guidance; document review
Lesley Kordella, Wildlife Biologist	U.S. Fish and Wildlife Service	Lead planner; DEIS and FEIS planning team coordinator; and DEIS and FEIS organization, writing, and review
Scott Lamprecht Fisheries Biologist	South Carolina Department of Natural Resources	Expertise in fisheries
Cindy Longmire, Social Scientist	DJ Case and Associates	Public Comment Summary
Kristin Madden, Deputy Chief, Division of Migratory Birds, Interior Regions 6, 7 (NM), and 8	U.S. Fish and Wildlife Service	Assistance with development of vision, goals, alternatives and environmental consequences; reviewer
Edward Maillett, Economist	U.S. Fish and Wildlife Service	Socioeconomics expertise and review
Noah Matson, Deputy Assistant Director for Migratory Birds	U.S. Fish and Wildlife Service	Overall planning coordination, organization, and review
John McConnell, Wildlife Biologist	USDA Wildlife Services	Expertise in aquaculture; assistance with development of vision, goals, alternatives and environmental consequences; reviewer
Michelle McDowell, Wildlife Biologist, Interior Region 9	U.S. Fish and Wildlife Service	Assistance with development of vision, goals, alternatives and environmental consequences; reviewer; cormorant populations, fisheries expertise

Dave Miko, Deputy Assistant Director, Fish and Aquatic Conservation	U.S. Fish and Wildlife Service	Assistance with development of vision, goals, alternatives and environmental consequences; reviewer; fisheries expertise
DJ Monette, Associate Native American Liaison Advisor	U.S. Fish and Wildlife Service	Cultural and historical resources expertise, writer, reviewer
Dave Olson, Wildlife Biologist and Migratory Game Bird Coordinator, Interior Region 5 and 7	U.S. Fish and Wildlife Service	Assistance with development of vision, goals, alternatives and environmental consequences; reviewer; human health and safety, wildlife, aquaculture expertise
Rachael Pierce, Migratory Bird Biologist, Interior Region 3	U.S. Fish and Wildlife Service	Assistance with development of vision, goals, alternatives and environmental consequences; reviewer; cormorant populations, fisheries expertise
Ken Richkus, Chief, Division of Migratory Bird Management	U.S. Fish and Wildlife Service	Lead planner; DEIS and FEIS planning team coordinator; and DEIS and FEIS organization, writing, and review
Mark Seamans, Wildlife Biologist	U.S. Fish and Wildlife Service	Assistance with development of vision, goals, alternatives and environmental consequences; reviewer; cormorant populations
Phil T. Seng, Vice President	DJ Case and Associates	Document layout, editing, and production; Section 508 compliance
Caleb Spiegel, Wildlife Biologist	U.S. Fish and Wildlife Service	Assistance with development of vision, goals, alternatives and environmental consequences; reviewer; human health and safety, wildlife, aquaculture expertise
John Stanton, Wildlife Biologist	U.S. Fish and Wildlife Service	Assistance with development of vision, goals, alternatives and environmental consequences; reviewer
Kimberly Wagner, PhD Staff Wildlife Biologist - NEPA	USDA Wildlife Services	Assistance with development of vision, goals, alternatives and environmental consequences; reviewer; wildlife expertise
Nathen Wilke, Chief, Branch of Hatchery Operations and Applied Science Fish and Aquatic Conservation Program	U.S. Fish and Wildlife Service	Assistance with development of vision, goals, alternatives and environmental consequences; reviewer; fisheries expertise

Ryan Wimberly, Wildlife Biologist

USDA Wildlife Services

Assistance with development of vision, goals, alternatives and environmental consequences; reviewer

APPENDIX B. Summary of Public Involvement

This appendix summarizes input received during two separate public comment periods:

- Advance Notice of Proposed Rulemaking, and intention to prepare a draft Environmental Impact Statement
- Draft Environmental Impact Statement and Proposed Rule

Comments on Advance Notice of Proposed Rulemaking, and Intention to Prepare Draft EIS

On January 22, 2020, the Service announced an advance notice of proposed rulemaking (ANPR) and intention to prepare a draft environmental review pursuant to the National Environmental Policy Act of 1969, as amended. The Service encouraged interested parties to provide input during the public scoping and comment period from January 22 to March 9, 2020. Input was accepted by mail or through the regulations.gov comment portal.

The public record associated with the publication of the ANPR (FWS-HQ-MB-2019-0103-0001) states that 1,406 comments were received; however, two of these comments were actually the notice itself and the supporting documents to the notice. In addition, a total of 17 comments were received after the comment period closed but were accepted as part of the public record. The Service makes every effort to take into consideration all comments and any additional information received. Following is a brief summary of the comments received.

Total comments: 1,404 – 8 unrelated – 3 duplicates = 1,395 comments

One comment contained a petition that the commenter had posted on the Internet. It is included in the analysis below as a single entry; however, the petition had 1,710 signatures and 741 individual comments attached to the petition (all comments were supporting the petition for cormorant control).

Twenty commenters requested further clarification from the Service in the draft EIS as to the biological impacts and administrative logistics of the various proposed alternatives.

Comments by geography: Geography was determined by the text of the comment where possible. Several comments referenced a case study in the Pacific Northwest as evidence for their opposition, but it was not always clear if the commenter was from that geographic area. In addition, some states occur in more than one flyway, so there will be some “blurring” in these numbers. Generally, comments can be categorized in this manner:

Atlantic Flyway – 243 comments
Mississippi Flyway – 345 comments
Central Flyway – 16 comments
Pacific Flyway – 26 comments

Comments in support of the proposal: 1,124 comments (81%) stated support for managing cormorants, and an additional 81 comments (6%) were supportive in tone but did not expressly state their support.

General management/control: 694 of the supportive comments (62%) indicated support for management of cormorants in general.

Local Authorities: 141 supportive comments (13%) specifically stated support for local authorities such as states and tribes to have the ability to manage their cormorant populations.

Depredation Permits: 68 supportive comments (6%) specifically stated support for depredation permits or orders. Approximately one-quarter of the commenters who supported depredation permits were interested in landowner permits or permits for smaller operations.

Combination of local authorities and depredation permits: 52 supportive comments (5%) stated support for some combination of both local management authority and depredation permits.

Hunting: 154 of the supportive comments (14%) expressed interest in some type of hunting season or allowing sportsmen and women to help manage cormorant populations. Comments were mixed on having a restricted season or a wide-open hunting season structure and bag limit.

Eradication: 61 of the supportive comments (5%) called for the eradication or elimination of cormorants altogether.

Not all commenters explicitly stated why they supported the proposal; however, the following thematic categories were the predominant reasons provided for support.

- Fish predation and impacts to fisheries (73%)
- Increasing cormorant populations and being out-of-balance (37%)
- Environmental impacts to water quality, flora, property, displacement of other species, and public health (35%)
- Negative impacts to local communities because of loss of fisheries tourism (12%)
- Negative economic impact to aquaculture operations due to fish predation (7%)
- Considered them *destructive* (6%)
- Considered them valueless – *worthless, filthy* (5%)
- Considered them a nuisance (4%)

Comments in opposition to proposal: 172 comments (12%) stated opposition to the proposal and 11 comments (0.8%) were opposed in tone but did not expressly state their opposition.

- Inappropriate delegation of authority (47%)
- No evidence to support; Need to address other causal factors (19%)
- Against killing cormorants (17%)
- Wanted to see nonlethal alternatives used (12%)
- Conflict/competition with anglers is not a valid reason to kill cormorants (8%)

Comment stance unknown: There were 5 comments (0.4%) that were unclear as to whether they supported or opposed the proposal. These comments primarily were asking the Service to clarify the details of the proposed alternatives in the draft EIS.

Comments in Response to the DEIS and Proposed Rule

Public Comments Table of Contents

Introduction	90
Issue 1: Comments on the NEPA and Rulemaking Process	91
Issue 2: Comments on the Preferred Alternative and Proposed Rule	94
Sub-issue: Comments pertaining to regulatory requirements under the MBTA.....	94
Sub-issue: Comments pertaining to the Scope of Authorized Take under the Proposed Action	96
Sub-issue: Comments pertaining to Implementation of the Proposed Action.....	99
Sub-issue: Use of Nonlethal Methods for Cormorant Management, and Considerations for Types of Lethal Take.....	107
Sub-issue: Use of Decoys for use in Cormorant Management	109
Sub-issue: Take of Cormorants on Private Property	111
Sub-issue: Impacts to Non-target Species from Cormorant Management	112
Sub-issue: Use of Nontoxic Shot for Take of Cormorants.....	114
Sub-issue: Comments Requesting Clarity on a Cormorant Population Monitoring Program	116
Issue 3: Comments on the PTL and Impacts to Cormorants, Including the Western Subpopulation of Cormorants	117
Sub-issue: Comments on Data Analyses and Impacts to the Western Subpopulation	117
Sub-issue: Additional Comments on the PTL	124
Sub-issue: Impacts to Cormorants from the Proposed Action	131
Issue 4: Comments Pertaining to Evidence that Cormorant Presence is a Limiting Factor to Fisheries	133
Issue 5: Comments on the DEIS Analyses Unrelated to Cormorant Subpopulations.....	138
Issue 6: Comments in Support of, or Requesting Clarity about other Alternatives	140
Issue 7: Additional Issues not Included in any Particular Category or Theme	152
Figure B-1. Estimated number of breeding pairs of double-crested cormorants in the CRE and in the western subpopulation.....	123

Public Comments List of Figures

Figure B-1. Estimated number of breeding pairs of double-crested cormorants in the CRE and in the western subpopulation..... 123

Introduction

The Service published a DEIS and draft rule on June 5, 2020. The public comment period continued for 45 days until July 20, 2020. In response to the publication of the DEIS and draft rule on June 5, 2020, the Service received 1,047 comments.¹⁴ During the public comment period, various government agencies, organizations, and individuals submitted comments electronically to the regs.gov portal. This appendix, combined with revisions to the FEIS, provides a comprehensive response to these public comments. All relevant, substantive comments were grouped according to particular issue categories identified during the Service's review of comments. Relevant comments were identified as those pertaining to specific impacts to resource areas that could result from managing conflicts associated with cormorants and those pertaining to specific portions of the DEIS.

Substantive issues submitted by the public on the DEIS and proposed rule are grouped below into categories of similar themes to allow the public to more easily understand the Service's responses. These categories of issues include those relating to: (1) the NEPA and rulemaking process; (2) the proposed action and the proposed rule; (3) the PTL and impacts to cormorants, including the western subpopulation of cormorants; (4) evidence that cormorant presence is a limiting factor to fisheries; (5) comments on cormorant analyses within the DEIS; (6) comments in support of, or requesting clarity about other alternatives; (7) additional issues not included in any particular category or theme.

For each issue category, the following are provided:

Summary of Comments: A definition and summary of the issue based on the comments received in a particular issue category.

Source of Comments: A list of the types of stakeholders (governments, tribes, organizations, and other groups) that produced comments in the particular issue category. Individual comments from the general public are indicated under a collective heading for **General Public**-this includes form letters facilitated by nongovernment organizations that focus on environmental or economic issues.

Response to Comments: A collective response by the Service to the comments constituting the particular issue.

¹⁴ Regulations.gov shows 1,052 total comments, which comprise 1,047 public submissions, 2 primary documents (proposed rules), and 3 supporting documents (DEIS, 2003 FEIS, and USACE documents)

A number of comments received were identical form letters or slight variations from the form letters. Again, specific responses are provided for relevant and substantive comments. Responses are not always provided in instances where a submittal does not comment on the content of the draft rule or DEIS, but instead offers a general opinion or simply recommends a specific decision that is not delegated to the Service. However, the Service does provide responses to some recurring issues—even when not directly relevant—to better communicate the nature of the proposed conflict management approach and the NEPA process to the public.

The Service also received and considered many comments of an editorial nature; for example: suggested word changes and corrections, requests for clarification, questions regarding citations, etc. Where appropriate, the Service made the suggested revisions to the FEIS—these revisions constitute the Service’s response to editorial comments.

All substantive comments received during the comment period have been included within this volume of the FEIS. All comments received are part of the public record, and are available to the decision maker during the deliberation process for deciding on the approach for managing conflicts associated with cormorants.

Issue 1: Comments on the NEPA and Rulemaking Process

Summary of Comments: Nongovernment organizations state that the Service was unclear about how scoping comments submitted in response to the ANPR informed or influenced the DEIS.

Source of Comments: Nongovernment Organizations.

Response to Comments: Though NEPA regulations do not require the Service to provide responses to public scoping comments, the Service reviewed and considered all comments submitted by the public in response to the ANPR published on January 22, 2020. The Service addressed the substantive issues that were raised in public scoping while developing the DEIS (see above summary) and again in this comment summary.

Summary of Comments: Nongovernment organizations commented that the Service's projected timeline makes any decision appear pre-decisional. In addition, commenters assert that the Service's analysis in the DEIS is based on a series of meetings and interviews where insufficient data was collected concerning the core problem. Commenters further state that stakeholders invited were entities who perceive their operations have been compromised by the cormorant and officials from state agencies where complaints about fish-eating birds were received.

Source of Comments: Nongovernment organizations.

Response to Comments: The Service notes that the preferred alternative was not specifically or directly influenced by any external parties. However, Service staff worked with state and tribal partners to research past approaches, the efficacy of those approaches, and the overall scope of conflicts associated with cormorants since the previous depredation orders were vacated in 2016. In doing so, the Service hosted four regional workshops in 2018 and invited representatives from state agencies, tribes, and other federal agencies in order to gather more information on this issue from our traditional conservation partners. At that time, the Service was not proposing any specific management method for this issue, and was only collecting biological, social, and economic data from entities the Service typically collaborates with initially when addressing our trust resources on a national scale.

In an effort to understand a wide variety of issues surrounding the conflicts associated with cormorants, the Service also interviewed a variety of experts, researchers, and partners to prepare for the 2018 workshops. Questions within those interviews focused on capturing biological, social, and economic data the Service might be able to use to quantify and better understand any impacts relating to the conflicts. For example, the Service asked interviewees: (1) how they would describe their organization's concern about the degree to which cormorants are causing conflicts; (2) how cormorants are perceived by various recreational user groups; (3) what nonlethal management actions have been employed and if they were successful; (4) what lethal actions were used and for what reasons; and (5) interviewees were asked if their organization had attempted to balance competing values on cormorant management. These questions assisted the Service in understanding the scope of the conflict on a national scale, as well as the variability in stakeholder values and intensity of the conflict, which is a critical component of the NEPA analyses.

The Service took these steps prior to the publication of the ANPR on January 22, 2020 to ensure that whatever approach was proposed would be ecologically sound and sustainable in light of physical and biological change; practical, viable, or economically realistic; and responsive to specific areas of concern identified by our conservation partners (page 4 of the DEIS). Public input was sought upon publication of the ANPR and the DEIS, and responses are documented in this comment summary. Public input informed the Service in the identification of a preliminary range of alternatives and alternative elements, including the proposed action. Further, direct input about conflicts associated with cormorants at the 2018 workshops enhanced the value of public scoping comments and created efficiencies by allowing the Service to better understand the public's concerns about the proposed action and alternatives. It is not pre-decisional to do so.

Summary of Comments: Nongovernment organizations commented that the Service did not address how the February 3, 2020 proposed rule to codify the Department of the Interior's legal opinion¹⁵ (M-37050) regarding the governing of the "take" of birds under the MBTA could impact the decision the Service would make regarding conflicts associated with cormorants.

Source of Comments: Nongovernment organizations.

Response to Comments: The Service did not directly address how the proposed rule to codify the Department of the Interior's legal opinion (M-37050) regarding the application of the MBTA to incidental take could impact the decision the Service would make regarding conflicts associated with cormorants. This is primarily because the management of cormorants addressed in this EIS involves take caused by actions directed at migratory birds. Promulgating a regulation to address conflicts associated with cormorants would be consistent with the MBTA's prohibitions for misdemeanor violations, as reflected in the Act's legislative history, which are limited to intentional actions directed at migratory birds, their nests, or their eggs. The proposed action, a new special permit for states and tribes, would establish a new permit option under 50 CFR part 21 that would authorize purposeful take of cormorants. Under this permit, the Service would authorize states and tribal wildlife agencies to conduct lethal take of cormorants within their respective jurisdictions. Incidental take of cormorants would not be authorized under this new permit. Should intentional, unpermitted take of cormorants occur, the Service may not issue a new permit to that permittee in response to the violation of conditions of that permit. If the proposed rule regarding incidental take were finalized, individuals, businesses, and other entities would not be financially or criminally liable under the authority of the MBTA for incidental take of migratory birds. The Service would continue to enforce the MBTA in cases of purposeful take, such as with a new special cormorant permit for states and tribes, unless authorized under 50 CFR part 21, and provide technical assistance to industry, the public, and partners voluntarily seeking to reduce impacts to migratory birds, or as required to comply with other federal, state, tribal, and local laws and regulations.

Summary of Comments: Commenters state that the Service did not formally consult with the country of Canada in the development of the proposed action.

Source of Comments: Nongovernment organizations, general public.

Response to Comments: There is no legal requirement to formally consult with Canada for concurrence or input on the proposed action. However, the Service did informally consult with wildlife professionals working with the Canadian Wildlife Service, now known as Environment and Climate Change Canada, to inform the PTL. Further, the Service will invite Canadian professionals in future monitoring programs to ensure projected population sizes can be compared to actual population sizes.

¹⁵ Vacated August 11, 2020, see National Audubon Society v. U.S. Department of the Interior (1:18-cv-04601)

Summary of Comments: A state agency noted that the Service did not afford the public enough time to review and comment on the proposed cormorant rule and DEIS because of the global pandemic and various challenges associated with it and the concurrent need to comment on the proposed rule regarding the changes to the MBTA.

Source of Comments: State agency.

Response to Comments: Standard practice for public review of an environmental impact statement is to provide a comment period of 30 days; however, depending on a number of factors, including the degree of public interest, a longer or shorter period may be appropriate. The Service provided a 45-day comment period for review of the cormorant DEIS and draft rule. In addition, the Service considers comments received after the closing date when feasible.

Issue 2: Comments on the Preferred Alternative and Proposed Rule

Sub-issue: Comments pertaining to regulatory requirements under the MBTA

Summary of Comments: Some commenters expressed concern that the proposed action is a violation of the MBTA, and that the Service is abdicating its oversight responsibility for the management of a migratory species.

Source of Comments: Nongovernment organizations, state agencies, general public.

Response to Comments: The proposed action falls well within with the scope and authority of the MBTA. Additionally, the Service is not abdicating its responsibilities under the MBTA, nor does the Service support the persecution of bird species. The MBTA prohibits the take, including killing, capturing, selling, trading, and transport, of protected migratory bird species. The Service can authorize the take of birds when the Secretary of the Interior deems such take is appropriate, so allowing the take of birds in certain circumstances is within the Service's authority and is appropriate. The MBTA also provides the statutory authority to manage migratory bird populations to the Service. Under this authority, the Service's regional offices administer permits for qualified applicants for the following types of activities: falconry, raptor propagation, scientific collecting, rehabilitation, conservation education, migratory game bird propagation, salvage, depredation control, taxidermy, and waterfowl sale and disposal. These permits enable the public to engage in legitimate wildlife-related activities that would otherwise be prohibited by the MBTA. All of these Service permit programs ensure that such activities are carried out in a manner that safeguards target wildlife populations for the continued enjoyment by the American people. Safeguards include population monitoring, rigorous reporting requirements of take, and specific requirements for how an animal is allowed to be taken (including: methods of allowed take and disposal, limits on who can take wildlife under an individual permit, and limits on the level of take). Permits allow public stakeholders to engage in conservation efforts (via scientific research and the generation of data), rehabilitation activities, hunting, and wildlife management when appropriate to reduce human/wildlife conflict.

The use of the best biological information together with a peer-reviewed, scientifically accepted means of determining appropriate levels of take (the PTL) is consistent with the scientific management tenet of the North American Model of Wildlife Conservation (Organ et al., 2012). Further, where conflicts exist between birds and the human environment (e.g., economic losses due to depredating birds, depletion of other stocks of animals to unacceptable levels, or the destruction of habitat), alleviating those conflicts by removing a portion of the birds causing the conflicts is not only consistent with the North American model, but is the responsibility of the Service under the MBTA. The Service's actions are not intended to persecute birds, but rather seek to reduce real conflicts that state and tribal agencies have identified.

The proposed permit does not relieve the Service from its responsibilities under the MBTA. The Service is still responsible for determining when and how much take will be allowed and how based on the status of each population of cormorants. The Service also is responsible for assessing, together with its conservation partners, the status of cormorants to ensure their sustainability. Lastly, as stated in the draft proposed rule, the Service will maintain overall authority for the take of birds (85 FR 34584, June 5, 2020). However, the Service would provide the states and tribes an additional tool by way of this new special cormorant permit that allows them to more efficiently respond to conflict issues involving cormorants.

Summary of Comment: A form letter was submitted by 306 members of the general public. The comments noted several concerns, including one that the proposed action is a conflict of the mission of the Service.

Source of Comments: General public.

Response to Comments: The mission of the Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. As stated in the previous response, the MBTA also provides the statutory authority to manage migratory bird populations to the Service. Therefore, reducing conflicts associated with a trust species is a benefit to the American people. The proposed action is consistent with the mission of the Service.

Sub-issue: Comments pertaining to the Scope of Authorized Take under the Proposed Action

Summary of Comments: Several state agencies and commenters voiced a need for clarity on the scope of authorized take within a new cormorant depredation permit for states and tribes outlined in the proposed rule. Commenters state that this clarity is needed to understand where and when states and tribes can implement take of cormorants. For example, two state agencies recommend rewording “wild and publicly stocked fish stocked by state agencies or tribes” to “wild and stocked fish managed by state agencies or tribes”. Another state agency commented that a state agency may need to apply control of cormorants on public waters, which can occur in cases where a state does not own the land, and recommends the final rule language be revised from “Lands under the jurisdiction of the State” to “Lands and or public waters under the jurisdiction of the State.” Similarly, another state agency commented seeking clarification on the language used in the proposed rule, and references “state or tribal lands” and “respective jurisdiction.” Other commenters assert that the proposed rule should not limit state cormorant control efforts to only those water bodies where impact studies have been performed. They recommend the language in the final rule be revised from “publicly stocked fish” to “publicly accessible fisheries” to include protection for wild fish. Yet another state agency similarly requests that the Service provide states with standardized guidance on determining when take is warranted to support fish resources, and to reduce conflicts associated with risks to human health and safety, property, and species of conservation concern. State agencies further commented about the scope of the conflicts and asks if a state permit is the only way a state can address cormorant conflicts. Commenters ask about possible ramifications of opting out of the permit system and if there will still be a mechanism by which a state can address wild fishery conflicts with cormorants. One state agency commented on the geographic scope of a new state or tribal permit, stating that implementation of lethal control of cormorants to reduce impacts on aquaculture, wild and stocked fisheries, human health and safety, property, and species of conservation concern should be authorized at a biologically sustainable level for the Alaska, Pacific Coast, Interior, Atlantic, and Southern breeding cormorant populations. Lastly, nongovernment organizations commented in concern that the scope of the new special cormorant permit would allow states and tribes to be able to take cormorants at any location and at any time.

Source of Comments: State agencies, nongovernment organizations.

Response to Comments: The Service appreciates the comments that the scope of where take activities could occur may be too limiting relative to the areas in which states and tribes manage fisheries. The Service therefore revised the language in the final rule to better encompass the lands and waters managed by state and tribal fish and wildlife management agencies stating that “Under this (special double-crested cormorant) permit, the Service authorizes state and tribal fish and wildlife agencies to conduct lethal take of cormorants that is normally prohibited and is intended to relieve or prevent impacts from cormorants on lands or in waters managed by those agencies within their respective jurisdictions.” The scope of management and take activities conducted under the permit are intended to reduce or prevent conflicts associated with cormorants for the following concerns:

1. Depredation of fish at state- and tribal-owned or operated aquaculture facilities, including hatcheries;
2. Realized and potential impacts to human health and safety (e.g., collisions of airplanes with birds, fecal contamination of urban wetlands);
3. Impacts to threatened and endangered species (as listed under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)) and listed species identified in state- or tribal-specific legislation as threatened or endangered, or those listed as Species of Greatest Conservation Need in State Wildlife Action Plans, where take activities to prevent depredation on aquatic Species of Greatest Conservation Need may occur only in natural or public waters;
4. Damage to state- or tribal-owned property and assets; and
5. Depredation of wild and publicly stocked fish managed by state fish and wildlife agencies or federally recognized tribes and accessible to the public or all tribal members.

In response to comments requesting that the Service provide states with standardized guidance on determining when take is warranted to support fish resources, the Service intended this permit to provide flexibility to states and tribes, who are best positioned to determine how and when to prioritize take of cormorants within the scope of the new permit. The Service expects participating states and tribes to prioritize authorized take under the maximum level authorized by the Service in the permit and in its conditions.

In response to comments requesting clarity on continued use of individual depredation permits, the Service clarifies that if a state chooses not to apply for the new permit, they could still apply for 21.41 permits on a case-by-case basis. However, 21.41 permits would not authorize the take of cormorants to protect wild or stocked fish.

Regarding the comments about the geographic scope and the inclusion of Alaska, the Service notes that the Alaska subpopulation is not included. The Service used the Species Conflict Framework to identify where conflicts were occurring that did not have remedies available.

In response to comments from nongovernment organizations, the Service includes several conditions in the new permit that would clarify where, (the scope, outlined above) when, and how cormorants can be taken to prevent or minimize impacts from depredation. These conditions can be found in [Appendix D](#).

Summary of Comments: Several state agencies and nongovernment organizations commented on the need to include conflicts related to Species of Greatest Conservation Need (SGCN) as identified in State Wildlife Action Plans. Because not all states have state designated lists of threatened and endangered species within their state, state agencies recommend that the language of the rule be changed to “state or tribal species of greatest conservation need,” in reference to lists created for State Wildlife Grants. These state agencies also recommended greater flexibility for state fish and wildlife agencies to authorize take to protect SGCN species. One state agency stressed in the comments responding to the DEIS and the ANPR that when determining priority and allocation of allowable take of cormorants, the protection of special-status resources should have first priority. States also commented that the scope of authorized take under a new special permit should include conflicts related to SGCN as identified in State Wildlife Action Plans.

Source of Comments: State agencies, nongovernment organizations.

Response to Comments: The Service agrees, as one of the stated needs for action is to address impacts from cormorants on special status species. Impacts may involve competition for nest sites, competition for food, reducing available nesting space and nesting material for co-nesting species, habitat degradation, and nest abandonment resulting from habitat degradation. Therefore, the Service included new language within the scope of the preferred alternative, which now states, “listed species identified in state- or tribal-specific legislation as threatened or endangered, or those listed as Species of Greatest Conservation Need in State Wildlife Action Plans, where take activities to prevent depredation on aquatic Species of Greatest Conservation Need may occur only in natural or public waters.”

Sub-issue: Comments pertaining to Implementation of the Proposed Action

Summary of Comments: Several state agencies and nongovernment organizations commented on the need for funding and technical support to implement a new state-wide special permit as described in the preferred alternative. Commenters expressed concern that a new permit process would be overly burdensome to implement, which could delay cormorant control efforts and impede management success. Commenters also ask how much potential new monitoring or reporting a state would have to agree to and the amount of time and resources that would need to be invested. They express concern that funding of population monitoring (and monitoring of take) would be sourced from state budgets if population monitoring is stepped down to the Flyways. One state agency commented that in order to ensure that monitoring efforts are conducted consistently, the Service should conduct population monitoring or must allocate funding to the states for monitoring. Another state agency expressed concerns about the burden that the proposed permit will place on states to develop and maintain programs to manage allowable take (i.e. population monitoring, permitting, reporting). Similarly, state agencies cautioned that state resources are limited and inquired whether states will receive financial assistance to implement the new permit. Lastly, states commented that federal financial support may be needed to manage reporting and monitoring and the ability to administer a cormorant depredation program.

Source of Comments: State agencies, nongovernment organizations, and the general public.

Response to Comments: This new permit does not require a state or tribe to process or issue any depredation permits to entities within their jurisdiction. The Service recognizes that not all states and tribes may have the resources and expertise to implement a special cormorant permit, and that some may not want the permit even if they do have the resources and expertise. The Service also understands the need to secure the necessary resources to support staff, monitor take, and prioritize their needs when and if implementing a new special permit. As stated in the proposed rule and DEIS, states and tribes would not be required to request a permit, and those entities within states or tribes not seeking a new permit would continue to be able to apply for individual depredation permits (except those that address wild and publicly stocked fisheries). The Service's purpose and need for this action, however, is to provide the flexibility for a state or tribe to address spatial and temporal complexity of conflicts. This is because each state and tribe has different goals and objectives for wildlife management, and therefore, allowances for flexibility when prioritizing allocation of authorized take must be granted. In all cases under a new permit, states and tribes would be required to respond to questions as part of a permit application ,document all take that occurs under their permit(s), and provide the Service with a report of by January 31 for activities conducted during the preceding calendar year. But the cost and means to implement permit requirements will vary based on the goals of any particular state or tribe seeking relief from conflicts associated with cormorants. The Service cannot obligate funds to implement a new special permit at this time, nor could the Service accurately project any necessary additional funding for each state or tribe due to the flexibility provided to them.

As with the management of other migratory bird species, the Service expects costs of management to be shared between the Service, states, and tribes.

Summary of Comments: Commenters questioned how the Service will support states and tribes in case when litigation is brought upon them. There is concern that litigation will be brought against the state or tribe by parties opposed to cormorant depredation regulations.

Source of Comments: State and tribal agencies.

Response to Comments: The Service does not anticipate litigation would be brought against states or tribes, as the Service would be acting within its purview and authority to authorize a state or tribe to take cormorants under the conditions of the permit and to deny future permit requests should a state or tribe violate the terms of their permit. The Service would require rationale for why a state or tribe needs to conduct lethal control in the permit application. The permit and its conditions for authorizing take of cormorants would be the legal authorization for the state and tribe, should the Service decide to grant the permit.

Summary of Comments: Several state agencies and commenters submitted several questions pertaining to how the Service would manage overall allocation of authorized take of cormorants. Generally, commenters asked how the Service would: (1) allocate take among all existing authorizations for take, including a new state and tribal permit; (2) account for regional take under the national permit system; and (3) determine an upper limit of take for each state. State agencies commented on the need to understand how the Service would allocate take among all authorization mechanisms, and requested clarity on how annual take, both at the state and regional level, would be shared among the states and tribes so that they can make informed determinations in successive years. One state agency stated that the method by which take will be allocated across the western subpopulation is unclear from the DEIS and needs to be clarified. States request the Service engage the four administrative flyways so they can provide recommendations to the Service on reasonable take allocation among states and flyways. Commenters also expressed concern that states may take the majority of the allocated take within a cormorant subpopulation's allowable take threshold within the PTL. One commenter further asserts that there is no structure to ensure that take for resources will be balanced (prioritization) or that a diversity of stakeholder interests will be considered.

Source of Comments: State agencies, nongovernment organizations, and general public.

Response to Comments: States and tribes would not be required to request a permit, and those entities within states or tribes not seeking a new permit would continue to be able to apply for individual depredation permits (except those that address wild and publicly stocked fisheries). The Service cannot yet provide the specificity requested on how the allocation between the new special permits and individual permits for aquaculture facilities and property owners would occur because the Service does not yet know how many states or tribes would request the proposed new permit. However, the Service understands that states and tribes need clarity on the Service's expectations for an acceptable level of requested take in an application for a new permit. Permittees would be restricted to maximum levels of take authorized, designed to not exceed the PTL within the subpopulation where the state or tribe is located. This level of authorized take would depend on: (1) which states and tribes seek a new special permit within the same subpopulation analyzed within the PTL; (2) an assessment by Service permit staff of the available level of take each year within the specific subpopulation where the state or tribe is located; and (3) an assessment by Service permit staff of the historic information of authorized take of cormorants due to depredation in the past. However, allocation of authorized take may be modified as conditions change once take is allowed. The Service encourages interested states and tribes to communicate with the Service during the application process to best determine prioritization and allocation of authorized take of cormorants.

In addition, the Service would require states and tribes applying for the first time to consult with the Wildlife Services for an assessment of the appropriate level of take and provide recommendations of short-term measures to provide relief from depredation and long-term measures to help eliminate or significantly reduce the problem. Wildlife Services provides a "Form 37 Permit Review Form". This form is required for first-time applicants only. Permittees would need to submit a Form 37 for renewal applications unless requested by the regional Migratory Bird Permit Office. Permittees would be expected to continue working with Wildlife Services for review of management plans and remaining current on best practices. Allocation of authorized take may be modified as conditions change once take is allowed. The Service encourages interested states and tribes to communicate with the Service during the application process to best determine prioritization and allocation of authorized take of cormorants.

Summary of Comments: Several commenters requested clarity about who a state or tribe may delegate authority to as a subpermittee under a new permit to conduct take of cormorants. States request clarity on the level of authority given by a state or tribe to carry out lethal take, asking if this would be limited to only state agency personnel, or other private and public entities or persons as authorized by states. One state agency, for example, commented that the language related to subpermittees should read, "Subpermittees may be, but are not limited to, employees of state and tribal wildlife agencies, WS [USDA Wildlife Services] employees, and employees of federal and state agencies or private incorporated companies specializing in wildlife damage abatement." A nongovernment organization commented that the Service should define the level of training and control needed to ensure people operate in a humane, accountable, and lawful manner.

Source of Comments: State agencies, nongovernment organizations.

Response to Comments: The Service agrees with the need to provide further clarification of the role that subpermittees may play and to identify who can operate as a subpermittee pursuant to a permit issued under this rule. The final rule states that subpermittees "can be employees of state and tribal wildlife agencies, USDA Wildlife Services employees, and employees of federal and state agencies or private companies specializing in wildlife damage abatement and under direct control of the permittee." The Service is limiting subpermittees to these entities because in some areas other cormorant species and look-alike species (e.g., anhingas) can overlap in specific ranges and habitats with cormorants. Professional biologists and trained experts are more likely to be able to differentiate between these species and reduce the possibility of taking non-target species.

In response to the comments regarding the level of training needed, the Service emphasizes that there are many levels of training that vary widely across the country that may be appropriate. The Service will not identify specific training requirements necessary to become a subpermittee. Rather, we expect that the categories of individuals listed above will have the skills, or could readily acquire the skills, to accurately identify double-crested cormorants and differentiate other look-alike species to avoid taking them. Further, by virtue of their positions, we expect that all such employees will operate in a humane, accountable, and lawful manner. The authority to take double-crested cormorants conferred by the permit is given to the state or tribal fish and wildlife agency, and those agencies may designate permittees that the Service approves on the application for the permit. To provide added clarity, the Service included as part of the application for a new permit that permittees must agree that, "(e) Anyone taking birds under this permit must be skilled in double-crested cormorant identification. Non-target take of any other avian species must be reported to your permit office with your annual report including species, number, and description of events." The application for this permit can be found in [Appendix H](#) of this FEIS. Further, any birds incidentally taken would be reported by states and tribes, and the Service would use this data to better track accidental take of these species when take of cormorants occurs and recommend appropriate actions such as additional training of personnel or avoiding areas where there is a high concentration of non-target species in the area.

Summary of Comments: Several comments requested clarity on the reporting process the Service would require under a new special cormorant permit.

Source of Comments: State agencies, nongovernment organizations.

Response to Comments: The Service will require annual reporting. A reporting form is attached to this FEIS in [Appendix I](#) for the public to view.

Summary of Comments: Several state agencies and other commenters expressed that the Service would need to ensure that current depredation permits for take of cormorants continue to be issued under 50 CFR § 21.41, as population levels allow. Commenters state that depredation permits are essential to manage the effects of increased cormorant populations on migrating salmon and steelhead smolts. States request clarity on which entities remain eligible to receive individual depredation permits for those states that do choose to obtain a special statewide depredation permit, noting that they do not desire the authority to issue take permits to other entities within their state to address aquaculture conflicts, property damage, nuisance, or human safety issues. States also request the preferred alternative include a specific statement affirming the continued availability of individual depredation permits for entities within states that choose to obtain a special depredation permit.

Source of Comments: State agencies, general public.

Response to Comments: Individual permits would still be available to address some depredation activities, but not for protection of wild or publicly stocked fish stocked by state or tribal agencies (except where circumstances require the protection of federally-listed species). Entities wishing to address conflicts associated with cormorants and wild or publicly stocked fish would be addressed through the special cormorant permit, which would only be available to fish and wildlife agencies of states and federally recognized tribes in the contiguous 48 states. Entities other than private landowners who want to reduce depredations of fish in their private ponds may be eligible to apply for permits other than the special cormorant permit.

Summary of Comments: State agencies commented asking how the USDA Wildlife Services program would work with the Service within the scope of the proposed action.

Source of Comments: State agencies.

Response to Comments: Wildlife Services assists people with applying for a depredation permit from the Service by completing a Migratory Bird Permit Application or Review form (Form 37), and will continue to do so as part of the individual permit application process stated in 50 CFR 21.41. The Form 37 provides the Service with the basic information required as part of the application process for a depredation permit, which includes information on the extent of the damages or risks, the number of birds involved, and recommended methods to alleviate damage (see 50 CFR 21.41 for required information). As part of the Form 37, Wildlife Services also documents previous actions conducted to address damage or the threat of damage and the results of those actions, including the use of nonlethal methods that the applicant has used previously. However, unlike individual permits, a Form 37 would not be used within the new special cormorant permit process. The Service would require first-year applicants for the new permit to obtain a completed Form 37. Elements typically required in a Form 37 would also be required as part of the Service's application for the new special permit. This permit application is included in [Appendix H](#) of this FEIS for reference.

Summary of Comment: Commenters encouraged the Service to issue 5- year permits with annual reports.

Source of Comments: State agencies.

Response to Comments: Given the controversial nature of this issue and the novel approach toward reducing conflicts, the Service believes annual permits and annual reporting are appropriate at this time for permittees. As the Service gains experience through input from states and tribes, the Service may consider permits of longer duration, but additional NEPA analyses may be required for any additional rulemaking procedures or amendments.

Summary of Comment: Nongovernment organizations commented that 5-year reports are too infrequent to conduct detailed evaluation of the program

Source of Comments: Nongovernment organizations.

Response to Comments: Take of cormorants will be compiled annually and information can be made available if needed prior to completion of the 5-year reports. However, as with any bird population monitoring efforts, variation throughout the year, due largely to sampling error, can be quite high. The Service concludes that assessing population status over a 5-year period will avoid inappropriate decisions based on observed, but not necessarily real, annual changes in abundance, and still be sufficient to ensure sustainable populations of cormorants.

Summary of Comment: Several commenters expressed concern over any requirement that permittees gather data to assess the efficacy of take. Similarly, commenters seek to clarify who would be required to collect any such data. States expressed concerned that the requirement of a “detailed statement” showing how controls will address specific issues caused by cormorants as part of permitting process would cause unnecessary delays in management and are not needed because sufficient data has already been collected to assess control efforts attempted in the past. States mentioned that “redundant” documentation required under the proposed new permit process could delay control and impede success. They recommend that there needs to be a “fast, efficient timeline for determining the need for use of lethal controls.” They also noted that the prior Service depredation management order “worked well” and the selected permitting process moving forward should be based on that model. Some commenters also assert that the Service should encourage states and tribes to “conduct monitoring to assess the efficacy of control activities,” and that it should be a requirement for agencies taking cormorants at locations where there is uncertainty about cormorant impacts and the potential for benefits.

Source of Comments: State agencies, tribal agencies, general public.

Response to Comments: The Service acknowledges the need to provide clarity to potential permittees about the necessary information applicants need to provide in the application. The application is attached to this FEIS in [Appendix H](#). This application does not include language that permittees gather data to assess the efficacy of take. Rather, it includes language asking the applicant to provide a description of long-term plans to eliminate or significantly reduce continued need to take cormorants. The Service encourages state and tribal fish and wildlife agencies to coordinate with subpermittees' take measures that address long-term prevention of depredation where possible and conduct monitoring in conjunction with the Service as it develops its population monitoring plan.

The Service notes that the management of conflicts associated with cormorants under the older, vacated depredation orders did not work well for specific reasons discussed earlier and alleged in the lawsuit. The new regulation (a special cormorant permit for states and tribes) would provide flexibility to address conflict issues as they uniquely occur within each state or tribe, and attain the accountability needed to reduce the likelihood of further legal action. The Service recognizes that the application process will require some forethought by a state or tribe to determine the conflicts that need to be addressed, what nonlethal actions have been taken, what lethal actions are contemplated, and long-term plans to eliminate or significantly reduce continued need to take cormorants. The Service encourages interested states and tribes to communicate with the Service during the application process to best determine prioritization and allocation of authorized take of cormorants.

In response to comments requesting the Service require monitoring to assess the efficacy of control activities, the Service encourages this, but will not require it. The Service encourages and expects continued use of nonlethal measures in conjunction with lethal measures where permittees find this approach most effective. Often, a combination of measures is the most effective way to address conflicts associated with cormorants. The Service needs to rely on permittees to make site-specific assessments and employ cormorant conflict management in a manner that makes the most sense, so long as those permittees follow the conditions of the permit. For added clarity in response to these comments, the following is a condition that would be part of any permit issued by the Service under the preferred alternative in this FEIS: states and tribes must use nonlethal methods, and independently determine that those methods are insufficient in controlling the depredation conflict, before lethally taking cormorants. Permittees may also consult with USDA Wildlife Services for additional assistance to determine when nonlethal methods are insufficient.

Summary of Comment: Nongovernment organizations and the general public commented with concern that the preferred alternative is "inhumane", "unethical" and "intolerable" because year-round lethal take will lead to high chick mortality through starvation, predation by gulls facilitated by human disturbance, a removal of a parent, and/or exposure. Commenters assert that the proposed rule does not include any prohibition for when cormorants are allowed to be taken, noting concern that control during specific times during the breeding season will leave young in the nest without one or both parents resulting in starvation or death by a predator. The public further commented that the removal of breeding birds during the period of offspring presence in colonies is unacceptable as a component of a management strategy, and requests the Service require a control moratorium during the nesting season when chicks are present.

Source of Comments: Nongovernment organizations, general public.

Response to Comments: The Service acknowledges that some segments of the public may oppose lethal take under any circumstances. However, the Service considered the humane treatment and welfare of cormorants in alternatives that allow take. The Service views lethal control methods as a last resort for addressing conflicts between avian species and human interests. As stated in [Appendix D](#). Standard Authorization Conditions for Take: In accordance with conditions of issuance and acceptance of permits (50 CFR 13.21(e)(1)), states and tribes must use nonlethal methods, and independently determine that those methods are insufficient in controlling the depredation conflict, before lethally taking cormorants. In addition, lethal take of adults during the breeding season should occur prior to hatching of eggs to avoid the loss of adults that likely would result in orphaning chicks and their ultimate death due to starvation. Adult birds may not be taken at any nest with young in it unless the take of adults addresses a human health and safety issue. States, tribes, and their subpermittees must make efforts to avoid disturbance to co-nesting species. In addition, the permitting process provides a system of greater scrutiny given for each proposed use of lethal methods.

Sub-issue: Use of Nonlethal Methods for Cormorant Management, and Considerations for Types of Lethal Take

Summary of Comment: Commenters submitted several questions regarding the required use and efficacy of nonlethal methods used to address conflicts associated with cormorants. Comments appear to focus on two primary concerns: (1) how will the Service enforce or require that permittees implement nonlethal methods first before carrying out authorized take, and (2) how will the permittee determine when nonlethal methods of management are ‘enough’ or insufficient. Commenters assert that the Service should require permittees (individual or a new special permit for states and tribes) to “make progress” toward nonlethal solutions to conflicts as a condition of any permit. They further comment that they felt the DEIS did not provide information on how nonlethal methods are used in a comprehensive approach. Some commenters express concern that there is a general bias against nonlethal measures even when nonlethal measures are proven to work. Additional commenters assert that the Service failed to demonstrate how states and tribes would satisfy the requirement that people first use nonlethal methods to address conflicts. In addition, commenters recommend the Service ensure that states and tribes applying for the special permit have conclusive data on a site-by-site basis indicating the effectiveness of cormorant management before take begins. Several commenters also stated that the Service failed to analyze or consider nonlethal management in any of the alternatives.

Further, state agencies expressed concern that a requirement for attempting nonlethal control before lethal control will delay effective management, and that such a requirement would be so complex that it will add unnecessary documentation and time before lethal controls may be used. States commented seeking clarification on implementation of nonlethal methods as well, stating that such a request is not feasible since the geographic distribution of state and tribal fish hatcheries is too broad and each hatchery is taken on a case-by-case basis. States also commented that nonlethal control methods are often impractical or ineffective, as cormorants become habituated to persistent, affordable methods (e.g., noise making deterrents, lasers, harassment from shore by hatchery personnel). States further assert that the size of some hatcheries makes other methods difficult or too expensive to implement. Some states and members of the general public suggest that the Service identify a process for the required evaluation of efficacy of nonlethal methods. States also recommend that the Service develop guidelines for determining when there is sufficient proof that nonlethal mechanisms are ineffective at resolving conflicts.

Source of Comments: State agencies, nongovernment organizations, general public.

Response to Comments: The Service received many comments either in favor of or opposed to using nonlethal methods in all situations. Commenters cite that nonlethal methods are not effective in all cases; some may be cost-prohibitive, or some may not respond well in situations where birds may become habituated to nonlethal management. The Service agrees that harassment of cormorants may be effective in some areas, but ineffective in others. The conditions that dictate this are often site-specific and variable throughout any given year. The Service anticipates lethal removal of cormorants would be warranted in some circumstances. In addition, as the Service noted in the DEIS and the FEIS, nonlethal methods alone is not an effective management tool to respond to conflicts associated with cormorants, which is why the Service rejected that possible alternative in its analysis.

The Service acknowledges that the requirement to employ nonlethal methods before lethal methods may not provide the clarity of expectations for what the Service expects a permittee to do in every situation. Nor does this provide the clarity to a permittee to know when (and if) to switch from nonlethal methods to lethal. To be clear, the Service encourages and expects continued use of nonlethal measures in conjunction with lethal measures where permittees find this most effective. Often, a combination of measures is the most effective way to address conflicts associated with cormorants. Therefore, the Service cannot independently enforce this at every site across the country, and conditions of where nonlethal measures and lethal take are effective will not be entirely consistent. The Service needs to rely on permittees to make site-specific assessments and employ cormorant conflict management in a manner that makes the most sense, so long as those permittees follow the conditions of the permit. For added clarity in response to these comments, the following is a condition that would be part of any permit issued by the Service under the preferred alternative in this FEIS: states and tribes must use nonlethal methods, and *independently* determine that those methods are insufficient in controlling the depredation conflict, before lethally taking cormorants. In addition, permittees may also consult with USDA Wildlife Services for additional assistance to determine when nonlethal methods are insufficient.

Regarding the comments that the Service ensure that states and tribes applying for the special permit have conclusive data on a site-by-site basis indicating the effectiveness of cormorant management before take begins, the Service responds more fully to that and related issues below under [Issue 4: Comments pertaining to Evidence that Cormorant Presence is a Limiting factor to Fisheries.](#)

Summary of Comment: Nongovernment organizations commented that the Service needs to provide more details regarding methods of take, and that certain methods of take should not be authorized (cervical dislocation and high pressured hoses as specific examples).

Source of Comments: Nongovernment organizations.

Response to Comments: Methods of take are codified in regulation 21.28. Methods are generally divided by means of humane lethal take or active nest take. Lethal take may occur by firearm or lethal or live traps. Active nest take may occur by egg oiling or destruction of nest material and contents (including viable eggs and chicks). Birds may be euthanized by cervical dislocation, CO₂ asphyxiation, or others recommended method in the American Veterinary Medical Association Guidelines on Euthanasia. Use of hoses to remove active nests is an appropriate method of lethal take, so long as permit conditions regarding take of adults when chicks are present are upheld. Specifically, lethal take of adults during the breeding season should occur prior to hatching of eggs to avoid the loss of adults that likely would result in orphaning chicks and their ultimate death due to starvation. Adult birds may not be taken at any nest with young in it unless the take of adults addresses a human health and safety issue. States, tribes, and their subpermittees must make efforts to avoid disturbance to co-nesting species.

Summary of Comments: State agencies and the public commented on the type of oil used when oiling eggs, suggesting this not be limited to corn oil. They emphasized that there are other alternative cooking grade oils, such as soy, cottonseed, safflower, and sunflower that have very low toxicity. Commenters also recommended that they be able to make their own decisions on what egg oil to use, based on its extensive experience.

Source of Comments: State agencies, general public.

Response to Comments: Use of only corn oil is provided in Service regulations where egg oiling is likely to be used as a depredation control activity (21.49, 21.50, 21.51, 21.52, 21.55). The Service acknowledges that others could be used, but would require approval or changes to those regulations. Such approval is not part of this current rulemaking process. As indicated in the proposed rule, 100 percent corn oil is a substance exempted from regulation by the Environmental Protection Agency under the Federal Insecticide, Fungicide, and Rodenticide Act. Corn oil has been used to oil eggs of various migratory bird species (e.g., Canada geese, gulls) for many years because it is low-cost, readily available, and effective at preventing bird eggs from hatching. Although several food-grade oils are also exempted from regulation by the Environmental Protection Agency (e.g., soybean oil, cottonseed oil), there is limited efficacy data available for those oils.

Sub-issue: Use of Decoys for use in Cormorant Management

Summary of Comment: Some commenters voiced a preference for the use of decoys when implementing cormorant management actions.

Source of Comments: General public, nongovernment organizations.

Response to Comments: The Service acknowledges that decoys can be effective in luring birds into sites to make them easier to kill, particularly those that are gregarious by nature. In most cases, the kill of birds is higher when using decoys than when they are not used (e.g., use of decoys in hunting situations). However, in cases concerning depredation issues, animals that may not otherwise depredate a particular area may do so when decoyed into that area. Decoying birds may create or extend (e.g., exacerbating a disease outbreak by attracting additional birds) a problem where an issue may not exist or could be lessened if the birds had not been decoyed into the area. For these and other reasons, decoys may not be used in the Service's depredation permit (50 CFR 21.41) or depredation orders for resident Canada geese (50 CFR 20.49, 20.51, and 20.52).

Currently in permit regulations (50 CFR part 21), using decoys to attract birds is specifically allowed only for species that are designated by the Service as overabundant (i.e., light geese and resident Canada geese) or to lure invasive species for culling. The purpose of those regulations (50 CFR 21.55, 21.60, 21.61) is to reduce the abundance of those species throughout the areas they inhabit. In contrast, the proposed regulation for cormorants specifies that the intent is not to reduce their abundance (85 FR 34583, June 5, 2020); rather, the intent is to reduce the conflicts associated with cormorants in specific locations and at specific times. This intention of the proposed regulation is consistent with other permit regulations cited above where decoys are not allowed. Hence, allowing decoys to be used to attract cormorants so they may be killed would be inconsistent with other regulations in place that have a similar intent.

Use of decoys was allowed in the depredation orders (Aquaculture [21.47]; Public Resource [21.48]) that were vacated in 2016 by the U.S. District Court for the District of Columbia. During the time those orders were in place, there was no limit to the number of birds that could be taken under the authority of those orders. Although reporting by those taking cormorants was supposed to occur per the regulations, reporting take was not consistent, leading to concerns about the true amount of take that was occurring. As a result, the Service was not confident that they could determine the impact of take during the depredation orders on the status of cormorants (or on fish populations). This issue, in part, complicated defending the vacated depredation orders. As a result, for alternatives in the proposed rule that include a new aquaculture depredation order, the Service would place a limit on each entity that could conduct control activities. For these reasons, the Service concluded that decoys and other lures or baits should not be allowed to conduct cormorant control activities in the proposed regulations. Doing so would be counter to the precedent set in existing regulations with similar intent, could create or exacerbate conflicts, and could limit the ability of entities to obtain relief from cormorant conflicts due to the limited numbers of birds that could be taken to ensure sustainability of cormorant populations.

Sub-issue: Take of Cormorants on Private Property

Summary of Comment: Several state agencies and public commenters requested the Service include provisions that allow for the lethal take of cormorants on private property, particularly to protect fish that are stocked by the landowner for their personal use. Some commenters voiced concerns that if such provisions aren't allowed, that landowners will take matters into their own hands to protect their fish, and that the presence of and depredation by cormorants on stocked fish in private ponds would negatively impact recruitment of new anglers. One commenter recommended that a private industry biologist be added to any future committee that develops regulations regarding cormorant take.

Source of Comments: State agencies, general public.

Service Response: The Service, in some instances, does allow the take of migratory birds to protect private property. Under the proposed regulation, private landowners may apply for a depredation permit (50 CFR 21.41) to alleviate damage to some types of property (i.e., buildings and infrastructure), vehicles and equipment, some types of vegetation, and display animals (such as zoo exhibits) that are used primarily or exclusively for the personal enjoyment of the landowner. However, by policy, the Service's Migratory Bird Program does not issue permits to prevent depredation or harm to privately owned animals (e.g., hobby animals, pets or similar) that are raised free-range or otherwise released to the wild. Numerous nonlethal means are available to landowners who maintain animals in natural-like environments, such as harassment, use of effigies, habitat modification, and others. Regarding the comment suggesting that some landowners may unlawfully take cormorants if they do not receive authorization to do so from the Service, we recognize this may occur but we cannot prevent unlawful activity, nor can the Service predict where and when unlawful activity would occur in such cases. However, landowners taking such actions would face the possibility of being cited for violations of the MBTA, as well as fines for such violations. In response to comments about recruiting new anglers, the commenters provided no empirical information to suggest that cormorant depredations at private ponds will hinder recruitment of new anglers, nor any information about the magnitude of such an effect if it occurs. The Service notes that most state agencies, some federal entities, and other groups offer free fishing days, where they often provide equipment and mentoring that allow new anglers, particularly youth, to fish ponds recently stocked with fish to introduce individuals to angling. The Service believes the potential for those efforts to recruit anglers is much greater than what is likely to occur on private ponds accessible only to the private landowner. Finally, allowing a private industry biologist to engage in discussions with federal personnel on regulatory matters would be contrary to the Federal Advisory Committee Act (FACA), unless a formal FACA committee was established by the Secretary of the Interior to address those regulatory issues. If such a committee were formed, it would need to be representative of all stakeholder groups, not only those of private industry.

Sub-issue: Impacts to Non-target Species from Cormorant Management

Summary of Comment: Several commenters expressed concern for non-target species and the impacts that may occur as a result of taking cormorants. Specifically, commenters state that the Service should provide clarity pertaining to the following topics associated with non-target species: (1) how impacts to young of non-target and ground-nesting species will be addressed and avoided adequately; (2) how the Service would work with permittees to ensure that people undertaking cormorant management (including subpermittees) have the knowledge and training regarding cormorants and other waterbird biology to undertake actions that minimize threats to all species encountered; and (3) how state and tribal decision makers would ensure they have the capacity to take responsibility for the actions (monitoring, planning) that need to occur to safeguard co-nesting species against the impact of the disturbance occurring from cormorant management. Lastly, several commenters voiced concern that the analyses of impacts to non-target species was insufficient in the DEIS.

Source of Comments: State agencies, nongovernment organizations, general public.

Response to Comments: The Service considered the impacts on non-target migratory birds including threatened and endangered species of issuing depredation permits. As explained in the Environmental Consequences section, there is potential for misidentification of other bird species, especially bird species with a similar appearance to a cormorant that are also fish-eating bird species that occur in aquatic habitats. The Service anticipates the unintentional take of non-target species to occur infrequently and involve very few individuals of a particular species; therefore, the Service does not anticipate cumulative adverse effects to occur from unintentional take of non-target species under any of the alternatives.

Further, an Intra-Service ESA Section 7 consultation Biological Evaluation (ESA BE) was completed for this DEIS to assess if any proposed, threatened, or endangered species or associated critical habitat would be affected by cormorant control. The Service adds specific permit conditions for piping plover (*Charadrius melanotos*), interior least tern (*Sterna antillarum*), and wood stork (*Mycteria americana*) to all of the alternatives in order to protect these specific listed and sensitive species.

Under the section entitled Proposed Federal Action and Alternatives Considered, the Service stated that states and tribes would be required to report any other species of bird taken incidentally as a result of take of cormorants, along with the numbers of birds of each species taken. This would be required to minimize risks to non-target species, and co-nesting species that look similar to double-crested cormorants (e.g., neotropic cormorants, great cormorants, and anhingas). The Service would use this data to better track accidental take of these species when take of cormorants occurs and recommend appropriate actions such as additional training of personnel or avoiding areas where there is a high concentration of non-target species in the area. That reporting form can be found in [Appendix I](#) of this FEIS. Instructions to applicants would be clarified in an accompanying FAQ to the application.

The FEIS also discusses several examples of conditions that the Service could require when issuing permits, if deemed warranted during the application review process. Examples include minimizing the number of site visits, maintaining appropriate distances from other co-nesting species to minimize adults flushing from nests, and/or conducting activities later in the nesting season when co-nesting species have eggs and nestlings and are less likely to leave their young. The Service could also require the use of a suppressed firearm to take cormorants to minimize noise disturbance and/or require persons conduct activities at night to reduce the likelihood that co-nesting species would move off nests. Further, the Service would consider potential effects to other colonial waterbirds when evaluating applications for permits.

In some situations, entities conducting activities to take cormorants where co-nesting species occur are conducting those activities to benefit co-nesting species by reducing nest site competition. Therefore, the entity receiving a permit is likely to take measures to minimize disturbance to that co-nesting species. The Service must maintain the flexibility to use local inputs when making decisions on what guidelines to impose in any given situation because requests for permits are inherently unique. In addition, the Service now includes the following condition as part of its standard conditions in any new state or Tribal special cormorant permit: Under this permit, the Service would authorize state and tribal fish and wildlife agencies to conduct lethal take to reduce conflicts involving impacts to species listed as Species of Greatest Conservation Need in State Wildlife Action Plans; damage to state- or tribal-owned property and assets; and depredations of wild and publicly stocked fish stocks managed by state fish and wildlife agencies or federally recognized tribes and accessible to the public or all tribal members. Take activities to prevent depredation on aquatic Species of Greatest Conservation Need may occur only in natural or public waters.

Information on cormorants and co-nesting bird species can be found in pages 35-38 of the 2003 FEIS and pages 27-30 of the 2017 EA concerning avian associates of cormorants. The Service incorporates this information by reference in this FEIS, and expands upon these analyses under each Alternative.

Summary of Comment: Nongovernment organizations commented in response to the Service's Streaked Horned Larks (SHLA) Effects Determination under its Intra-Service Section 7 Consultation of the Endangered Species Act. Commenters state that SHLA are ground nesting birds that nest in sparsely vegetated sites, including on Columbia River islands. These sites could also serve as cormorant breeding colonies. Active lethal control activities in close proximity to a SHLA nest could cause nest failure due to trampling or disturbance. Therefore, commenters request that the Service require nest surveys for SHLA if lethal cormorant control is going to occur in proximity to suitable SHLA nesting habitat, within geographies that SHLA are believed to be breeding.

Source of Comments: Nongovernment organizations.

Response to Comments: The Service conducted the ESA Intra-Service Section 7 Consultation in coordination with all Regional ESA Section 7 coordinators and appropriate Threatened and Endangered species experts or leads, including for the SHLA and SHLA critical habitat regarding the effects of the cormorant proposed action. Although SHLA may occupy the same islands on the Columbia River as cormorants, the habitat and nesting locations are different and separated. SHLA nest in very sparsely vegetated sandy areas whereas cormorants utilize habitat with trees and/or rip rap/large rocks on these islands. Effects from the proposed action are not likely to adversely affect SHLA nor modify designated critical habitat, as cormorant take and control activities will not occur in areas occupied by SHLA.

Summary of Comment: The general public commented that the DEIS needs to consider and analyze impacts to biodiversity, noting that the Service needs to define this impact at the scale at which it is significant enough to trigger management. Commenters stressed that perceived impacts to other birds and vegetation from cormorant nesting activities should be considered within the broader context of other factors affecting the community in order to understand whether cormorant management will be beneficial.

Source of Comments: General public.

Response to Comments: The DEIS and FEIS were developed to address conflicts brought to the Service by state and tribal natural resource agencies across all contiguous 48 states. The specific impact to biodiversity, scale to trigger management across such a broad spectrum, and considering other factors is outside the scope of this action.

Sub-issue: Use of Nontoxic Shot for Take of Cormorants

Summary of Comment: Several commenters voiced a preference for the Service to require only nontoxic shot and not allow the use of any lead ammunition.

Source of Comments: General public.

Response to Comments: The Service has taken measures to limit the use of lead ammunition when persons issued permits use firearms to take cormorants. As a standard condition of permits, the Service requires persons to use nontoxic shot when using shotguns to take cormorants. As indicated in the proposed rule, one of the limitations on management and take activities for the special cormorant permit issued to a state or tribal wildlife agency is the requirement that take using firearms must also occur using nontoxic bullets, except when using an air rifle or air pistol. The Service would allow the use of lead ammunition when using an air rifle or air pistol because of the limited availability of nontoxic bullets for those firearms. WS indicates that most lethal take of cormorants is done so with .22 caliber rifles, and relatively little occurs with air rifles or air pistols. Therefore, limiting the use of lead when using firearms to take cormorants would further reduce risks of exposure to lead. Although risks from the use of lead ammunition would occur, those risks would continue to be minimal for those reasons discussed in the DEIS and FEIS.

Summary of Comment: Several commenters state that the Service should let states and tribes decide if they can or cannot use lead ammunition.

Source of Comments: General public.

Response to Comments: There is extensive research on the toxic effects that ingesting lead can have on people and wildlife. The DEIS discussed and evaluated the risks to people and wildlife from exposure to lead used in firearm ammunition. To minimize the risks associated with the use of lead shot, the Service is requiring that all persons issued permits use nontoxic shot as defined under 50 CFR 20.21(j). In addition, to reduce risks associated with lead bullets used in firearms, the Service is requiring that states and tribes issued special cormorant permits use nontoxic bullets as defined under 50 CFR 20.21(j), except when using an air rifle or air pistol. The implementation of those requirements when the Service issues various permits ensures consistent application of those standard conditions and further reduces the risks associated with the use of lead shot and bullets.

Summary of Comment: Commenters state that the Service should allow states and tribes issued a special cormorant permit to use lead bullets when using rimfire firearms (i.e., .17 caliber, .22 caliber) because nontoxic bullets are not readily available for those firearms. Nontoxic bullets for rimfire firearms are less accurate, less humane, and they have a tendency to not fragment upon impact and pass through a cormorant, which poses a safety concern.

Source of Comments: General public.

Response to Comments: The Service is concerned about the risks to people and wildlife from lead shot and lead bullets used in firearms, and requiring the use of nontoxic shot and bullets when issuing various permits can reduce those risks. Based on the Service's review of nontoxic bullet availability for rimfire firearms (i.e., .17 caliber, .22 caliber) and their accuracy, the Service concluded nontoxic bullets are sufficiently available for rimfire firearms when states and tribes plan for their use during activities and nontoxic rimfire bullets have similar accuracy to lead rimfire bullets. Although safety and humaneness concerns associated with the use of nontoxic rimfire bullets occur, planning and accounting for those possibilities when using nontoxic rimfire bullets can increase humaneness and reduce safety risks.

Summary of Comment: A commenter provided 149 articles that addressed the toxicity of lead to people and animals, including the risks to people and animals from ingesting lead from ammunition used in firearms and from lead tackle used for fishing.

Source of Comments: General public.

Response to Comments: The DEIS and FEIS address the toxicity of lead, including the risks to people and animals from ingesting lead from ammunition used in firearms. The Service reviewed the articles submitted by the commenter as new information. The articles provided by the commenter affirm the conclusions in the DEIS and FEIS that lead can be toxic to people and wildlife and there are risks associated with the use of lead ammunition in firearms that were discussed and evaluated in the DEIS and FEIS. Although risks from the use of lead ammunition would occur, those risks would continue to be minimal for those reasons discussed in the DEIS and FEIS.

Sub-issue: Comments Requesting Clarity on a Cormorant Population Monitoring Program

Summary of Comment: Several states, nongovernment organizations, and members of the public commented on the need for more clarity and details from the Service with regard to the development of a cormorant population monitoring program and how adaptive management will be incorporated. Entities request the Service provide an outline of a cormorant population monitoring regime as a foundation for current consideration by stakeholders and as the basis for stakeholder meetings with the Service following the publication of the record of decision. These commenters also ask how much potential new monitoring or reporting a state would have to agree to, and the amount of time and resources would need to be invested. Some state agencies and Flyway Councils provided specific recommendations for population monitoring. One state requests that the Service provide standardized population monitoring and reporting protocols needed to evaluate impacts of authorized take on cormorant populations, as well as criteria to be used to assess the cost and benefit of take on wild fish stocks, aquaculture facilities, human health and safety, property, and species of conservation concern.

Source of Comments: State agencies, nongovernment organizations, general public.

Response to Comments: The Service will work with the non-game technical sections of the four Flyway Councils and partnering federal agencies to develop agreed upon, standardized monitoring protocols. The purpose of the monitoring protocol will be to provide scientifically defensible estimates and/or indices of cormorant population abundance, biologically allowable take, and observed take. The protocols will detail agency specific responsibilities and estimated annual costs associated with monitoring. The Service and our partners will complete the development of the monitoring protocols within approximately one year of publication of the final rule.

Issue 3: Comments on the PTL and Impacts to Cormorants, Including the Western Subpopulation of Cormorants

Sub-issue: Comments on Data Analyses and Impacts to the Western Subpopulation

Summary of Comments: Several entities commented with concerns regarding the PTL and potential impacts to the western subpopulation of cormorants. Similarly, some commenters also submitted additional data considerations and analyses, expressing concern that the PTL was not peer reviewed. Commenters provided many specific empirical details for the Service to consider, but in general, considerations included the following issues: (1) the confidence interval for this western subpopulation is too large; (2) the take limit for the western subpopulation is much larger than historical take in the west; and (3) there was an error in the equation used to estimate a pre-breeding multiplier.

One state agency commented that the proposed increase in potential take for the western subpopulation is not consistent with available information for the western subpopulation, but rather appears to represent a serious overestimate. The state provided information relevant to the adjustments they recommend for the PTL, and commented on the western subpopulation, voicing concern that the confidence interval for this population is nearly as large as the point estimate.

In addition, nongovernment organizations commented that the DEIS does not consider recent population trend data for the western subpopulation that suggest that the population has been declining as a result of increased colony disturbances by bald eagles and humans and potential loss of inland freshwater habitat as a consequence of diminished water availability. Commenters state that these trends suggest that carrying capacity in this region has declined, and comments that the Service did not consider this in the DEIS.

State agencies further commented similarly on several aspects of the PTL and the western subpopulation, and added that the Service should use a more conservative management factor for modeling the PTL for the western subpopulation, similar to that used for the Florida subpopulation.

Prominent researchers from the general public also commented with concern about the estimates of the western subpopulation, stating that “A Monitoring Strategy for the Western Population of Double-crested Cormorants within the Pacific Flyway” (PFNMBTC 2013) relies on a dual frame sampling approach whereby a sample of the known and potentially active breeding colonies for cormorants within the breeding range of the western subpopulation are selected for counting to determine colony size. As the strategy is currently implemented on an annual basis, it apparently produces an estimate of population size that is biased high due to extrapolation of colony counts from a weighted sample of colony sites in the area frame to all sites in the area frame. This commenter also notes that the PTL for the western subpopulation is not sustainable and will cause a rapid decline. The commenter offered considerable empirical data, in addition to that provided by a state agency. Specifically, the PTL modeling approach described in Appendix E was used to derive a “conservative” PTL for the western subpopulation of 8,881 individuals/year. This level of potential annual take represents 15% to 28% (median = 19%) of the estimated total number of breeding individuals in the population as of 2019 (45,778 individuals; 95% c.i. = 31,850 – 59,710 individuals), based on the Service’s Double-crested Cormorant Western Population Status Evaluation (USFWS 2020b).

The commenter explains that the input data used in Appendix E of the DEIS are not the most recent data that the Service should have obtained for the western subpopulation. His comments cite issues with:

- (N_{min}), model assumes a minimum population size that is about 28% greater than the survey data collected by the Service says it currently is. The minimum known population size (N_{min}) that was input to the PTL model for the western subpopulation was 69,817 individuals (range = 49,966 – 89,668; USFWS 2020a, Table E-2). By the Service’s own estimate, the western subpopulation consisted of about 45,778 breeding individuals (USFWS 2020b, Table 3).
- (r_{max}) is about twice the empirically-derived r_{max} for the western subpopulation (USACE 2015). The 95% c.i. for the estimate is also very large: 0.1666 to 0.5487, suggesting that using the mid-point of 0.3577 could easily result in a large overestimate of r_{max} and a PTL that exceeds sustainable take levels.
- (F_0) the “management factor”. This choice of management factor is based on the assumption that the western subpopulation will respond to intensive harvest in a similar manner to the cormorant population in the Central and Mississippi flyways, which is an order of magnitude larger and currently increasing. The choice of management factor also assumes that, following a large cull of individuals from the western subpopulation, the population will respond in a density-dependent fashion with high fecundity and recruitment, a response that is far from certain given the current decline of the western subpopulation.

Source of Comments: State agencies, nongovernment organizations, general public.

Response to Comments: The Service agrees on several points and is grateful to commenters for sharing the necessary data for additional analyses within the PTL and the western subpopulation. These comments overlapped in several ways, which prompted the Service to provide this comprehensive response, which is broken up into three main themes: (1) responses to the need for peer review; (2) the error noted in the pre-breeding multiplier used in the PTL; and (3) comments regarding the PTL for the western subpopulation.

Peer Review of the PTL: In regard to the need for peer review of the PTL, the general approach and methods for the PTL calculation have been peer reviewed, and there are citations in the DEIS. The 5-year review process proposed in the DEIS and FEIS will allow comparison of take and population monitoring data with the PTL. The general approach and methods for the PTL calculation have been peer reviewed and are used by the Service for managing both game and non-game species. The population size estimates used in the EIS are the most recent estimates available. However, based on information received during the public comment period, the PTL for the western subpopulation may not have captured complex and changing population dynamics precipitated by cormorant management in the CRE. To reduce the risk of over-exploiting the western subpopulation, the Service will limit annual allowable take to half the PTL in the DEIS, or 4,539 individuals. This is a maximum allowable annual take level, not a prescribed level. Based on past take of cormorants the expected take is unlikely to exceed 2,000 annually (annual take in 2015 and 2016 was >2,000 as part of the CRE management, but this is not expected to be repeated). The status of the population can be reassessed at 5-year intervals, and there is a sound monitoring program in place for the western subpopulation, which can estimate how the western subpopulation responds to take subsequent to the habitat management in the CRE.

In addition, the original monitoring strategy for the western subpopulation of cormorants included a weighting scheme for the "area frame" to concentrate sampling effort on the locations with the highest potential cormorant use. However, monitoring has deviated from the initial monitoring strategy in that ~3X more sites were monitored per year than the initial, random selection of ~40 sites overall. Preliminary analyses indicate that including all monitoring data versus only the selected sampling sites had negligible effects on overall estimates of population abundance and trends. Thus, we expect minimal potential bias due to the original area frame weighting scheme. Additional analyses and/or stratification of the "area frame" based on all available data collected to date may help to better understand potential bias under various sampling schemes.

Error in Pre-Breeding Multiplier: Two errors were found in the formula used to extrapolate cormorant nest counts to the number of individuals in a population. First, the equation in the center of page 91 had the denominator and numerator reversed. This was a typo in that the equation was used in its proper form to estimate a pre-breeding multiplier. In other words, the equation was used in its proper form and the reversal did not result in any errors in estimating potential take level.

Second, the equation on page 91 to extrapolate cormorant nest counts is missing a term needed to correctly estimate the proportion of non-breeding birds. The equation as written estimates the number of non-breeders as a percentage of breeders, whereas it should have estimated the number of non-breeders as a percentage of the total population. This error was propagated in estimating potential take level. Correcting this error caused estimates of potential take level to increase 2-3% for each subpopulation.

Response to Comments Regarding the PTL for the Western Population: Based on information received during the public comment period, the PTL for the western subpopulation may not have captured complex and changing population dynamics precipitated by cormorant habitat management in the CRE. To reduce the risk of over-exploiting the western subpopulation the Service would reduce the level of authorized annual take to half the PTL in the DEIS, or 4,539 individuals. In the interest of responding to comments received concerning the PTL and western subpopulation, what follows is a more detailed explanation of how the PTL was formulated and exploration of some additional data.

Data was not available to estimate maximum potential growth rate for all cormorant subpopulations, therefore data were borrowed from other subpopulations of cormorants. In addition, although there is now a population monitoring program for western cormorants, there is still uncertainty in what should be considered an average annual population size (i.e., carrying capacity for the western subpopulation) because 1) annual estimates of abundance vary, 2) nesting colony habitat on East Sand Island was drastically reduced in 2019 and 3) the Astoria-Megler Bridge has much more suitable nesting habitat than assumed in the 2015 management plan (U.S. Army Corps of Engineers. 2015). The following paragraphs explore the use of additional data to estimate allowable take for the western subpopulation. Three points should be kept in mind: (1) the DEIS notes that the Service would produce a report every five years, and additionally as necessary, that provides analyses from population-monitoring efforts and other status information; (2) there exists a very good population monitoring program for the western subpopulation; and (3) levels of allowable take in the DEIS are limits that are estimated to be sustainable and allow for conservation of cormorants. This should allow for a relatively quick assessment of the impact of take on cormorant populations, especially comparing realized take with changes in population size on an annual basis in addition to the 5-year assessment interval.

It is suggested that the reduction of the cormorant colony size by implementing the 2015 management plan in the CRE has reduced the carrying capacity for the western subpopulation and that numbers used in the DEIS do not reflect this reduction (see “Double-crested cormorant management plan to reduce predation of juvenile salmonids in the Columbia River Estuary,” 2015, by the U.S. Army Core of Engineers). Prior to 2016, the East Sand Island colony comprised a significant portion of the western subpopulation. In the DEIS, to account for uncertainty in population size in calculating potential take level, data were simulated and population size was randomly drawn from a uniform distribution of 49,966–94,272 individuals (includes both breeding and non-breeding individuals). Thus the median population size was assumed to be approximately 72,000 individuals (or about 30,000 breeding pairs). The median estimate of population size used to calculate potential take level (30,000 breeding pairs) is close to the estimated size of the western subpopulation in 2018 but much higher than the western subpopulation estimate in 2019 (see figure below).

The annual number of breeding pairs in the western subpopulation does generally track the CRE population (see figure below; Columbia River data for figure and analysis supplied by J. Lawonn, Oregon Department of Fish and Wildlife). However, the total loss of breeding birds 2014–2019 is greater in the western subpopulation than the CRE, suggesting that something else is affecting the western subpopulation, or that the CRE population interacts/intermixes with the western subpopulation in more complex ways than imagined, or some combination of these two possibilities. It is likely that just 3 years of data post-CRE-reduction is insufficient to understand how the carrying capacity of the entire western subpopulation has changed. The effect of reducing the CRE colony should continue to be monitored and reassessed after 5 years.

To calculate maximum allowable annual take (potential take level or PTL) in the DEIS a value for maximum population growth rate was needed. The value that was used was estimated from cormorant nest count data from the Great Lakes (Erie, Ontario, and Huron). It was assumed that this maximum population growth rate was intrinsic to cormorants and thus applicable to the western subpopulation. However, the western subpopulation is a separate subspecies and experiences little interchange with other cormorant populations. Therefore it is possible that there may be differences in life history strategy that have evolved between the western and other subpopulations. Here, for comparison, long-term nest count data from the CRE was used to estimate a separate maximum population growth rate for the western subpopulation of cormorants. Data from 1991–2016 were used in a discrete logistic model to estimate maximum population growth rate for the CRE colony of cormorants. The estimate of maximum population growth rate, 0.27, was lower than that used in the DEIS. It should be noted that as a sampling unit to estimate population growth rate, neither the CRE nor the three Great Lakes is ideal because the data are not from closed populations. In other words it is possible that either population could have been increased by undetected immigrants or decreased by undetected emigrants. This is an important distinction because maximum population growth rate used in the PTL modeling for cormorants assumes a subpopulation grows or decreases from births and deaths from within the subpopulation, not from movement of individuals in or out of the subpopulation. Modeling movement of individuals between subpopulations may be possible, but was not done in the DEIS to inform the PTL. Regardless, the Great Lakes data is from a much larger area than the CRE and data from adjacent areas (e.g., Lake Champlain, Lake Michigan) generally support the estimate of maximum growth rate and the rapid increase in cormorants. There is less ancillary data to support the CRE estimate and movement in or out of the local CRE population may be more likely than in the Great Lakes because the CRE is a much smaller area.

The average take of cormorants from 2013–2018 in the western subpopulation was 2,126 individuals per year (771; 496; 6,041; 4,224; 910, 315; for the years 2013–2018, respectively). With the exception of the observed take in 2015 and 2016, average annual take has been below 1,000 individuals per year for the western subpopulation. Take in the two high years was related to the reduction of the population in the CRE. Take of 1,000 individuals per year is far below the potential take level in the DEIS of about 9,000 individuals per year. Take of cormorants in the west may increase in the future beyond that observed in the past, and this should continue to be monitored and reassessed after five years, and additionally as necessary.

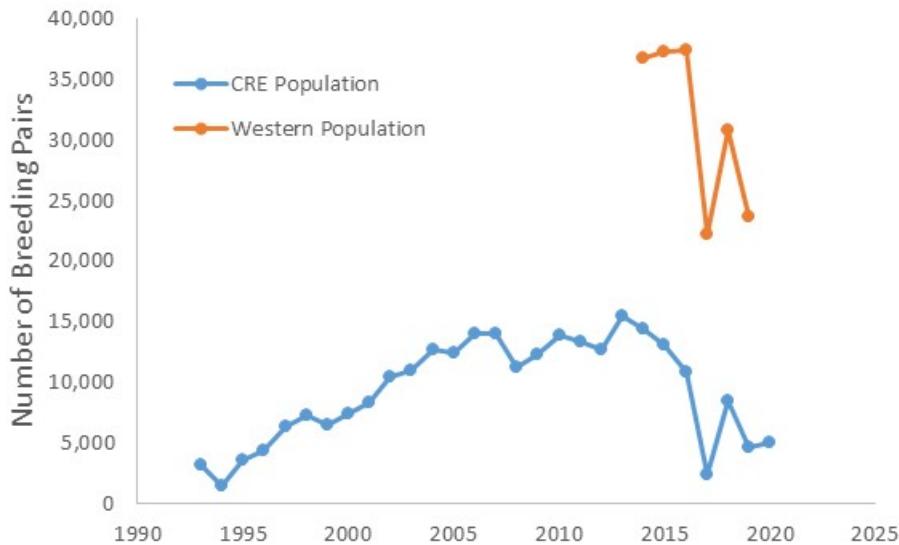


Figure B-1. Estimated number of breeding pairs of double-crested cormorants in the CRE and in the western subpopulation.

Summary of Comment: Additional comments submitted pertained to the scale of management for the western subpopulation, stating that cormorants in the west are nesting over an enormous area from the U.S.-Mexico border to southern British Columbia and from the Continental Divide to the Pacific Coast. Satellite telemetry (Courtot et al. 2012), band resightings, and analyses of genetic structure (Mercer et al. 2013) all indicate that adults of breeding age move among breeding colonies in this large area, and thus constitute one breeding population or management unit (Adkins et al. 2014). Commenters state that the western subpopulation is currently declining, which he states is largely a result of the repeated abandonment during the breeding season of the former East Sand Island cormorant colony site and the associated loss of colony productivity (young raised; Anchor QEA 2017). The commenter also emphasizes that cormorant colonies in other areas within the breeding range of the west are also in decline, and without the large breeding colony of cormorants on East Sand Island in the Columbia River estuary, which formerly produced thousands of young cormorants annually, the cormorant population in the west is likely in decline. The commenter also expressed concern that widespread shooting of cormorants by the states and tribes without close supervision by the Service would significantly impact the western subpopulation, which the Service has estimated at about 41,000 breeding individuals (USACE 2015).

Source of Comments: General public.

Response to Comments: The Service assessed management on this scale and adjusted the maximum allowable take for the western subpopulation (see response to PTL comments above). While it is state and tribal resource agencies that will apply for permits, the allocation of take, the population monitoring, and take monitoring are compiled and assessed at the western subpopulation scale. Decline in the western subpopulation was predicted and the estimated population size is higher than was projected (Corps 2015). The Service did not set a sustainable level of about 41,000 breeding individuals. Rather sustainable refers to long-term population trajectory through time. The ca. 1990 population level was used as a reference point in time while assessing effects of the management plan (Corps 2015). Cormorant populations along the Pacific Coast have increased from much smaller sizes in the past (Carter et al. 1995).

Sub-issue: Additional Comments on the PTL

Summary of Comment: Some commenters voiced concerns that the PTL does not consider illegal take.

Source of Comments: Nongovernment organizations, state agencies, general public.

Response to Comments: The PTL estimate considers all forms of take and is conservative in that the lower 60% CI of the PTL was used. However, in the DEIS and FEIS where comparisons are made to historical take data, historical take only included legal take. There was no apparent method to estimate historical or future illegal take for cormorants as part of this NEPA analysis. If illegal take is determined then it can be counted against PTL, but if illegal take is substantial then this should also become an enforcement issue in the management of cormorants.

Summary of Comment: Commenters noted a missing footnote in the table of the PTL describing the population of cormorants; the table identifies footnote F as the source of the population data. However, there is no footnote F. The footnotes skip from E to G. Commenters also state that Table E-1 in the DEIS does not provide a source for the population estimates for the western subpopulation.

Source of Comments: Nongovernment organizations.

Response to Comments: The Service agrees that Footnote 'F' should have been: "U.S. Fish and Wildlife Service. 2020." Double-crested cormorant western subpopulation status evaluation, final annual 2019 report. Unpublished Report by Migratory Birds and Habitat Programs, U.S. Fish and Wildlife Service, Portland, Oregon.

Summary of Comment: Commenters state that the PTL needs to consider impacts of the take of non-breeding cormorants on breeding population sizes and vice versa.

Source of Comments: State agencies.

Response to Comments: Estimates of the number of non-breeding cormorants were included in the estimate of total population size for calculating PTL. See "Double Crested Cormorant" in "Affected Environment" section of DEIS and FEIS, and Appendix E. However, it was assumed that take among age classes would be proportional to the relative size of age classes. It was noted in the DEIS and FEIS that if take occurs mostly at breeding colonies, which are comprised of mostly adult birds, then the PTL may have to be re-calculated.

Summary of Comment: Commenters state that evidence needs to be presented that demonstrates that proposed take limits are based on sound population estimates and science.

Source of Comments: State agencies.

Response to Comments: The general approach and methods for PTL calculation have been peer reviewed (e.g., see the following citations in the EIS: Wade 1998, Runge et al. 2004, Johnson et al. 2012). The population size estimates used in the EIS are the most recent estimates available. Population survey methodology did vary among and within subpopulations and the citations are given in footnotes to Table E-1.

Summary of Comment: Commenters question how the Service will determine what constitutes a sustainable cormorant population size, and inquired as to what the biological basis is for the numeric take quota of cormorants.

Source of Comments: State agencies, tribal agencies.

Response to Comments: The theory supporting PTL modeling is well established and is used for the harvest management of game species and sustainable take of non-game species. The science behind the PTL approach, and case studies using PTL, demonstrates the methodology and theory are sound and suitable for managing take (e.g., see the following citation in the FEIS: Wade 1998, Runge et al. 2004, Johnson et al. 2012). In brief, PTL relies on harvest theory, which predicts that different potential levels of harvest rate result in different population sizes. This is what the biological components of the PTL estimate. It is the policy component of the PTL that can introduce conservatism into the PTL calculation based on risk aversion or perceived uncertainty in the biology components of the PTL. The science behind the PTL approach and case studies using PTL demonstrate the methodology and theory are sound and suitable for managing take (e.g., see the following citation in the EIS: Wade 1998, Runge et al. 2004, Johnson et al. 2012).

Summary of Comment: Commenters from the general public and a tribal agency assert that the cormorant population estimates described in the DEIS are too low and that cormorants are overpopulated. Commenters state that the population modeling used includes incomplete population estimates because the number of birds in the Canadian Prairie Provinces and bird numbers outside of the Great Lakes in other Interior regions of the United States are unknown and not included. In addition, commenters expressed concern that the population numbers used were not median numbers, but instead, numbers within the lower confidence limit of 60%. As a result, very conservative population numbers are presented on pages 90-97 of the DEIS.

Source of Comments: Tribal agency, general public.

Response to Comments: The population size estimates used in the DEIS and FEIS are the most recent estimates available. Population survey methodology did vary among and within subpopulations and the citations are given in footnotes to Table E-1. These estimates did include Canada and the Canadian estimates were used in calculating PTL. Further, an estimate of maximum population growth potential is given in Appendix E for the Great Lakes. This estimate was used to infer population growth potential in other subpopulations. The cormorant population analyses in the DEIS and FEIS did not estimate average annual growth rates because, with the exception of the western subpopulation, the data were not available.

In addition, young birds not yet of breeding age were included in population estimates. For calculating PTL a random draw from a uniform distribution representing the low and high population size estimates was used, not the lower 60% confidence interval of population sizes (See "Simulating PTL" in Appendix E for how uncertainty in all parameters was accounted for in PTL simulation). The lower 60% confidence interval of the posterior distribution of simulated PTL values was used to set the value for PTL.

Summary of Comment: A member of the general public commented that the modelling of an acceptable take for the central flyway birds must be rejected. This commenter stated that there are no recent population surveys or estimates of the current Great Lakes population in the US or Canada.

Source of Comments: General public.

Response to Comments: The population size estimates used in the DEIS and FEIS are the most recent estimates available. Population survey methodology did vary among and within subpopulations and the citations are given in footnotes to Table E-1. In addition, new population monitoring of cormorants is proposed in the EIS, which should allow for assessing how the PTL is performing at five-year intervals.

Summary of Comment: Nongovernment organizations and the general public commented that the approach of the PTL used by the Service is politically driven and not based on science. Commenters expressed concern that allowable take levels specified in the PTL may be too excessive. Some state agencies commented that evidence needs to be presented that demonstrates that proposed take limits are based on sound population estimates and science. Similarly, states also commented that regional and continental cormorant populations should be managed sustainably and adaptively, potentially at lower levels.

Source of Comments: State agencies, nongovernment organizations, general public.

Response to Comments: The general approach and methods for PTL calculation have been peer reviewed (e.g., see Wade 1998, Runge et al. 2004, Johnson et al. 2012). The population size estimates used in the DEIS and FEIS are the most recent and best available. Population survey methodology did vary among and within subpopulations and the citations are given in footnotes to Table E-1. Scientific research has also demonstrated that cormorants can negatively impact fish at certain locations and times, thus there has been a demand among fisheries biologists for management options. In addition, the FEIS calls for new population monitoring and a five-year review of the PTL and associated management decisions. This proposed process interweaves a scientific approach to assessing population status and informed decision making.

The theory supporting PTL modeling is well established and is used for the harvest management of game species with populations that number in the millions, and for managing take of non-game species that may have small populations (e.g., see Wade 1998 and his description on the use of PTL for cetaceans). The PTL approach relies on ecological theories concerning how populations respond to harvest (see Runge et al. 2004 for a detailed description). In brief, PTL relies on harvest theory, which predicts that harvest at a given rate over time will result in a sustainable and predictable population size. If there is no harvest the result is a population that is at carrying capacity. The biological components of the PTL (maximum population growth rate, population size, and implicit components such as carrying capacity and assumed density dependent growth response) are used to estimate equilibrium population sizes at various harvest rates. The policy component of the PTL (the management or recovery factor) is used to reduce risk or seek conservatism in allowing take if there is great uncertainty in the biological components or if managers seek larger sustainable population sizes. Keeping the annual harvest rate at or below that of PTL reduces the risk of over-exploitation and results in sustainable populations.

The general approach and methods for the PTL calculation have been peer reviewed. However, based on information received during the public comment period, the PTL for the western subpopulation may not have captured complex and changing population dynamics precipitated by cormorant management in the CRE. To reduce the risk of over-exploiting the western subpopulation the Service would reduce the level of authorized annual take to half the PTL in the DEIS, i.e. 4,539 individuals. The status of the western and other subpopulations can be reassessed at five-year intervals. There is a sound monitoring program in place for the western subpopulation and the DEIS and FEIS propose improving population monitoring for the other subpopulations.

Summary of Comment: A federal agency requests discussion on how cormorant sex ratio is factored into the PTL model.

Source of Comments: Federal agency.

Response to Comments: The Service notes that the sex ratio was not explicitly included in PTL models. It was assumed that sex ratios were 50/50 in the subpopulations, population growth rates were similar between sexes, and that take would occur even between the sexes.

Summary of Comment: State agencies provided citations on population growth and expansion of cormorants, citing Breeding Bird Survey (BBS) data and other data. The state asserts that a lack of lethal take in the Great Lakes region has resulted in a rapid increase in cormorant populations, resulting in an over-abundance of these migratory birds throughout the flyway.

Source of Comments: State agency.

Response to Comments: The Service again notes that the population size estimates used in the DEIS and FEIS are the most recent and best available. Cormorant populations have varied over time, sometime going through rapid periods of growth (e.g., the Great Lakes beginning in the early 1970's) and sometimes declining (e.g., the CRE in Oregon as a result of breeding habitat management). The PTL modeling used more recent estimates of population size, mostly from data collected in the past five to ten years, as a measure of current conditions. Population sizes may increase in the future, and the DEIS and FEIS propose better population monitoring be conducted. If populations do increase (or decline) the PTL can be re-evaluated at five-year intervals.

Summary of Comment: A member of the public commented that cormorants breed on remote islands in large bodies of water. The commenter states that BBS surveys are conducted along roadsides and are notorious for being an unreliable source of trend information for most waterbird species, and therefore, other sources of information are required to estimate trends. The report submitted to the Service in July 2017 by Wyman et al. (Assessment of the Double-crested Cormorant breeding population in the North American Great Lakes 1977-2014) used the results of multiple surveys to summarize the distribution and abundance of cormorant nests (at multiple geographic scales) in the Great Lakes during the period 1977-2014 and identifies changes that occurred over that time. This source of information should be included in the DEIS (at least for the Great Lakes region).

Source of Comments: General public.

Response to Comments: The Service notes again that population size estimates used in the DEIS and FEIS are the most recent estimates available. Population survey methodology did vary among and within subpopulations and the citations are given in footnotes to Table E-1. The estimate of maximum population growth was from the long-term data set of nest counts from Lakes Erie, Huron, and Ontario. BBS data or trend estimates were not used in calculating the PTL. The data used by Wyman et al. provided much of the inferences in the DEIS and FEIS about cormorant population dynamics.

Summary of Comment: A member of the public commented that the Service essentially has no timely data reflecting the vast changes that engulfed the Great Lakes and led to a regime shift that has decreased cormorant productivity and survivorship immensely. The commenter notes that research submitted to the Waterbird Society indicated a simultaneous decline of the two resident breeding gulls (HERG, RBGU), Caspian terns, and cormorants, and that this can only relate to the massive regime shift that has engulfed the upper lakes. The commenter further states that there are no recent population surveys of estimates of the current Great Lakes population in the United States or Canada and concludes that the modeling of an acceptable take for the central flyway birds must be rejected.

Source of Comments: General public.

Response to Comments: The Service notes that the cormorant population in the Great Lakes grew from a low of near zero in the early 1970's to near a million individuals 30 years later. The population size estimates used in the DEIS and FEIS are the most recent and best estimates available. The estimate of maximum population growth was from the long-term data set of nest counts from Lakes Erie, Huron, and Ontario. The DEIS and FEIS call for increased population monitoring and at five-year intervals a review of the PTL for each subpopulation.

Summary of Comment: A state agency commented the Service should present number of breeding pairs in population estimate, citing page 24 of the DEIS: They recommend presenting number of breeding pairs as well, since this is the typical measure used to measure abundance in colony surveys.

Source of Comments: State agency.

Response to Comments: The Service notes that Table E-1 in Appendix E presents information on breeding pairs. The number of breeding pairs in the western subpopulation in the DEIS (Table E-1) are out of date and were updated in the FEIS.

Summary of Comment: A member of the public commented on the PTL, stating that the maximum take levels specified for the Interior Region are too high. The individual comments that these were developed without consideration of management of cormorants in Ontario, Canada and states that the proposed level of take far exceeds numbers taken from the entire Eastern United States annually under the vacated Public Resources Depredation Order. This commenter also notes that between 2005 and 2016, the U.S. Great Lakes population of cormorants underwent a significant and steady decline of 36%, presumably due to management under the vacated Public Resources Depredation Order (Cuthbert and Wires 2018).

Source of Comments: General public.

Response to Comments: The Service acknowledges that the PTL for the Interior Region is higher than what has been historically taken; although cormorant take did approach this level every year between 2013 and 2015. The Service therefore emphasizes several considerations about the PTL:

First, the PTL is biologically based. The Service used the most recent population data available which, for the Interior subpopulation, is some of the best data that we have for cormorants nationwide. The Service regularly uses PTL models to determine sustainable levels of take and we feel confident that if this level of take were to be authorized, it would be biologically sustainable.

Second, the PTL sets the upper limit for allowable take; it is not a take prescription. The PTL limits apply to take for entire subpopulations. The subpopulation units are based on subspecies designations (i.e., Florida, Western, and Atlantic plus Central) and, in the case of the Atlantic versus Central, by examining band recovery and telemetry studies of migration. The number of birds authorized for take for the Interior population will depend on a) the number of states that request a state permit, and b) the number of birds each state/tribe requests to take in order to minimize their particular conflict. State requests will be assessed to determine whether the request is reasonable. For instance, the Service will likely compare their requested take to levels of take under the vacated depredation orders combined with known individual permits, needs, and what is allowable under the PTL and subpopulation threshold.

Third, the Service emphasizes that the scope of the issue has changed. Currently, under the scope of individual depredation permits, the Service can authorize cormorant take up to ~40,000 for states in the Mississippi/Central flyway. This was based on past ‘needs’ in order to cover issues related to aquaculture, property damage, human health and safety, and co-nesting species. Over the past two years, the Service has found that this amount does not always meet the needs of the states, particularly in southern areas (e.g., aquaculture). Therefore, the Service will need to increase the allowed level of take if we are going to expand the scope of what is covered (e.g., fish conflict).

Finally, while the cormorant population in the Great Lakes declined as much as 36% from its record high in 2005 (Wyman et al 2016), cormorant nesting increased nearly 4% between 2016 - 2018 following the end of the depredation orders; an indication of the extraordinary ability of these birds to thrive in the absence of management pressure. In fact, at some locations (e.g., Les Cheneaux Islands) the percent change in the number of nesting cormorants was as much as 60% (Cuthbert and Wires 2018). Further, a decline in the Great Lakes, where the birds were heavily managed, does not equate to a population-wide decline. In fact, according to data obtained from Canadian surveys, cormorant populations have continued to do well in their northern breeding grounds where they do not experience the same management pressure. In the past, it was often suggested that the Service needed to develop a conservation order to manage the overall cormorant population to resolve the conflict. The argument has always been that managing local conflict via depredation permits or depredation orders will never reduce those conflicts if the population always continues to grow. As such, the Service made a policy decision in the FEIS to attempt to stabilize the cormorant population just below its current level. The Service concludes this is the best way to balance the needs of the states/tribes to manage their wildlife resources as well as the needs of the Service to maintain a healthy cormorant population.

Sub-issue: Impacts to Cormorants from the Proposed Action

Summary of Comment: Commenters stated that the DEIS failed to address the cumulative impacts of climate change and other cormorant take, and should therefore evaluate the cumulative impact of other cormorant take, such as the planned hunting seasons in Ontario, Canada.

Source of Comments: Nongovernment organizations, general public.

Response to Comments: The Service used population data from Canada in the subpopulation estimates (see comments in response to the PTL), and will work closely with Ontario on population monitoring and obtain take data and incorporate it into our assessments. The DEIS discussed climate change on pages 71-77. There remains some uncertainty regarding effects of climate change, but the Service can estimate that there will likely be less water available in the Great Basin, and cormorant colonies may shift locations. Cormorants may be able to stay and forage longer in northern portions of the Interior and Atlantic subpopulations, and it's possible that breeding seasons may lengthen. In addition, structures (e.g., bridges and transmission towers) were predicted to be used at higher rates if bald eagle populations continue to grow and reoccupy their historical range (Adkins et al. 2014). The Service makes decisions given this uncertainty by using the data and modeling available and adapting through time as change occurs. The planned five-year assessment would address this.

Summary of Comment: Nongovernment organizations commented that the DEIS did not analyze where cormorants are doing “well.”

Source of Comments: Nongovernment organizations.

Response to Comments: While commenters did not explicitly state how this information would directly inform the proposed action, the Service notes that the DEIS describes increases in the populations on page 23, stating that, “Cormorant abundance in North America has increased dramatically since the 1960s and 1970s, mostly due to the growth of the Interior and Atlantic subpopulations. Increases largely have been attributed to better environmental regulations, primarily restricting use of chlorinated hydrocarbons (e.g., DDT), protection under the MBTA in 1972, and decreases in take, compared to the early twentieth century (Dorr et al. 2014).”

Summary of Comment: Commenters voiced concern that a new state or tribal special cormorant permit would enable states and tribes to take excessive action and pursue cormorant take aggressively. In addition, commenters assert that the Service selectively cited examples of cormorant conflict in states that are intolerant of cormorants (e.g., LA, AR, MS, VT, MI, TX, SC) to explain management that occurred under the vacated depredation orders and justify desired alternatives in the DEIS.

Source of Comments: Nongovernment organizations, general public.

Response to Comments: The Service also acknowledges that under a special cormorant permit, states and tribes may be eager to address conflicts associated with cormorants and pursue actions to respond to conflicts as they occur (85 FR 34582, June 5, 2020). However, because the number of cormorants will be limited under each permit in our proposed alternative, and the total take under all permits issued will be limited to levels designed to maintain each cormorant population, we expect that all subpopulations of cormorants will be sustained at or above the levels indicated in the DEIS and FEIS. The need for action, as identified in the DEIS, is to address conflicts and economic damage associated with cormorants, while addressing possible impacts to the environment. The DEIS referenced examples that demonstrate the conflicts and damage that cormorants can cause. Actions taken to alleviate conflicts and damage associated with cormorants does not necessarily demonstrate an intolerance of cormorants by a particular state but simply a desire to reduce damage and conflicts in those areas where they are occurring. Under the preferred alternative, the Service would maintain primary authority for the management of cormorant populations and would retain the authority to immediately suspend or not renew a permit if a permittee does not adhere to the terms and conditions set forth by the Service. In addition, the Service would allocate authorized take according to population levels in the PTL model in order to ensure the sustainability of the Atlantic, Interior, Southern, and Pacific cormorant subpopulations. Therefore, the take of cormorants to alleviate damage and conflicts would be within allowable take limits, which the Service can adjust based on monitoring efforts.

Issue 4: Comments Pertaining to Evidence that Cormorant Presence is a Limiting Factor to Fisheries

Summary of Comment: Several commenters point out issues with the science (or perceived as a lack thereof) used to support claims about impacts of cormorants on fish populations. Specific concerns include a lack of evidence:

- showing direct impacts on imperiled fish species;
- indicating that cormorant presence is limiting to fish residing in systems with introduced invasive species; and
- supporting whether cormorant predation on fish is compensatory or additive.

Commenters note that the scientific evidence does support cormorant impacts, illustrates that the effects of cormorant predation are closely tied to site- and time-specific conditions, and thus cannot be generalized or easily extrapolated to other locations within a state, region, or even within a waterbody. One of the primary examples held up to support the premise that cormorants do affect fish populations and respond to management has been highly contested by other scientists. Additionally, there is a large body of published research whose results did not demonstrate any link between fishery declines and cormorant predation, which commenters feel was all but ignored in the DEIS. At a minimum, commenters state that this information should be included in order for all aspects of the conflict to be considered. Finally, several commenters state that there are many known causes of fish declines (e.g., overfishing, pollution, food web changes, and invasive species, to name a few) and none of these issues were analyzed in detail, nor did the Service seriously consider any of these known mechanisms to be responsible for fish declines as opposed to cormorant predation. Commenters feel that to implement such a widespread and intensive program of lethal control of cormorants despite critical uncertainties in the data is reckless, arbitrary, and capricious.

Source of Comments: General public.

Response to Comments: The Service acknowledges that it is difficult, if not impossible, to unequivocally attribute declines in fisheries to the presence of cormorants in every situation. Cormorants occupy complex aquatic systems in which many factors are working to limit fish production including invasive species, water quality issues, food web changes, and intensive angling pressure, to name a few. However, residing in complex systems does not negate the potential of predation to exert negative pressure on fish populations. Top predators such as cormorants are known to influence and control the structure of aquatic communities. We note that there are many studies that have not shown links between cormorant predation and declines to a fishery. This can be because the prey species being monitored is super abundant and there is not an effect; or it can be due to modifying forces such as compensatory mortality and prey buffers. It is also possible that a lack of detection of an effect is because environmental factors are so complex that it's impossible to attribute changes to a fishery to just one limiting factor. Conversely, sometimes a link cannot be made because it's simply too difficult or expensive to obtain the data necessary to detect an effect.

Wires (2014) provides a detailed review of the fishery data required to definitively evaluate predation effects on fish populations (see page 33 in the DEIS). She concedes that obtaining this amount of data could take entire lifetimes, especially considering that this would be required at each site at which cormorants may forage. Similarly, determining whether cormorant predation is compensatory or additive also requires vast amounts of data which are almost always unattainable. Further, cormorant predation most certainly spans a continuum; meaning that it will differ from place to place, and sometimes even within the same waterbody, due to the unique biotic and abiotic characteristics of each site. Considering the geographic scale over which we are obligated to manage cormorants, it would be impossible to do so based on whether cormorant predation was considered compensatory or additive at a particular site.

In considering management requests, the Service needs to be mindful of what should be considered a “reasonable” burden of proof to require of our stakeholders in order to get authorization to manage a migratory bird conflict. The Service does not require unachievable data standards for any other migratory bird species that we manage and we cannot justify holding cormorants to a higher standard than we would for endangered species. There is a significant amount of data, both old and new, that show strong correlations between the number of cormorants foraging and localized fishery population indices. These have been well laid out in the DEIS, FEIS, as well as the literature. While the data is not perfect in every situation, enough data exists to support the premise that cormorants can sometimes cause impacts at local scales that are significant enough that they need to be managed.

Finally, the Service intends to remain committed to working with state and tribal natural resource managers to develop tools that will assist fisheries managers to better determine where and when cormorant management may be needed to reach fisheries goals. For instance, the Service is currently funding a post-doc position at Michigan State University’s Quantitative Fish Laboratory to develop a widely applicable formulation for estimating fish production and sustainable harvest levels of different aquatic systems, as well as developing a defensible basis for allocating the fish production between human uses and bird needs. The Service is hopeful that tools like these will be a precursor to enabling its partners to better manage cormorants in the future.

Summary of Comment: Several commenters criticize the Service for not providing a clear definition of what actually constitutes a conflict in the DEIS. To establish that a conflict exists, commenters state that there must be evidence and not merely a complaint. They posed the questions, “what is the damage we’re trying to alleviate?” and, “without specifying what the damage is, how can we know whether the proposed action will alleviate said damage?” Commenters voiced concern that a new special cormorant permit allows states and tribes to prioritize recreational fishing opportunities over the duty to protect cormorants pursuant to the MBTA, and would allow the take of cormorants for eating fish without first demonstrating the need for such action. Commenters strongly emphasized that the justification for allowing the take of cormorants cannot simply be that they exist and that they eat fish.

Commenters also requested the Service define depredation, as it is the event that triggers management. Given that the cormorant is a fish-eating bird, cormorant foraging must be distinguished from depredation of fish. Commenters generally posed the question, “does a ‘depredation’ happen any time a fish is consumed?” These commenters state that a vague description of the resource issue implies the mere presence of cormorants consuming fish is the conflict.

Along these lines, the commenters state that the Service does not provide guidelines for what actually constitutes an impact warranting management nor does it have standards for the kind of data needed to evaluate claims of impacts.

Source of Comments: Nongovernment organizations, general public.

Response to Comments: Commenters stress the need for the Service to provide a clearer problem statement describing the conflicts associated with cormorants. These commenters note that such a statement should specify measurable objectives and values to ensure that management developed for cormorants would not be open ended and would not legitimize irrational attitudes and authorize destruction of birds based on myths and misperceptions.

The Service acknowledges the challenges in identifying and enforcing measurable objectives for all stakeholders to use consistently in the proposed conflict management approach. This challenge stems from the need to address multiple types of conflicts associated with cormorants across multiple geographic and temporal scales and the variability of the conflict stakeholders report to the Service. The challenge also stems from a difference in values across stakeholders. The conflicts associated with cormorants can be viewed at different levels to reflect the complexity, scope, and depth of the problem in different settings. To respond fully to this comment, the Service examined the problem under the framework described by the Canadian Institute for Conflict Resolution, (2000), which classifies three levels of conflict: disputes, underlying, and identity-based.

The first level of conflict, the dispute, represents the immediate, material issue seemingly at the ‘center’ of the conflict (Canadian Institute for Conflict Resolution 2000, Madden and McQuinn 2014). In this case, it is the dispute over how to address depredation by cormorants across a broad geographic and complex scope of issues. As explained in the DEIS, the Service’s purpose and need for action is intended to address multiple factors including predation-related losses of wild and publicly stocked fisheries, aquaculture, federally listed and candidate fish species, adverse effects by cormorants on habitats important to bird species of concern, personal property and vegetation, and human health and safety. The Service must address these concerns from stakeholders across a broad geographic scale, and in a manner that can provide flexibility to federal, tribal, and state agencies to address spatial and temporal complexity of conflicts. The Service must also do so while ensuring the trust responsibility of the Service to maintain sustainable populations of cormorants.

Madden and McQuinn (2014) also state that more typically a dispute is also the surface expression of deeper levels of conflict, and that a narrow focus on the ‘dispute’ level explains, in part, why conservation practitioners are sometimes surprised that conflict remains or even escalates after the problem appears to have been ‘settled.’ The second level of conflict they identify is underlying conflict, which stems from a history of unresolved disputes. Madden and McQuinn (2014) emphasize that an underlying conflict results from past interactions between, or decisions made by, the same parties that intensify or aggravate the present situation. This history can obscure the complex social or psychological issues, which may result in an increased focus on a need to articulate a specific, concrete, economic, or physical loss. This is well documented in the case of cormorants. As stated in the DEIS (page 33), criticism of how resource agencies can define and show that avian-suppression measures have had an appreciable impact on the fish populations that such measures were supposed to protect continue and were cited in public comments. The Service acknowledges that defining every type of fishery or other conflict objective with a corresponding threshold of lethal removal of cormorants would indeed yield clear metrics stakeholders could use to define success in alleviating the problem.

However, it is important to note that assessing the influence of predation on a fishery is a complex endeavor that requires vast amounts of data. As stated in the DEIS (page 33), several site-specific data requirements would be necessary. This information is inconsistent from every fishery site, as limited funds and capacity of most organizations make it impossible to attain comprehensive site-specific information. The Service cannot obligate stakeholders to fund all the studies needed to fully define metrics for achieving success across every conflict. Further, because of the different values the American public places on cormorants and fisheries, the very definition of success will vary across stakeholders as well. For some, success may be defined as allowing some fish to be taken by cormorants, whereas others may define success by not allowing the very presence of cormorants. Some may also define success as a reduced number of complaints from the public each year. The Service stresses that the ability to define success cannot always be derived from biological metrics, as it is often derived from the values and goals of individual stakeholders.

In the case of underlying conflicts associated with cormorants, there is a long history of unresolved disputes across the entire scope of conflicts, which culminated in the vacation of the previous depredation orders in 2016, and the need to respond to deficiencies in the history of managing the conflict. To address this history, the Service attempted to take a fresh look at the full range of conflicts in this current action. In doing so, the Service concluded that the approach to this conflict needs to be flexible enough to respond to that variability in values and goals in a manner that maintains sustainable populations of cormorants, complies with the MBTA, and minimizes the regulatory burden on federal, tribal, and state agencies and individuals.

The third level of the model described by Madden and McQuinn (2014) is the identity conflict. This level represents the values, beliefs, or social-psychological needs that are central to the identity of at least one of the parties involved in the conflict. For example, the Service's presence and resources devoted to one species (in this case cormorants) may be perceived as ignoring or slighting the physical and social needs of a local community (Madden, 2004). Some stakeholder groups may experience national wildlife protection laws as an infringement upon their sense of autonomy (Clark et al., 2010, Simon, 2013). The Service fully acknowledges that deeper levels of social conflict exist within the conflicts associated with cormorants as well as the variability of those values, beliefs, and social-psychological needs across the nation. This variability is well documented in the many comments from people who see the cormorant's existence value requiring protection ranging to those who commented that cormorants need to be extirpated and unprotected. The Service acknowledges all these values, and is committed to its mission of working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people. Therefore, the Service will continue to carry out its mission and collaborate with stakeholders and partners to find solutions to address the variability of conflicts associated with cormorants. The Service makes decisions given uncertainty by using the data and modeling available and adapting through time as change occurs. A five-year assessment will help meet this need.

Issue 5: Comments on the DEIS Analyses Unrelated to Cormorant Subpopulations

Summary of Comment: Commenters state that the DEIS ignored or underemphasized the economic value provided by cormorants including bird watching and consuming invasive and predatory fish that may impact commercially valuable fish species. Similarly, commenters also stated that the DEIS ignored or underemphasized the biological value provided by cormorants including 'eliminating prey weakened by disease or other factors' and removing predatory fish that may have an impact on federally listed species. And similarly, the same commenters voiced concern that the DEIS also failed to adequately consider aesthetic and recreational value provided to a majority of the public by cormorants.

Source of Comments: Nongovernment organizations

Response to Comments: In the DEIS, the Service considered impacts on the economic value provided by cormorants, including bird watching (page 71). The Service contends that the economic benefits of cormorants do not outweigh the economic impacts of an unmanaged and rapidly increasing population. While the effects of cormorant management on fish communities will likely vary across sites, the Service concluded that cormorant management provides states and tribes with the most flexibility for managing their unique fishery issues, including flexibility in managing other aquatic predators of commercially and recreationally valuable species. Cormorant-fish conflicts differ from state to state and even within fisheries in the same state. Therefore, the Service does not believe that a federally mandated ‘one-size-fits-all’ solution will provide optimal results. Since a fishery may not always respond to cormorant management as expected, state and tribal managers need to have a range of tools available to be able to determine what may be limiting their particular fishery of concern, and to adapt to changing conditions at their sites. Utilizing the adaptive-management processes should allow managers to adjust their strategy if they find that cormorant control is not resulting in the desired fishery outcome.

In the DEIS, the Service took into account the biological value provided by cormorants to species of fish that are their main prey through eliminating weakened or diseased fish and regulating populations (pages 30 – 33). In addition, cormorants have demonstrated biological value in eating invasive species which may have an impact on sport and native fisheries such as the round goby in the Great Lakes (page 32). However, cormorants are opportunistic feeders and generalists. They are known to switch prey based on what is seasonally abundant at the time. Such complexity and variability in cormorant feeding ecology makes it difficult to link regular cormorant activity to elimination of weakened or diseased fish or removal of predatory fish because of site-specific and temporal differences in the fish community structure (see DEIS, page 30).

The Service evaluated impacts to aesthetic and inherent ('existence') values for each alternative in the DEIS (page 71). While the aesthetic and existence values of cormorants are challenging to quantify economically, and aesthetic value varies according to individual, the Service recognizes that cormorants have such value to various stakeholders. Under preferred alternatives, overall population viability of cormorants would not be affected. Therefore, impacts on existence value would be minimal from a population standpoint. Effects on aesthetic and recreational values associated with management alternatives in the DEIS vary depending on selected alternative, location, and associated stakeholder opinion. The Service's role is to help facilitate management of conflicts while ensuring that cormorant populations remain healthy.

Issue 6: Comments in Support of, or Requesting Clarity about other Alternatives

Summary of Comment: State agencies commented on the Service's characterization of a control order, stating that the intent of a control order would be to reduce the abundance of cormorants, which would likely reduce the intensity of conflicts and could be paired with state-permits to provide greater protection than any of the accepted alternatives. The state agency asserts that there is no reason such an order could not be paired with coordinated, site-specific efforts. The state also emphasizes that it may not entirely support a conservation order, but supports the notion that a lower population would certainly be likely to facilitate management, as few conflicts occurred while cormorant numbers were low (in both North America and Eurasia).

Similarly, state agencies also commented on the Service's characterization of hunting cormorants, similarly stating that there is no reason hunting needs to stand alone as a management action. One state agency suggests that combining hunting with coordinated, site-specific management could be a viable alternative, albeit one that may not be palatable to some. Members of the public commented in support of a hunting season for cormorants, stating the Service should utilize public hunters to manage the cormorant population because it would provide a cost-efficient option for managing the cormorant population where conflicts occur. They suggest the Service provide limited hunting opportunities on specific waterbodies during the fall and winter when predation on wild and publicly stocked fish is highest could prove much more effective and strategic in reducing cormorant impacts on local fisheries.

Source of Comments: State agencies, general public

Response to Comments: The Service notes that the commenting state agency referenced a control order, which the Service did not analyze in an alternative. Instead, the Service addressed a conservation order in the DEIS. Control orders allow for the lethal take of a specific species for reasons other than depredation, particularly when outside a species' native range. This may occur when a species is introduced by humans or conflict with natural resources or human health. Conservation orders allow for the lethal take of a specific species when there is a need to control an overabundant native species where management such as hunting does not alleviate the problem. Therefore in this response, the Service addresses both a conservation order and hunting cormorants, as both prompt similar responses.

The state agency asserts that a conservation order is intended to address abundance and population generally. The Service emphasizes that a conservation order is intended to address substantially overabundant populations where there are broad-scale and pervasive impacts to other resources. First, there is no evidence indicating that cormorants are substantially overabundant and are resulting in wide-scale destruction of every habitat they use or that are used by other species, and the Service has not designated them as overabundant. The Service's best estimate of the continental abundance of double-crested cormorants is about one million birds, which is lower than most species of migratory game birds that are subjected to harvest. Given those issues and the Service's population estimates, we did not conclude a conservation order (or hunting, which is addressed below) is warranted solely or in combination with other tools. Further, population reduction would not necessarily result in fewer conflicts in areas where take of cormorants is needed, because those areas will continue to attract birds. This same concept applies to the comments from the state agency on hunting as a viable alternative. Like a conservation order, hunting would attempt a general reduction of the population, which does not necessarily address the site-specific nature of most conflicts. In addition, the Service questions whether hunting, where the take of a species likely will not be used for a legitimate reason (e.g., food), is ethical or appropriate under the MBTA. In addition, the Service emphasizes the need for accountability with any action addressing conflicts associated with cormorants. Specifically, because the PTL specifies a limit to the number of cormorants that may be taken to ensure population sustainability, all take needs to be documented as it occurs, or be limited to a certain number to ensure that the maximum threshold of take is not exceeded. Harvests associated with hunting seasons are not limited to a particular number of birds that can be taken, and estimates of harvests occur only after the seasons have ended; thus, hunting seasons don't satisfy the need to monitor take as it occurs. Lastly, the Service emphasizes that hunting cormorants, or reducing the population of cormorants as in any conservation order, would reduce the take available to address site-specific conflicts that are a higher priority (e.g., aquaculture facilities). The Service, therefore, cannot justify implementing a conservation order or hunting seasons, thereby reducing the amount of take available to those entities seeking relief to reduce specific conflicts, which this rule attempts to address as its purpose and need.

Summary of Comment: Several members of the public commented on or supported a preference for nonlethal management of the conflict or management at all. Some of these comments focused on the need to "let nature take its course," and that humans are the cause of the conflict around fisheries and not cormorants.

Source of Comments: General public.

Response to Comments: A “No Management” Alternative would not meet the purpose and need as it would lead to increasing conflicts between cormorants and human interests, including economic damage from cormorants. Under this approach, we anticipate cormorant populations would increase, leading to a broad increase in conflicts and greater economic damage. This alternative was eliminated from detailed analysis because it does not meet the purpose and need for this action. In addition, in Appendix D. Standard Authorization Conditions for Take: In accordance with conditions of issuance and acceptance of permits (50 CFR 13.21(e)(1)), practicable and effective nonlethal methods are required as the initial approach before implementing lethal measures.

Summary of Comment: Several members of the public commented in support of the no action alternative, but also simultaneously cited the need for no management of the conflict, or managing the conflict with nonlethal management methods only. Comments appear as though there is some confusion over the differences between the no action alternative and the use of no management or nonlethal management methods.

Source of Comments: General public.

Response to Comments: The Service would like to clarify the difference between the no action alternative and nonlethal management only. Nonlethal management would essentially mean that the federal government would not issue any permits or other authorizations (i.e., depredation permits, depredation orders, control orders, or conservation orders) that would allow the take of cormorants to alleviate depredations or other conflicts. This is an alternative the Service considered but eliminated from further analysis (see page 20 of the DEIS). In contrast, the no action alternative would allow for take of cormorants to address conflicts (see pages 15-16 in the DEIS). In the no action alternative, the Service would continue issuing individual depredation permits allowing the lethal take of cormorants that are committing or about to commit depredation or harm/damage to (1) aquaculture facilities (commercial, state, and tribal-owned facilities including hatcheries), (2) federally threatened and endangered species (as listed under the ESA) or their habitats, (3) human health and safety, and (4) personal property (i.e. vegetation). The Service may also issue permits to take cormorants if there is convincing evidence that cormorants are adversely affecting species of high conservation concern (e.g., a regionally important bird population) or rare and declining plant communities at a local scale. The scope of authorization of cormorant take under the status quo is defined by the currently applicable procedures and frameworks. Those procedures and frameworks are specified in the MBTA (16 U.S.C. §§ 703-712), the Depredation Permit Regulation (50 CFR 21.41), the Issuance of Permits Regulation (50 CFR 13.21), the 2015 Final EIS (USACE 2015) for the management of the western subpopulation of cormorants, and the 2017 EA for management of cormorants essentially east of the Rocky Mountains (USFWS 2017). The no action alternative would be a continuation of these current procedures and frameworks, which does not include authorization of take through individual depredation permits for wild or publicly stocked fisheries because this was outside the scope of these NEPA analyses.

Summary of Comments: Several state agencies, organizations, and members of the general public commented in support of an aquaculture depredation order in conjunction with a new special state and tribal permit addressing conflicts associated with cormorants. Some state agencies also voiced support for a new aquaculture depredation order or a new general depredation order without commenting specifically on a new state or tribal special permit. One state agency references the DEIS by concluding that the environmental impacts between Alternatives A and C would be similar, and states that Alternative C would provide greater efficacy and less administrative burden for their agency. A nongovernment organization submitted a similar comment and voiced support for a nationwide depredation order. A separate state agency also commented in support of an aquaculture depredation order in general, stating that individual permits are not effective and the proposed rule does not provide a lethal take management option for commercial aquaculture facilities such as catfish farms. Another state commented in support of Alternative C, citing specific support for a new special state and tribal permit and the ability for states to manage their own water resources. Commenters in support of a new aquaculture depredation order suggest that this alternative would reduce the administrative and regulatory burden on the Service and the aquaculture industry and emphasize that individual take permit applications are a significant burden for small businesses. These commenters note that low take limits for individual permits are sometimes arbitrarily set by regional agency offices, making these permits inefficient, and that small businesses would be required to continue to apply for individual take permits. One aquaculture farmer spoke about complications with having to apply and pay for two separate permits at two separate regional offices due to having farms in bordering states.

Similarly, a nongovernment organization commented in support of a nationwide depredation order described in Alternative D, stating that individual depredation permits are ineffective due to the unpredictable migratory patterns of the cormorant making it difficult to effectively assess where individual permits are needed. A tribal agency also commented in support of Alternative D, a general depredation order, suggesting that the Service include federal lands in this alternative to allow state and tribal wildlife managers the necessary flexibility to manage cormorants effectively and efficiently for the resources that need protection. The tribal agency further states Alternative D is ideal to maximize flexibility in protecting out-migrating juvenile salmon and steelhead as it includes all lands where cormorants impact fisheries resources throughout the Columbia River basin.

Additional commenters submitted support specifically for the Service to reinstate the vacated depredation orders, and not the depredation orders analyzed in the DEIS. Commenters request the Service consider the following changes to those orders: (1) remove annual bird allocation, as this does not allow for seasonal, local, and regional variations in bird numbers at any particular farm nor can individual permits be rapidly revised to increase or reduce allocated birds; (2) remove the requirement to record and document cormorant control costs, as it would impose a new regulatory cost burden on farms; (3) remove prohibitions to lead rifle ammunition; (4) allow for the use of decoys to remove individual cormorants that have become habituated to hazing techniques.

Source of Comments: State agencies, tribal agencies, a federal agency, nongovernment organizations, members of the general public.

Response to Comments: The Service acknowledges that the DEIS noted in specific tables that the environmental impacts between the preferred Alternative A and Alternative C would generally be similar. These tables illustrated overarching differences between the alternatives on wild and publicly stocked fisheries (Table 11 on page 62), effects on migratory bird species and eagles from take of cormorants (Table 12 on page 66), socioeconomic effects at aquaculture facilities and recreational fisheries (Table 13 on page 68), effects on cultural resources and environmental justice from take of cormorants (Table 14 on page 70), and the general summary of environmental consequences across all alternatives (Table 15 on pages 78-79). However, there are critical differences in implementing any new depredation orders for cormorants compared to implementation of a new special permit for states and tribes. Under the vacated aquaculture depredation order, aquaculture facilities were required to annually report lethal cormorant control activities. This system of limited accountability and self-reporting with a year time-lag was not adequate to consistently track authorized take on a national scale. In addition to timing, the lack of reliable annual take from information under the previous depredation orders complicated our ability to assess the impacts of the orders on cormorant populations. The lack of accountability regarding take, coupled with the lack of a robust assessment, could make the Service legally vulnerable to reconstituting the vacated depredation orders.

As explained in the DEIS, the Service would apply an annual maximum allowable take threshold across all the needs identified by stakeholders. The Service determined this threshold by using a Potential Take Limit PTL model, which uses underlying cormorant population metrics (productive rates, survival rates etc.) to calculate an annual allowable take level. This is the same type of model used to sustainably manage some migratory game bird species (band-tailed pigeons) and take levels for species such as black vultures. By establishing an annual sustainable take threshold and ensuring systems are in place to keep take below that threshold, the Service will implement the robust tool needed to assess the effects of take on cormorant populations to address potential legal challenges.

To do this, however, the Service must be capable of tracking take by all authorization mechanisms available throughout the year. Presently, however, the Service does not have the necessary process or resources to adequately monitor take under a new depredation order. This is because, unlike the use of a permit system, the Service cannot track take under a depredation order until the take has already occurred, creating a greater probability that the take will exceed the maximum limit before it is reported. To adequately track take under any new depredation order, whether that order be the vacated orders, or those analyzed under Alternatives B, C, and D, the Service needs to develop a mechanism that allows take to be tracked in real time, such as the Canada Goose Registration database (50 CFR 21.50). Such a tool would reduce the likelihood of exceeding the annual take threshold or reaching the annual take threshold prior to the end of year. Establishing such a tool would require additional funding, staff, and time to build and maintain. Additionally, a registration/tracking tool would only be effective if those using the depredation order were willing to register and report take numbers on a regular and frequent basis. Without such a system in place, the Service could be vulnerable to legal challenges. This system is not in place, and therefore, relying on such a system would render this alternative not ripe for decision. The Service must therefore continue to rely on individual permits for private and commercial entities.

The preferred alternative would establish a new, optional permit that would be available to state and tribal fish and wildlife agencies in the 48 contiguous states to manage conflicts specifically associated with cormorants. This alternative would provide state wildlife management agencies and tribes flexibility within predefined guidelines to address conflicts caused by cormorants within their jurisdictions. The preferred alternative coupled with the continued use of depredation permits for aquaculture would provide the accountability and flexibility to manage cormorants while ensuring populations are managed sustainably and take is authorized in an equitable fashion across multiple conflicts, not just those voiced by any specific entity or commenter.

Regarding the individual's comment about having to apply and pay for two separate permits at two separate regional offices due to having farms in bordering states, the Service emphasizes that multi-regional depredation permits will remain available for these circumstances. For example, the regional office to which a commercial aquaculture producer would apply can issue a permit for more than one state and across regional boundaries. This would require a coordination step between those two regional permit offices, which is a standard operating practice for the Service when an applicant seeks to take migratory birds from states that occur in different administrative regions.

In response to comments regarding use of lead ammunition and the use of decoys, the Service addressed those in [previous comments above](#).

Summary of Comments: Members of the general public submitted remarks indicating they do not share the Service's concern about the lack of timely reporting, and state that the Service's assessment of the cormorant population under the previous vacated aquaculture depredation order is incorrect. Commenters further assert that evidence shows that the concern is unsubstantiated because during the 13-year history of both vacated depredation orders, the cormorant population increased. They further emphasize that current individual bird depredation permits require farmer reporting which was not identified as a problematic issue in the Environmental Assessment for Issuing Depredation Permits for Double-crested Cormorant Management (FWS 2017). They support the notion that oversight by two federal agencies, Wildlife Services and the Service, was effective in protecting cormorant populations and managing farm fish predation by these birds through lethal and nonlethal methods. However, the commenter does not object to improved reporting methodology and supports the development of an on-line reporting system as presented in the draft EIS (FWS 2020: page 58) or any other reasonable means to report, collect and analyze this information.

Source of Comments: General public.

Response to Comments: As discussed in the DEIS and above in response to comments supporting depredation orders in Alternatives B, C, D, and the vacated orders, the Service emphasizes that the previous depredation orders for cormorants required persons operating pursuant to the orders to report their cormorant take to the Service annually. As indicated in the DEIS, reporting of take under the previous depredation orders for cormorants was not always consistent and could differ among states and regions. In some cases, the Service would receive incomplete reports or no report at all before the annual deadlines, and the Service occasionally had to follow-up with persons to request reports or to request additional information. An increasing population trend does not negate the need for accurate reporting because evaluating annual take is a key component in monitoring the cormorant population and ensuring a sustainable cormorant population. As discussed in the DEIS, the Service will prepare reports every five years, and additionally as necessary, to provide the public with information regarding the implementation of the preferred alternative; therefore, accurate recording and reporting of take is necessary to ensure accurate reports and regulatory frameworks.

Under the previous aquaculture depredation order, the Service was unaware of persons operating pursuant to the depredation order and the number of birds they killed until they submitted their annual report. The main differences between the alternatives pertain to the burden associated with accurately monitoring the authorized and actual take of cormorants throughout the year. When the United States District Court for the District of Columbia vacated the previous depredation orders in May 2016, the Court concluded the Service did not sufficiently consider the effects of the depredation orders on cormorant populations and other affected resources and failed to consider a reasonable range of alternatives in the review within its environmental assessment under NEPA. Based on the conclusions of the Court, the Service developed the PTL models to evaluate take on the cormorant populations. As explained above in response to commenters preferring new depredation orders, accurate reporting is necessary to ensure the level of take occurring annually does not exceed that described in the PTL model, which is important because exceeding the allowable PTL level of take can have differential effects on cormorant populations due to differences in population size and the location and magnitude of take. Wildlife Services and the Service would continue to be available to assist aquaculture producers experiencing losses due to cormorants. The Service appreciates the support of the commenter as the Service uses previous frameworks to develop reporting and monitoring procedures.

Summary of Comments: Commenters note that absent a depredation order, this rulemaking has the potential to increase costs to small private aquaculture facilities who are not otherwise able to employ effective methods of controlling cormorant damage; allowing for increased measures to prevent damage on public lands while not allowing for the same measures at private facilities may serve to further increase the volume of cormorants feeding at these private facilities, as the cormorants may move to locations with less perceivable threats.

Source of Comments: General public.

Response to Comments: Under all the alternatives, persons could only take cormorants after they have used nonlethal methods of reducing or eliminating the conflict. Persons applying for permits must use nonlethal methods and independently determine that those methods are ineffective before lethally taking cormorants. Therefore, the costs associated with the use of nonlethal methods would occur under any of the identified alternatives that allow the lethal take of cormorants.

Summary of Comments: Several entities commented in strong support of the no action alternative, which would continue to address conflicts associated with cormorants within a specific scope with the issuance of individual permits. Reasons for support of the no action alternative generally indicate that this option would focus lethal control explicitly on birds that are committing or about to commit depredation or harm/damage, identifies and defines a limited and specific set of types of conflicts, requires permittees to demonstrate they have exhausted reasonable nonlethal methods of management, and requires the Service to approve lethal control on a case by case basis. In addition, supporters of the no action alternative cite the need to ensure the western subpopulation does not experience significant negative impacts, and that providing relief to states and tribes for depredation of wild and publicly stocked fisheries is not appropriate as these fishery resources make up the cormorant's natural diet.

In contrast, several commenters cite the limitations of individual permits and commented in opposition of the no action alternative. Commenters note that research from Burr (2019) shows that lethal control influences how cormorants distribute themselves between the two available foraging options (aquaculture vs. natural water bodies), and that individual permits restrict the limit of the number one can take, thus reducing their efficacy. In addition, commenters in opposition of the no action alternative state that cormorants carry an abundant number of digenetic trematodes, several of which are known to infect channel catfish; farmers need to take as many cormorants as they need to prevent this, but individual permits have a maximum allowable take imposed.

Source of Comments: Nongovernment organizations, general public.

Response to Comments: The Service addresses support and opposition to the no action alternative in this comprehensive response.

The Service disagrees partly with commenters in support of the no action alternative. While individual permits do offer control on a site-specific case-by-case basis, they do not meet the purpose and need for action as cited in the DEIS. Specifically, the no action alternative does not fully address the need for tribes in the western region of the United States (excluding Alaska) to address cormorant impacts on fisheries—especially on hatchery-raised salmonids. Tribes in the western region expressed a need for a mechanism to address conflicts with fisheries at multiple scales (page 51 of the DEIS). Similarly, the Service is rejecting the no action alternative because it could potentially have a negative effect on wild and publicly stocked fish, as it would not allow for take of cormorants found to be heavily depredating a fishery. Under the no action alternative, the Service expects continued or enhanced conflict between cormorants and some economically important fisheries across the nation, as well as at some hatchery release sites (page 62 of the DEIS).

However, the Service agrees in part with commenters in support of the no action alternative where site-specific oversight of reporting from the Service is warranted. As stated in the DEIS (page 58), state and federal agencies have had the highest level of compliance in annual reporting. However, the history of reporting take accurately under the previous depredation orders from private and commercial entities, however, has been inconsistent; some commercial aquaculture facilities may underreport or over-report in an effort to manipulate how many cormorants they may be authorized to take in future years. To bolster more accurate reporting, the Service would need to develop an online reporting system, in which a report is required before the person(s) is/are authorized to continue during the subsequent year and is a condition of the online registration for any renewals. This system is not in place, and therefore, relying on such a system would render this alternative not ripe for decision. The Service must therefore continue to rely on individual permits for private and commercial entities.

In response to those private and commercial entities in opposition of the no action alternative and the continued use of individual permits, the Service emphasizes again that any depredation order would be very different from the vacated depredation orders to which these entities grew accustomed. A new aquaculture depredation order would include a cap on the number of cormorants that could be taken under each authorization for aquaculture facilities. The Service has developed PTL models to ensure the cumulative allocation of cormorant take across all permit types and alternatives meets the need to maintain sustainable cormorant populations. Cumulative impacts to cormorant populations under each alternative stem from the ability of the Service to ensure the level of take does not exceed that described in PTL models. Therefore, to properly track and monitor the authorized take of cormorants across the contiguous 48 states, the Service must maintain the ability to allocate and limit take as necessary to ensure cumulative take does not exceed the allowable take predicted by the PTL models. Therefore, permits issued by the Service for the take of cormorants must have an authorized take limit that the permit holder cannot exceed. Similar to previous depredation permit procedures, persons may apply for an amendment to their existing permit requesting higher take limits, which the Service will evaluate and, if justified based on their completed application form, may issue amended permits allowing for additional take.

Summary of Comments: Several commenters submitted additional alternatives for the Service to consider. For the purpose of this comment, the Service focuses on the ones requesting the Service analyze different levels of authorized take under the PTL model as unique alternatives. These comments appear to focus on the need to evaluate impacts to the cormorant population (and subpopulations) with more conservative parameters.

Source of Comments: State agencies, nongovernment organizations.

Response to Comments: Under NEPA, the Service is not required to consider alternatives that are not significantly different from those considered or that have substantially similar consequences. Different levels of authorized take under the PTL would yield alternatives that would all have the same or similar consequences to cormorants; all the resulting alternatives would be formulated to ensure cormorant populations would be maintained sustainably per the trust responsibility of the Service. As stated above, the PTL approach relies on ecological theories concerning how populations respond to harvest (see Runge et al. 2004 for a detailed description). In brief, PTL relies on harvest theory, which predicts that harvest at a given rate over time will result in a sustainable and predictable population size. The biological components of the PTL (maximum population growth rate, population size, and implicit components such as carrying capacity and assumed density dependent growth response) are used to estimate equilibrium population sizes at various harvest rates. The policy component of the PTL (the management or recovery factor) is used to reduce risk or seek conservatism in allowing take if there is great uncertainty in the biological components or if managers seek larger sustainable population sizes. Keeping the annual harvest rate at or below that of PTL reduces the risk of over-exploitation and results in sustainable populations.

Summary of Comments: Some commenters submitted additional alternatives for the Service to consider. For the purpose of this comment, the Service focuses on the ones requesting the Service include a scientific-evidence based approach for resolving human-cormorant conflicts. One commenter specifically notes that under this alternative, the Service would maintain responsibility for management decisions and make decisions regarding lethal management on a case-by-case basis and issue individual permits when necessary (the no action alternative). The commenter further elaborates on this approach by adding that the Service would rely on site-specific scientific study to evaluate conflicts, alleged impacts, and potential benefits from any management under consideration. If management is undertaken for cormorants, it should be focused around a clearly defined problem statement and include clear goals, measurable objectives, rational population targets linked to balanced and measurable resource targets, and a strong monitoring program for both cormorants and the resources being managed. The commenter emphasized the need to work towards increasing “social carrying capacity” for cormorants by prioritizing support for educational efforts that dispel myths, enlighten the public about the role of this native species in aquatic ecosystems, and increase appreciation for cormorants. In addition, this alternative would prioritize nonlethal approaches that don’t involve culling many thousands of cormorants when cormorants need to be managed. The commenter further cites successful examples at various scales are available from Denmark (see Bregnballe and Eskildsen 2002, 2009; Bregnballe et al. 2013), Tommy Thompson Park in Toronto (TRCA 2017), and Oneida Lake, New York (Coleman 2009 and DeBruyne et al. 2013).

Source of Comments: General public.

Response to Comments: The Service appreciates the insight and well-researched input from the commenter in this process on this issue and several others. However, for reasons cited in previous responses to comments, this new alternative is not ripe for decision for the following reasons: (1) As stated in the response above to comments asking the Service to further support claims about impacts of cormorants on fish populations, it is difficult, if not impossible, for the Service to unequivocally attribute declines in fisheries to the presence of cormorants in every situation; (2) sometimes a link cannot be made because it's simply too difficult or expensive for all government, tribal or commercial entities to obtain the data necessary to detect an effect; (3) Wires (2014) provides a detailed review of the fishery data required to definitively evaluate predation effects on fish populations (see page 33 in the DEIS), and concedes that obtaining this amount of data could take entire lifetimes, especially considering that this would be required at each site at which cormorants may forage; (4) determining whether cormorant predation is compensatory or additive also requires vast amounts of data which are almost always unattainable; and (5) cormorant predation most certainly spans a continuum, meaning that it will differ from place to place, and sometimes even within the same waterbody, due to the unique biotic and abiotic characteristics of each site. Considering the geographic scale over which we are obligated to manage cormorants, it would be impossible to do so based on whether cormorant predation was considered compensatory or additive at a particular site.

As stated above, in considering management requests, we need to be mindful of what should be considered a “reasonable” burden of proof to require of our stakeholders in order to get authorization to manage a migratory bird conflict. The Service does not require unachievable data standards for any other migratory bird species that we manage and we cannot justify holding cormorants to a higher standard than we would for endangered species. There is a significant amount of data, both old and new, that show strong correlations between the number of cormorants foraging and localized fishery population indices. These have been well laid out in the DEIS as well as the literature. While the data is not perfect in every situation, enough data exists to support the premise that cormorants can sometimes cause impacts at local scales that are significant enough to require management.

Summary of Comments: Some commenters submitted additional alternatives for the Service to consider. For the purpose of this comment, the Service focuses on the ones requesting the Service approach the conflicts associated with cormorants more holistically. For example, commenters stated that the Service should consider a combination of actions including: (1) avoid actions that create ideal nesting habitat that concentrates cormorants in new areas; (2) regarding Columbia River fish: the Service should restore more natural waterways; (3) the Service should reduce the nesting density of fish-eating birds; (4) examine the effects of climate change, and (5) investigate other anthropogenic factors.

Source of Comments: Nongovernment organizations.

Response to Comments: As the Service stated in prior responses to comments, multiple factors contribute depredation of fisheries by cormorants and other waterbirds. Review of the fishery data required to definitively evaluate predation effects on fish populations (see page 33 in the DEIS) would require many years of analysis and complex collaboration with many partners to achieve these holistic goals. While the Service agrees with comments in part that a holistic approach in general would better address the complexity and number of factors contributing to depredation at fisheries, many of the actions commenters identify are outside the purview of the Service. However, the Service is committed to fulfilling its mission by working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people.

Issue 7: Additional Issues not Included in any Particular Category or Theme

Summary of Comment: A tribal agency inquired as to the need for take of cormorants at airports.

Source of Comments: Tribal agency.

Response to Comments: Cormorant collisions with aircraft are the primary human health and safety issue, warranting a depredation permit. Collisions between aircraft and cormorants are a concern because they threaten passenger safety, result in lost revenue and costly repairs to aircraft, and can diminish public confidence in the air transport industry. Hazards are dependent on the physical, biological, and behavioral characteristics of a bird species. Cormorants are a particular hazard to aircraft because of their body size (wingspan of 45-48 inches [114-123 cm]) and mass (2.8-5.5 lbs. (1,200-2,500 g), slow flight speeds, and flocking behaviors. Birds with slow flight speeds can create increased hazards to aircraft because they spend relatively greater lengths of time in aircraft movement areas. Cormorants were rated as the 8th most hazardous wildlife species to aircraft (DeVault et al. 2011). According to the Federal Aviation Administration's (FAA) Bird Strike database, there were 187 reported wildlife strikes involving cormorants to civil aircraft in the United States from 1990 to December 2019 (FAA 2020). Cormorant-strike damage to aircraft can range from minor to substantial damage, even destroying aircraft or causing injury to people. Reported cormorant strikes also include damage that had a negative effect on flight (e.g., need to abort takeoff or return to airport). In some cases, reported cormorant strikes involves more than one bird, which creates hazards of simultaneous damage to multiple portions of the aircraft/engine(s). The Service has primarily issued cormorant depredation permits, relative to human health and safety, to airports. Where the potential for cormorants and aircraft collisions exist, there is a need to manage cormorant activity in and around airfields.

Summary of Comment: State agencies submitted comments referencing table 7 in the DEIS, stating that it includes only rough estimates often based upon an incomplete geographic assessment. The numbers for walleye, sauger, salmon, and steelhead appear to be based only on the Great Lakes Region and therefore, underestimate the importance of these resources to the angling public. The state also notes that Table 8 provides a summary only of the fish produced within the national hatchery system and does not account for production in state and private hatcheries. Another state agency commented similarly, stating that the current level of take allowed by the Service at state-managed hatcheries under the permit system is inadequate.

Source of Comments: State agencies.

Response to Comments: The Service notes that Table 7 references Table 3 in the 2016 National Fishing and Hunting publication. The scope of the data consists of all freshwater anglers and hours associated with freshwater outside the Great Lakes. With regard to Table 8, the Service notes that including only the National Fish Hatcheries does likely underestimate the total fish production by hatcheries, and many states likely raise far more fish than the Service's National Hatchery System. The Service does not feel that adding this data would assist in further defining the conflict associated with cormorants at hatcheries and fisheries, but may provide a greater perspective of the scope where states and tribes may apply a new permit. However, given each state and tribe would be limited to a maximum allowable take under a new permit, and that each state and tribe needs to have the flexibility to carry out such allotted take, the Service does not feel that this additional data would substantively add to the decision it needs to make in addressing conflicts associated with cormorants.

Summary of Comment: One state agency inquired as to whether or not they should apply for and receive 150 permits. They note that if the Service is considering offering a higher take, or the maximum allowable take in Alternatives A-D, is it possible to consider a higher level take (150 permits) under Alternative E for state hatcheries. The state notes that they operate four state owned hatcheries, where fingerlings are raised for stocking public water bodies for the enjoyment and recreational use of fisheries resources by the public. The state asserts that the current number of depredation permits allocated to the state appears to be helpful in reducing fingerling depredation and pond liner damage, but not adequate to prevent still significant losses to production and facilities. Therefore, the state commented requesting 150 cormorant depredation permits, regardless of the management alternative selected, to better manage cormorant populations at its state hatchery facilities.

Source of Comments: State agency.

Response to Comments: The Service encourages the state agency to seek a new permit as specified in the final rule to accomplish its goals, as this new permit would be sufficient and less costly for a state to meet its needs. The new permit would provide the flexibility to state and tribal fish and wildlife agencies to address conflicts related to the following issues: wild and publicly stocked fish managed by state fish and wildlife agencies or federally recognized tribes; tribal- and state-owned or operated aquaculture facilities (including hatcheries); human health and safety; state- or tribal-owned property and assets; and threatened and endangered species or those listed as Species of Greatest Conservation Need in State Wildlife Action Plans. If a state determines this new permit would meet their needs, upon receiving the permit that state would have the discretion to determine whether, when, where, and for which of the above purposes they conduct lethal take within limits and allocations set by the Service.

Summary of Comments: A state agency commented recommending that the NEPA documentation explicitly outline the values used to assess the trade-offs between protecting non-native free-swimming fish stocks over native cormorant populations.

Source of Comments: State agency.

Response to Comments: The Service acknowledges that values among the public will vary on the subject of authorizing take of a native migratory bird to protect non-native fish species from depredation. Those states or tribes that choose to apply for a new special cormorant permit may implement lethal control of cormorants in areas where stocking and/or management of non-native fish occurs for the purposes of public recreation and angling. Thus, the purpose and need for this action is, among other stated needs in the FEIS, to reduce predation-related losses of wild and publicly stocked fisheries and reduce predation-related losses of stocks at aquaculture facilities. As stated in the FEIS, aquaculture facilities refer to the cultivation of aquatic animals and/or plants in natural or controlled aquatic environments for commercial or conservation efforts. In the case of this action, aquaculture references any commercial or conservation aquaculture production facility or program that produces fish or other aquatic organisms that are susceptible to cormorant predation or impact during any stage of production, and/or immediately following release into natural or controlled environments. Therefore, the purpose and need for this proposed action could include non-native fisheries in the scope of a new special permit.

However, the Service does not base its decision to implement the proposed action on varying values alone. The decision to authorize the take of cormorants to protect a non-native fish would be subject to the scope of conditions in a new special permit for states and tribes and individual permits for the commercial aquaculture industry. It is also subject to the provisions under the MBTA and the four international conventions with Canada, Mexico, Japan, and Russia. Cormorants are protected under the treaty with Mexico (Agreement in 1972, supplementing the agreement of 1936). The overriding objective of each of the four Conventions is to provide for the conservation of shared bird species. Each convention also allows for regulations to be established in each country to control the taking of species under many different circumstances. The treaty provides broad authority to protect birds and regulate take, so long as that take is compatible with the treaty. Every permit issued by the Service under the MBTA involves an evaluation of the impact of that permit to the population of birds of interest. Therefore, wild and publicly stocked fisheries may be enhanced while meeting the Service's mandate of the Conventions to provide for the conservation of double-crested cormorants.

Summary of Comments: A tribal agency commented that there are some tribes where cormorants are a clan totem. Therefore, the tribal agency suggests that the Service include wording that would allow tribal members enrolled in a federally recognized tribe to request and obtain cormorant feathers from culled birds for traditional uses.

Source of Comments: Tribal agency.

Response to Comments: Federally recognized tribal members may obtain cormorant feathers from the non-eagle feather repositories, if available. The Service may facilitate transfer of feathers from culled birds, and encourages tribal agencies to coordinate with the Migratory Bird Program office when seeking a new special cormorant permit.

Summary of Comments: Nongovernment organizations commented that the Service illegally issued a permit for take at East Sand Island and east of Rockies, in reference to the vacated public resources depredation order and the aquaculture depredation order.

Source of Comments: Nongovernment organizations.

Response to Comments: This comment refers to two legal challenges. Both were ruled on by Federal Courts. The Service did issue depredation permits to the Corps for implementation of the *Double-crested Cormorant Management Plan to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary*. Audubon Society of Portland *et al.* did challenge the legality in 2016, see Case No. 3:15-cv-665-SI. Judge Simon order of August 31, 2016, states: “The Court, however, leaves the Double-crested Cormorant plan and challenged Records of Decision in place because the plan provides some benefit to salmonids that are listed as endangered or threatened under the Endangered Species Act, whereas Double-crested Cormorants are not listed as either endangered or threatened.” The Court left the management plan and associated Records of Decision in place. Though the Court found a procedural error with the EIS, the Court declined to vacate the plan or ROD while the Corps and FWS fixed the EIS. Therefore, the associated permits were still in effect.

The Court did find that the Corps and FWS violated NEPA by failing properly to consider reasonable alternatives in developing the management plan for Double-crested Cormorants. This refers to a previous lawsuit and remedy, see *Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv.*, 184 F. Supp. 3d 861 (D. Or. 2016). The Corps and Bureau of Reclamation were required to complete a programmatic NEPA document to include the operations, maintenance, and configuration of the Columbia River System, comprised of 14 federal dam and reservoir projects in Idaho, Montana, Oregon and Washington. The Columbia River System Operations FEIS was issued in July 2020. A Record of Decision is required, by Court Order, by September 30, 2020. The associated final biological opinion (opinion) prepared by NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7(a)(2) of the ESA on the effects of the proposed action includes the continuation of the Double-crested Cormorant Plan in the Columbia River Estuary (NOAA Fisheries, 2020). The second legal challenge is related to the Court Order vacating the public resources depredation order and the aquaculture depredation order. This is discussed in the FEIS.

APPENDIX C. Applicable Statutes, Executive Orders, Policies, and Regulations

Cultural Resources

American Indian Religious Freedom Act, as amended, 42 U.S.C. 1996 – 1996a; 43 CFR Part 7

Antiquities Act of 1906, 16 U.S.C. 431-433; 43 CFR Part 3

Archaeological Resources Protection Act of 1979, 16 U.S.C. 470aa – 470mm; 18 CFR Part 1312; 32 CFR Part 229; 36 CFR Part 296; 43 CFR Part 7

National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470-470x-6; 36 CFR Parts 60, 63, 78, 79, 800, 801, and 810

Paleontological Resources Protection Act, 16 U.S.C. 470aaa – 470aaa-11

Native American Graves Protection and Repatriation Act, 25 U.S.C. 3001-3013; 43 CFR Part 10

Endangered Species Act, 16 U.S.C. §§1531-1544

Executive Order 11593 – Protection and Enhancement of the Cultural Environment, 36 Fed. Reg. 8921 (1971)

Executive Order 13007 – Indian Sacred Sites, 61 Fed. Reg. 26771 (1996)

Fish and Wildlife

The Migratory Bird Treaty Act of 1918 (MBTA), as amended, 16 U.S.C. §§ 703–712

Bald and Golden Eagle Protection Act, as amended, 16 U.S.C. 668-668c, 50 CFR 22

Endangered Species Act of 1973, as amended, 16 U.S.C. 1531-1544; 36 CFR Part 13; 50 CFR Parts 10, 17, 23, 81, 217, 222, 225, 402, and 450

Fish and Wildlife Act of 1956, 16 U.S.C. 742 a-m

Lacey Act, as amended, 16 U.S.C. 3371 et seq.; 15 CFR Parts 10, 11, 12, 14, 300, and 904

Executive Order 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds, 66 Fed. Reg. 3853 (2001)

Water Resources

Coastal Zone Management Act of 1972, 16 U.S.C. 1451 et seq.; 15 CFR Parts 923, 930, 933

Federal Water Pollution Control Act of 1972 (commonly referred to as Clean Water Act), 33 U.S.C. 1251 et seq.; 33 CFR Parts 320-330; 40 CFR Parts 110, 112, 116, 117, 230-232, 323, and 328

Rivers and Harbors Act of 1899, as amended, 33 U.S.C. 401 et seq.; 33 CFR Parts 114, 115, 116, 321, 322, and 333

Safe Drinking Water Act of 1974, 42 U.S.C. 300f et seq.; 40 CFR Parts 141-148

Executive Order 11988 – Floodplain Management, 42 Fed. Reg. 26951 (1977)

Executive Order 11990 – Protection of Wetlands, 42 Fed. Reg. 26961 (1977)

APPENDIX D. Standard Authorization Conditions for Take

Under the current framework, the Service may issue depredation permits to manage cormorant damage at or near aquaculture facilities, alleviating human health and safety concerns, protecting threatened and endangered species (as listed under the Endangered Species Act of 1973, as amended), and reducing damage to property. The Service may also issue permits to take cormorants if there is convincing evidence that cormorants are adversely affecting species of high conservation concern (e.g., a regionally important bird population) or rare and declining plant communities at a local scale. Upon receiving a permit application for the take of migratory birds, the Service is required to process the permit application as quickly as possible (50 CFR 13.11(c)). Depredation permits are issued pursuant to 50 CFR 21.41, which authorizes the take of migratory birds that are injuring “crops or other interests”. The Service has historically interpreted “other interests” to mean property damage, human health and safety, and threatened and endangered species. A scientific collecting permit is required before any person can take, transport, or possess migratory birds, their parts, nests, or eggs for scientific research or education purposes (50 CFR 21.23).

Applicants for scientific collecting permits (50 CFR 21.23) follow similar procedures as applicants for depredation permits. Applicants must submit applications containing the species and numbers of migratory birds or their parts, nests, or eggs to be taken and the location or locations where activities will occur. In addition, the applicant must provide a statement of the purpose and justification for the permit, including an outline of any research project involved. Scientific collecting permits are also subject to additional permit conditions outlined in 50 C.F.R 13 and 50 CFR 21.23(c). A Form 37 is not required in scientific collecting permit applications.

Applicants for depredation permits are required to provide a description of: 1) the area where depredations are occurring; 2) the nature of the crops or other interests being injured; 3) the extent of such injury; and 4) the particular species of migratory birds committing the injury (50 CFR 21.41 (b)(1-4)). In accordance with conditions of issuance and acceptance of permits (50 CFR 13.21(e)(1)), practicable and effective non-lethal methods are required as the initial approach before implementing lethal measures. If non-lethal measures are ineffective, lethal methods may be considered in combination with non-lethal methods as a means to reinforce non-lethal measures. Therefore, applicants must also provide a description of the non-lethal measures that they have used and would continue to use (and which would be considered under 43 CFR 46.130(b)). WS assists the Service with issuance of migratory bird depredation permits by conducting interviews and site visits with individuals experiencing damage. WS collects information on the nature and extent of the damage, the species and number of migratory birds involved, non-lethal actions already taken to resolve the problem, and the results of the non-lethal actions.

WS supports efforts by the Service to minimize take authorized through depredation permits by recommending the appropriate number of birds to be removed on the WS Form 37. Form 37 is completed to assist in alleviating damage caused by migratory birds, including implementation measures to avoid and minimize take of non-target species in association with depredation permits. Form 37 and a description of any long-term measures to eliminate or significantly reduce the continued need for managing damage must be included in the permit application. Once a permit application is received, the Service can: 1) deny the application for a depredation permit; 2) issue a depredation permit at the removal level requested; or 3) issue a depredation permit for a different level of take. In addition, the Service may include appropriate conditions on each permit (50 CFR 13.21), such as measures to minimize disturbance to co-nesting species or prohibiting the take of a species at or near nesting colonies when dependent young are present. The Service may also apply conditions requiring continued use of non-lethal methods.

In all alternatives analyzed in this draft EIS, the Service would retain overall authority for the take of cormorants to ensure that levels of take are consistent with management objectives. States and tribes must use nonlethal methods, and determine that those methods are ineffective, before lethally taking cormorants. Lethal management should be considered as part of an integrated approach to managing cormorant conflicts and used only when other methods fail to resolve conflicts. No permit is required merely to scare or herd migratory birds other than threatened or endangered species or bald or golden eagles (see 50 CFR 21.41). The Service would periodically determine the population-specific numbers of cormorants that could be taken lethally during a specified number of years in efforts to reduce conflicts while sustaining cormorant abundances, and would authorize take at a level that would keep overall take near those levels (see [Appendix E](#) for a full description of the PTL assessment). The annual allocation of take would be based on recent demand by those entities and adjusted as needed (while remaining at or below population-specific allowable take levels) to respond to spatial and temporal changes in population status and the need to reduce conflicts in specific regions. The Service will prepare reports every five years and additionally as necessary to provide the public with information regarding the take of cormorants and the extent to which the regulatory framework ultimately used in any alternative, along with other management tools (e.g., depredation permits, 50 CFR 21.41), is achieving management objectives.

The special double-crested cormorant permit would be subject to the following conditions/restrictions:

1. States and tribes must use nonlethal methods, and independently determine that those methods are insufficient in controlling the depredation conflict, before lethally taking double-crested cormorants.
2. Lethal take of adults during the breeding season must occur prior to hatching of eggs to avoid the loss of adults that likely would result in orphaning chicks and their ultimate death due to starvation. Adult birds may not be taken at any nest with young in it unless the purpose of the take of adults is intended to address a human health and safety issue. States and tribes and their subpermittees must make efforts to avoid disturbance to co-nesting species. Existing research findings and publications detailing appropriate nonlethal methods and/or models for reducing conflicts should be used to justify activities.
3. A permit under this section does not authorize the taking of any other migratory bird, including other species of cormorants; the disturbance of bald or golden eagles; or the take of any species listed under the ESA as threatened or endangered. If these impacts to other migratory bird species or to threatened and endangered species are likely to occur, the permittee must obtain permits specifically authorizing those activities (i.e., additional migratory bird, Bald and Golden Eagle Protection Act, and/or threatened and endangered species permits).

4. Actions under the permit may be conducted during any time of the year on lands or in waters managed by state or tribal fish and wildlife agencies within their jurisdictions, or where states or tribes manage wild or stocked fish that are accessible by the public or all tribal members. Actions may occur only when cormorants are committing or are about to commit depredations at tribal- and state-owned or operated aquaculture facilities (including hatcheries); to alleviate impacts to health and human safety; reduce impacts to threatened and endangered species (as listed under the ESA or identified in state- or tribal-specific legislation as threatened or endangered) or those listed as Species of Greatest Conservation Need in state Wildlife Action Plans; and to prevent damage to state- or tribal-owned property and assets. Take activities to prevent depredation on aquatic Species of Greatest Conservation Need may occur only in natural or public waters. Permittees need to include a description of long-term plans to eliminate or significantly reduce continued need to take cormorants as part of their application. Permits will be issued annually. Permittees are required to submit an annual report by January 31 for activities conducted during the preceding calendar year. The report must detail the amount of lethal take that occurred under their permit and for what purpose the take was conducted.
5. Anyone undertaking lethal control with a firearm must use nontoxic shot or nontoxic bullets (50 CFR 20.21). However, this prohibition would not apply if an air rifle or an air pistol is used.
6. Individuals conducting lethal control may not use decoys, calls, or other devices or bait to lure birds within gun range.
7. Methods of take are at the discretion of the permittee responsible for the action, but must be accomplished by means of humane lethal take or active nest take. Lethal take may occur by firearm in accordance with paragraph (5) above or lethal or live traps. Active nest take may occur by egg oiling or destruction of nest material and contents (including viable eggs and chicks). Birds may be euthanized by cervical dislocation, CO₂ asphyxiation, or other methods recommended by the American Veterinary Medical Association. Only 100 percent corn oil, a substance exempted from regulation by the Environmental Protection Agency under the Federal Insecticide, Fungicide, and Rodenticide Act, may be used to oil eggs. Other damage control methods of take consistent with accepted wildlife damage management programs may be authorized.
8. States and tribes applying for the first time must consult with WS for an assessment of the appropriate level of take and provide recommendations of short-term measures to provide relief from depredation and long-term measures to help eliminate or significantly reduce conflicts. Wildlife Services provides a "Form 37 Permit Review Form". This form is required for first-time applicants only. Permittees need not submit a Form 37 for renewal applications unless requested by the regional Migratory Bird Permit Office. Permittees are expected to continue working with WS for review of management plans and for remaining current on best practices .
9. States and tribes and their employees and subpermittees may possess, transport, and otherwise dispose of cormorants taken. Cormorants killed and nests/eggs destroyed under the authority of this permit must be properly disposed of by donation to an entity authorized by permit or regulation to receive migratory birds, or be destroyed completely in accordance with federal, state, and/or local laws and ordinances. This may include donation to public museums or public scientific and educational institutions for exhibition, scientific, or educational purposes, or burial or incineration. This permit does not allow for birds or their parts or nests/eggs to be sold, offered for sale, bartered, or shipped for the purpose of sale or barter. Birds may not be retained for personal use.
10. This permit does not apply to any efforts to prevent depredation or harm to privately owned animals (e.g., hobby animals, pets, or similar categories of animals) that are raised free-range or otherwise released to the wild. Private landowners may apply for a depredation permit (50 CFR 21.41) to alleviate damage to some types of property (i.e., buildings and infrastructure; vehicles and equipment; some types of vegetation; and display animals, such as those in zoo exhibits).
11. States and tribes may designate subpermittees who must operate under the conditions of the permit. Subpermittees can be employees of state and tribal fish and wildlife agencies, WS employees, and employees of other federal, state, or tribal agencies or private companies specializing in wildlife damage abatement and under direct control of the permittee.
12. Any employee or subpermittee authorized by the state or tribe to carry out actions under the special permit must retain in their possession a copy of the state's or tribe's permit while carrying out any action.

13. Any state or tribal agency, when exercising the privileges of this permit, must keep records of all activities, including those of subpermittees, carried out under the authority of the special permit. Prior to any permit renewal, the Service will require an annual report detailing the activities conducted under the permit and the numbers of cormorants, nests, and eggs lethally taken, treated, or destroyed.
14. Nothing in the permit should be construed to authorize the take of cormorants, their eggs, or nests contrary to any state or tribal law or regulation or on any federal land without written authorization by the appropriate management authority. Further, none of the privileges granted under the permit shall be exercised without any state or tribal permit that may be required for such activities.
15. The scope of this permit applies to lands or in waters managed by state and tribal fish and wildlife agencies and within those agencies' jurisdictions. If a state or tribe must enter private property to access state and tribal lands or waters where take is approved in their permit, the state or tribe must obtain authorization from the private property owner, and require that the private property owner or occupant provide free and unrestricted access. The private property owner or occupant should also allow access at all reasonable times, including during actual operations, to any Service special agent or refuge officer, state or tribal wildlife or deputy wildlife agent, warden, protector, or other wildlife law enforcement officer on the premises where they are, or were, conducting activities. Furthermore, any state or tribal employee or approved subpermittee conducting such activities must promptly furnish information concerning such activities to any such wildlife officer.
16. The Service reserves the authority to immediately suspend or revoke any permit if the Service finds that the terms and conditions set forth in the permit have not been adhered to, as specified in 50 CFR 13.27 and 13.28.

APPENDIX E. Assessment of Double-crested Cormorant Take

Potential biological removal (PBR) models were used to estimate the impact of take on the double-crested cormorant population. Wade (1998) developed PBR models to determine the effect various levels of take had on marine mammals. Runge et al. (2004) extended the work of Wade (1998), explicitly tying the models to harvest theory, describing them as potential take level (PTL) models. The simplest form of the model is:

$$PTL = N_{min} \frac{r_{max}}{2} F_0,$$

where N_{min} is the minimum known population size, r_{max} is the maximum population growth rate, and F_0 is the management or recovery factor. Estimation of PTL should account for uncertainty in population size and population growth rate, if known. The PTL framework has previously been used as a tool to manage take of double-crested cormorants (USFWS 2009), and other nongame species (Runge et al. 2009, Johnson et al. 2012). The following paragraphs detail the data and assumptions used to estimate PTL for double-crested cormorants.

Population Subunits. The population of double-crested cormorants that either winter or breed in the continental United States is the target for this assessment. Three subspecies of double-crested cormorant occur in this area: *P. a. floridanus* which is resident in Florida and the Caribbean; *P. a. albociliatus* which breeds along the Pacific Coast from British Columbia to Baja California and inland to states on the western side of the Continental Divide; and *P. a. auritus*, which occurs over the remaining area and into Canada (Dorr et al. 2014). Because it is a different subspecies and occurs only in a small part of the overall range of concern, the Florida subspecies has PTL estimated separately. The population west of the Rocky Mountains (USFWS 2020) seldom mixes with other populations and is also a different subspecies, so it also has PTL estimated separately.

P. a. auritus was subdivided into two populations that conform to the existing North American flyway boundaries (Atlantic and Central plus Mississippi). This was based studies that used satellite telemetry and band recovery (Dolbeer 1991, Hatch 1995, Scherr et al. 2010, Guillaumet et al. 2011, Dorr et al. 2012, Chastant et al. 2014). In addition, raw band-recovery data (acquired from the USGS Bird Banding Laboratory 21 November 2019: 244,251 banding records and 15,113 recovery records from 1923 to 2019) was used to examine boundaries of populations. The population east of the Appalachian Mountains and into Quebec and the Maritimes had <10% of banded individuals recovered in other flyways and was considered separate. Cormorants in the Central flyway predominantly breed in the ‘Prairie’ (Alberta, Manitoba, Saskatchewan, North Dakota and South Dakota) while those in the Mississippi flyway breed in the ‘Great Lakes’ (Ontario, Michigan, Minnesota, Ohio, and Wisconsin). However, there is mixing of these birds in the Lower Mississippi Valley during winter, especially birds from the Central flyway that move south and east. Approximately 40% of breeding birds banded in the Central flyway that were recovered during winter were recovered in the Mississippi flyway. In addition, about 15% of birds banded as breeders in the Central flyway and subsequently recovered were recovered during the breeding season in the Mississippi flyway. Combining cormorants from the Central and Mississippi flyways into a single population is in agreement with the suggestions of Dolbeer (1991) and Hatch (1995).

N_{min} . Minimum population sizes were calculated for the two populations of *P.a. auritus* and for the *P. a. albociliatus* and *P.a. floridanus* populations (Table E2). The range of N_{min} estimates represents high and low observations over a number of years from individual states and provinces, or uncertainty in point estimates provided by surveyors (Table E1). The *P. a. floridanus* subspecies breeds in Florida and the Caribbean and is considered non-migratory (Dorr et al. 2014). The breeding population size of this subspecies in Florida is much smaller than that of *P.a. auritus* (Table E2). However, the two subspecies intermix during winter in Florida and are indistinguishable (but see Sheehan 2013). Therefore, a separate PTL analysis was done for the entire state of Florida. Individuals killed during the breeding season in Florida should be considered the *floridanus* subspecies, and birds killed during winter would be of unknown subspecies. A conservative approach to the PTL analysis was used for the state of Florida: the size of *P.a. floridanus* breeding population was used as N_{min} .

PTL assessment requires N_{min} be expressed as number of individuals, yet nearly all counts of cormorants in the literature are expressed as the number of nests or breeding pairs. Cormorant census data come from nest counts conducted in the United States and Canada. The numeric range in counts represents high-low years, or best guess by state biologists (Table E1). Nest counts are likely an underestimate of the breeding population because of nest failure and re-nesting not observed by surveyors, missed colonies, and nest detection <100% at surveyed colonies. Nest counts do not survey non-breeding birds, i.e., young of year, two-year-olds, and some proportion of adults. It is thought that the proportion of adults that do attempt to breed is high (Dorr et al. 2014).

One and two-year-old cormorants seldom breed but are exposed to take. To get a total estimate of breeding plus non-breeding birds given only nest counts (C), a pre-breeding multiplier (PBM) was derived using data from a breeding season flock composition study (Dorr et al. 2016). Dorr et al. (2016) collected reproductive condition data from cormorant feeding flocks in a single year in Michigan, Minnesota, and Vermont ($n=358$ females), and estimated that 22.1% of birds in these flocks were non-reproductive. Thus, total breeders equals $2 \times C$, and total non-breeders $2 \times C \times 0.28$, with $PBM=2.567$. The resultant estimate of population size (N) is a pre-breeding estimate: $N=PBM*C$.

An alternative method to estimate PBM is by using a projection matrix approach, estimating (and assuming) a stable age distribution in the population given demographic parameters, then calculating the proportion of pre-adult birds. This approach assumes all adults breed and no pre-adult birds breed. This approach can be used to estimate a pre- or post-breeding number of cormorants. For a post-breeding census the Leslie matrix can be parameterized:

$$\begin{bmatrix} N_{HY}(t+1) \\ N_{SY}(t+1) \\ N_{ASY}(t+1) \end{bmatrix} = \begin{bmatrix} 0 & 0 & S_{ASY}b \\ S_{HY} & 0 & 0 \\ 0 & S_{SY} & S_{ASY} \end{bmatrix} \times \begin{bmatrix} N_{HY}(t) \\ N_{SY}(t) \\ N_{ASY}(t) \end{bmatrix}$$

where b is annual fecundity, and S is annual survival by age class: HY=hatch year; SY=second year; and ASY=after-second-year. A pre-breeding Leslie matrix parameterization could be:

$$\begin{bmatrix} N_{SY}(t+1) \\ N_{ASY}(t+1) \end{bmatrix} = \begin{bmatrix} 0 & S_{HY}b \\ S_{SY} & S_{ASY} \end{bmatrix} \times \begin{bmatrix} N_{SY}(t) \\ N_{ASY}(t) \end{bmatrix}$$

Seamans et al. (2012) estimated age-specific survival for the Great Lakes population of cormorants using capture-recovery data from 1979 to 2006 ($S_{HY}=0.45$, $S_{SY}=0.84$, and $S_{ASY}=0.88$). Seamans (M.E. Seamans, U.S. Fish and Wildlife Service, unpublished data) estimated fecundity of 0.36. Solving the stable age distribution iteratively resulted in an age-class (HY, SY, ASY) proportional distribution for the post-breeding approach of [0.217, 0.25, 0.685] and $PBM=2.92$. Using the pre-breeding approach resulted in a stable age distribution (SY, ASY) of [0.138, 0.862] and $PBM=2.32$.

Neither the Dorr approach nor the matrix approach directly account for non-breeding adults. Dorr et al. (2016) did not identify the age (SY v ASY) of birds killed in feeding flocks. The matrix approach explicitly assumes all ASY breed, which is unlikely. However, the two approaches resulted in PBM estimates that were similar. The range for PBM (2.320–2.567) was used to calculate N_{min} .

r_{max} . From 1979–2009 annual counts of breeding cormorants were available for three Great Lakes: Erie, Huron, and Ontario. Annual harvest data were also available during this time period. These count and harvest data were used to estimate r_{max} . Starting about 1979 the cormorant population in the Great Lakes experienced rapid growth, going from near zero breeding birds to over 200,000. A discrete-time logistic population growth model was fit to the data to estimate r_{max} . The form of the logistic growth model was:

$$N_{t+1} = N_t + r_{max} N_t \left[1 - \frac{N_t}{K} \right] - H_t,$$

where N_t was number of breeding birds in year t , K was carrying capacity (estimated from the model), and H_t total harvest in year t . The estimate of r_{max} and its uncertainty ($r_{max}=0.3577$, SE=0.0933, 95% CI 0.1666 to 0.5487) was used in PTL analyses for all populations of cormorants.

F_0 . The value to use for F_0 is dependent on management goals and can be set between 0 and 2. If the goal is to have the largest population of cormorants possible then F_0 is set at or near 0, thus resulting in a population at or near its carrying capacity. As an example, an $F_0 = 0.1$ was recommended for whales which have special protections (Wade 1998). For many game species F_0 is set at or near 1, which theoretically results in the maximum sustained annual yield (MSY) over time. If the actual take level occurs as prescribed when F_0 is 1, then the resultant population size should be at half of carrying capacity. An $F_0 > 1$ might be chosen for over-abundant species if the goal is to drastically reduce population size.

Double-crested cormorants are not considered a sensitive species thus an $F_0 \sim 0.1$ is not required. Because cormorants have no special protections or designations, take could be allowed to approach that of a game species managed for MSY. However, allowing annual take at $\frac{1}{2} r_{max}$ may require increased population monitoring to ensure over-harvest is not occurring. An $F_0 = 1.0$ was chosen for the *P.a. auritus* and *P. a. albociliatus* populations. For *P.a. floridanus* an $F_0 = 0.5$ was chosen because the population is much smaller, more isolated, and fewer monitoring programs are in place to assess the effect of take on the subspecies.

Simulating PTL. A simulation approach was used to estimate PTL and its uncertainty. Uncertainty in PTL estimates came from sampling uncertainty distributions for key parameters. When a range of values was available to represent uncertainty in population size, a sample was randomly selected from a uniform distribution bounded by the range of estimates. This process accounted for uncertainty related to the pre-breeding multiplier, incomplete counts, counts completed in different years, etc. We also allowed for uncertainty related to the count or observation process; we included a multiplicative, random observation error, $\theta \sim \text{Normal}(0, \sigma_{obs}^2)$, with σ_{obs}^2 drawn from a uniform distribution between 0.1 and 0.2 (i.e., observation error produced a CV = 10 – 20%). The magnitude of uncertainty was based on the observed CV in annual nest counts from Lakes Erie, Huron, and Ontario 1995 – 2009 (i.e., CV=16%). Population growth rate was sampled from a normal distribution with mean and standard deviation based the estimation of r_{max} (above). The final model to assess allowable take of cormorants while accounting for uncertainty in population size, survey sampling error, observation error, and uncertainty related to population growth rate was:

$$\begin{aligned} N &= C \exp(\theta) \\ C &\sim \text{Uniform}(C_{low}, C_{high}) \\ \theta &\sim \text{Normal}(0, \sigma_{obs}^2) \\ \sigma_{obs} &\sim \text{Uniform}(0.1, 0.2) \\ r_{max} &\sim \text{Normal}(\mu_{r_{max}}, \sigma_{r_{max}}^2) \end{aligned}$$

A simulation with 10,000 iterations from the model above was used to estimate PTL for each population. Program R (R Core Team 2012) was used to execute the simulations. Results are presented in Table E2.

Literature Cited in Appendix E: Assessment of Take.

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Table E-1. Number of breeding pairs of cormorants in populations/states/provinces. "Source" designates where updated info for 2019 came from.

Subpop.	State/Province	Breeding Pairs	Source
Atlantic			
Connecticut	858	A	
DC	0	A	
Delaware	36	A	
Georgia	10-100	A	
Maine	19,408	A	
Maryland	2,900	A	
Massachusetts	6,883-8,181	A, H	
New Hampshire	20	A	
New Jersey	60-70	A	
New York	6333	A	
North Carolina	50	G	
Pennsylvania	122	A	
Rhode Island	2400	A	
South Carolina	200	A	
Vermont	2,000	A	
Virginia	2,876-8,012	A, H	
West Virginia	No data	2017 EA	
US subtotal	44,156-47,690		
Maritimes	37,000	B	
Quebec	28,346 - 29,780	C	
Canada subtotal	65,346 - 66,780		
Atlantic Total	109,502 - 114,470		
Central + Mississippi			
Alabama	550	2017 EA	
Arkansas	150	2017 EA	
Colorado	1,450	D	
Illinois	754	2017 EA	
Indiana	1,800	2017 EA	
Iowa	1,100-1,600	2017 EA	
Kansas	3	2017 EA	
Kentucky	800	2017 EA	
Louisiana	150	2017 EA	
Michigan	25,000-30,000	2017 EA	
Minnesota	15,421	2017 EA	
Mississippi	200-500	2017 EA	

Missouri	300-500	2017 EA
Montana	1,680	D
Nebraska	50-300	2017 EA
New Mexico	92	D
North Dakota	14,179	2017 EA
Ohio	3,500	2017 EA
Oklahoma	50-100	2017 EA
South Dakota	12,633	2017 EA
Tennessee	500	2017 EA
Texas	60	2017 EA
Wisconsin	11,424	2017 EA
Wyoming	100	D
US subtotal	91,946 - 98,246	
Ontario	60,606	E
Prairie Region	83,840	E
Manitoba		
Saskatchewan		
Alberta		
Canada subtotal	144,446	
Central + Mississippi Total	236,392 - 242,692	
Pacific		
Western US	22,164 to 37,454	F
Arizona		
British Columbia		
California		
Idaho		
Nevada		
Oregon		
Utah		
Washington		
Florida	8,000	G

A: Mid-Atlantic/New England Maritime Colonial Waterbird Survey, 2013

B: 2018 estimate for the Maritimes from JF Rail (Canadian Wildlife Service; personal communication)

C: Quebec estimates from 2003 – 2019, JF Rail (personal communication)

D: 2011 estimate from Cavitt et al. 2014

E: 2014 estimate for the Prairie Region and Ontario from JF Rail (personal communication).

F: U.S. Fish and Wildlife Service. 2020.

G: Florida estimate from C Johnson (North Carolina Wildlife Resources Council; personal communication).

Table E2. Pre-breeding double-crested cormorant population estimates (breeders and non-breeders; Low-High represents the range in estimates). Median estimate and lower 60% confidence interval (L60% CI) of the potential take level (PTL). The L60% CI was used as the maximum allowable annual take level.

Subspecies	Population size		PTL	
Region	Low	High	L60% CI	Median
<i>P. a. auritus</i>				
Atlantic Flyway				
Atl. Canada & Quebec	151,603	171,421		
Atlantic United States ¹	102,442	122,439		
Atlantic Total	254,045	293,860	37,019	48,679
Mississippi & Central Flyway				
Canada	335,115	370,850		
United States	213,315	252,236		
Miss. & Cent. Total	548,430	623,086	78,632	103,882
<i>P. a. albociliatus</i>				
Pacific Flyway				
U.S. & Canada	49,966	94,272	9,077	12,503
<i>P. a. floridanus</i>				
Florida ²	18,560	20,539	1,314	1,736

¹does not include Florida.

²allowable take in Florida based only on population size of *P.a. floridanus*.

APPENDIX F. Federally listed Fish Species within the Affected Environment

Bull Trout (*Salvelinus confluentus*)

This DPS includes all bull trout within the contiguous United States (USFWS 2014). Bull trout in the Columbia River Basin exhibit a resident, fluvial (migration between different streams or rivers), and adfluvial (migration between streams and lakes) life histories. Use of the CRE by bull trout is believed to be minimal because these populations are not anadromous (USFWS 2014). Adult bull trout spawn in late summer to late fall (August to November) and reach maturity at four to seven years of age (USFWS 2014). Fish can live to be 12 years old. Size at maturity varies by location and life history (migratory versus resident), but is generally between 12 and 20 inches total length, with fish greater than 30 inches and 30 pounds observed (USFWS 2014). PIT tags implanted in juvenile and sub-adult bull trout have been detected on a cormorant colony located in the middle Columbia River (Roby et al. 2013); however, bull trout PIT tags have not been recovered on the East Sand Island cormorant colony, nor have bull trout been identified in cormorant diet samples. As such, there is no evidence that cormorants nesting on East Sand Island have consumed bull trout in the Lower Columbia River Basin to date.

Lower Columbia River Chinook Salmon (*Oncorhynchus tshawytscha*)

This ESU includes all naturally spawned populations of Chinook salmon from the mouth upstream to the Hood River and the White Salmon River, including the Willamette River to Willamette Falls, Oregon (NOAA 2011a). Select hatchery stocks are also included in the ESU. Juveniles typically out-migrate to the ocean in the spring (April-June) as yearlings or in late spring to summer (June-August) as subyearlings. Numerically, hatchery-reared subyearlings dominate the juvenile population, with between 50 and 100 million subyearlings released annually into the Lower Columbia River Basin since the 1990s (NOAA 2011a). Based on the recovery of a small number of PIT-tagged lower Columbia River hatchery Chinook, annual predation rates by cormorants nesting on East Sand Island averaged 26 percent (range = 4-40 percent) of available fish during 2007-2010 (Lyons et al. 2014), representing some of the highest salmonid predation rates documented. Data indicate that hatchery stocks released in close proximity to East Sand Island and subyearling Chinook were the most vulnerable to cormorant predation in the CRE (Sebring et al. 2013). Due to a lack of wild Chinook PIT-tagging for this ESU, especially below Bonneville Dam, and the disproportionate tagging of fish in proximity to East Sand Island, however, it is unknown how representative these predation rate estimates are to all Chinook from the Lower Columbia River ESU (Lyons et al. 2014). Diet composition data collected from cormorants nesting on East Sand Island also indicate that subyearling Chinook are particularly vulnerable to cormorant predation, with average annual consumption estimates of 7.8 million (range = 1.9-15.6) subyearling Chinook during 2004-2013. Although this estimate includes subyearling Chinook from all Columbia River Basin populations (Lower Columbia River, Snake River, Upper Columbia River, and others combined), genetic analysis indicates that most (about 70 percent) of subyearling Chinook consumed by cormorants originate from the Lower Columbia River ESU (Roby et al. 2014).

Snake River Fall-run Chinook Salmon

This ESU includes all naturally spawned fall-run Chinook salmon in the lower Snake River and in lower reaches of the Tucannon River, Grande Ronde River, Imnaha River, Salmon River, and Clearwater River sub-basins (NOAA 2011a). Select hatchery stocks are also included in the ESU. Juveniles out-migrate during the spring as yearlings or in late spring to early fall (June–September) as subyearlings (Keefer and Peery 2008). Predation rates by cormorant nesting on East Sand Island indicate that an average of three

percent (range = two to five percent) of available Snake River fall-run Chinook smolts were annually consumed by cormorants during 2004-2013.

Snake River Spring/Summer-run Chinook Salmon

This ESU includes all naturally spawned populations of spring/summer-run Chinook salmon in the mainstem Snake River and the Tucannon River, Grande Ronde River, Imnaha River, and Salmon River sub-basins (NOAA 2011a). Select hatchery stocks are also included in the ESU. Snake River spring/summer-run Chinook salmon out-migrate in the spring as yearlings. Predation rates by cormorants nesting on East Sand Island indicate that an average of four percent (range = two to seven percent) of available Snake River spring/summer Chinook smolts were annually consumed by cormorants during 2004-2013.

Upper Columbia River Spring-run Chinook Salmon

This ESU includes all naturally spawned populations of spring-run Chinook salmon in tributaries upstream of Rock Island Dam and downstream of Chief Joseph Dam in Washington State (NOAA 2011a). Select hatchery stocks are also included in the ESU. Upper Columbia River spring-run Chinook are one of two ESA-listed Columbia River Basin salmonid populations designated as endangered (the other being Snake River sockeye), and they are considered to be at a high risk of extinction (NOAA 2011a). Upper Columbia River spring-run Chinook salmon out-migrate during the spring as yearlings. Predation rates by cormorants nesting on East Sand Island indicate that an average of four percent (range = two to six percent) of available Upper Columbia River spring-run Chinook smolts were annually consumed by cormorants during 2004-2013.

Upper Willamette River Chinook Salmon

This ESU includes all naturally spawned spring-run Chinook salmon in the Clackamas River and in the Willamette River and its tributaries, above Willamette Falls, Oregon (NOAA 2011a). Select hatchery stocks are also included in the ESU. Upper Willamette River Chinook salmon out-migration times vary considerably compared to other ESA-listed salmonid populations in the Columbia River Basin, with fish out-migrating nearly year-round (Fish Passage Center 2014). Peak out-migration generally occurs in the spring as yearlings. Predation rates by cormorants nesting on East Sand Island indicate that an average of two percent (range = one to four percent) of available Upper Willamette River Chinook smolts were annually consumed by cormorants in the CRE during 2007-2013.

Columbia River Chum Salmon (*O. keta*)

This ESU includes all naturally spawned chum salmon in the Columbia River and its tributaries in Oregon and Washington (NOAA 2011a). Select hatchery stocks are also included in the ESU. Although all naturally spawned chum salmon found in the Columbia River are included in the ESU, the vast majority of Columbia River chum originate in streams located downstream of Bonneville Dam (NOAA 2011a). Chum salmon fry out-migrate shortly after emergence in late winter to spring (March-May). Juvenile chum salmon may reside and feed in the Upper or Lower CRE before entering the open ocean (Groot and Margolis 1991). There are no PIT tag-based predation rate estimates available for Columbia River chum. Diet composition data from cormorants nesting on East Sand Island indicate that chum salmon are rarely consumed, however, with only one juvenile salmonid genetically identified as a chum salmon out of 451 samples tested (Lyons et al. 2014). Consequently, impacts to Columbia River chum salmon from cormorants nesting on East Sand Island were likely minimal, although data regarding ESU-specific predation rates are lacking.

Lower Columbia River Coho Salmon (*O. kisutch*)

This ESU includes all naturally spawned populations of coho salmon in the Columbia River and its tributaries, from the mouth up to and including the Big White Salmon River and Hood River and up the Willamette River to Willamette Falls, Oregon (NOAA 2011a). Select hatchery stocks are also included in the ESU. Lower Columbia River coho out-migrate during the spring as yearlings. Similar to other ESA-listed salmonid populations that originate in the Lower Columbia River Basin, the majority of coho from this ESU are found in streams located downstream of Bonneville Dam. Based on the limited number of coho PIT-tagged downstream of Bonneville Dam, predation rates by cormorants nesting on East Sand Island on juvenile coho averaged 28 percent (range = 10-30 percent) of the available fish during 2007-2010 (Lyons et al. 2014), representing some of the highest salmonid predation rates documented. Few wild coho, however, were PIT-tagged, and estimates were based predominately on select groups of hatchery fish released in proximity to East Sand Island; thus, it is unknown how representative these predation rate estimates are to all coho from the Lower Columbia River ESU (Lyons et al. 2014). Diet composition data collected from cormorants nesting on East Sand Island also indicate that juvenile coho are particularly vulnerable to cormorant predation in the CRE, with average annual consumption estimates of 2.4 million (range = 0.3-4.8) smolts during 2004-2013. Although this estimate includes coho from all populations or stocks combined, genetic analysis indicates that most (ca. 80 percent) coho found in cormorant diet samples originated from the Lower Columbia River ESU (Roby et al. 2014).

Pacific Eulachon (*Thaleichthys pacificus*)

This DPS includes eulachon from the Mad River in northern California to the Elwha River in Washington, an area referred to as the southern DPS (NOAA 2014a). Pacific eulachon are small (maximum length approximately 9 inches), anadromous fish (NOAA 2014a). The Columbia River and its tributaries are believed to support the largest eulachon runs in the southern DPS (NOAA 2011b). Although little is known about the movement of larvae and juvenile eulachon, they are believed to move quickly through the estuary (weeks), are widely distributed in the ocean, and are typically found in deep water (60 to 450 feet; NOAA 2011b). In the Columbia River, adult eulachon return to spawn in late winter to early spring (February to early April; NOAA 2011b). Due to their small size, eulachon are susceptible to cormorant predation throughout their entire life cycle. There is very little temporal overlap, however, between the cormorant nesting season (April to September) and the adult eulachon spawning run. Furthermore, eulachon (juveniles or adults) have not been identified in East Sand Island cormorant diet samples, so the impact of nesting cormorants on eulachon in the Lower Columbia River Basin is presumed to be low. The impact of non-breeding birds or breeding birds that arrive in the Columbia River Estuary before the nesting season, however, is unknown. There are no PIT tag-based predation rate estimates available for Pacific eulachon.

Snake River Sockeye Salmon (*O. nerka*)

This ESU includes all anadromous sockeye from the Snake River Basin, Idaho, as well anadromous and resident sockeye salmon (referred to as kokanee) from Redfish Lake, Idaho (NOAA 2011a). One hatchery stock, from the Redfish Lake Captive Program, is included in the ESU. Snake River sockeye are one of two Columbia River Basin salmonid populations designated as endangered (the other being Upper Columbia River spring-run Chinook), and although adult return numbers have recently improved, they are still considered to be at a high risk of extinction (NOAA 2011a). Anadromous juvenile Snake River sockeye out-migrate in the spring as yearlings. Predation rates by cormorants nesting on East Sand Island indicate that an average of four percent (range = three to six percent) of available anadromous Snake River sockeye smolts were annually consumed by cormorants during 2009-2013.

Lower Columbia River Steelhead (*O. mykiss*)

This DPS includes all naturally spawned steelhead populations below impassable barriers in streams and tributaries of the Columbia River between the Cowlitz and Wind Rivers, Washington, the Willamette River to Willamette Falls, Oregon, and the Hood River, Oregon (NOAA 2011a). Select hatchery stocks are also included in the DPS. Juvenile Lower Columbia River steelhead out-migrate as yearlings in the spring. There are no PIT tag-based predation rate estimates available for this DPS. Smolt consumption estimates based on diet composition data are also lacking. Predation rate data from other steelhead DPSs (those originating entirely upstream of Bonneville Dam) indicate that juvenile steelhead are susceptible to cormorant predation in the CRE, with average annual predation rates ranging from two to 17 percent (depending on the DPS and year). Because data from other salmonid ESUs or DPSs indicate that fish that originate or are released in proximity to East Sand Island may be particularly vulnerable to cormorant predation, it is possible that impacts to Lower Columbia River steelhead are greater than those implied by predation rate estimates on Middle Columbia River, Upper Columbia River, and Snake River steelhead (see below).

Middle Columbia River Steelhead

This DPS includes all naturally spawned steelhead populations from above the Wind River, Washington, and the Hood River, Oregon, upstream to, and including, the Yakima River, Washington (NOAA 2011a). Select hatchery stocks are also included in the DPS. Lower Columbia River steelhead out-migrate as yearlings in the spring. Predation rates by cormorants nesting on East Sand Island indicate that an average of eight percent (range = two-15 percent) of available Middle Columbia River steelhead smolts were annually consumed by cormorants during 2007-2013.

Snake River Steelhead

This DPS includes all naturally spawned steelhead populations in streams in the Snake River Basin in Washington, Oregon, and Idaho (NOAA 2011a). Select hatchery stocks are also included in the DPS. Snake River steelhead out-migrate as yearlings in spring. Predation rates by cormorants nesting on East Sand Island indicate that an average of eight percent (range = three-17 percent) of available Snake River steelhead smolts were annually consumed by cormorants during 2004-2013.

Upper Columbia River Steelhead

This DPS includes all naturally spawned steelhead populations below impassable barriers in streams in the Columbia River Basin upstream from the Yakima River, Washington, to the United States-Canada border (NOAA 2011a). Select hatchery stocks are also included in the DPS. Upper Columbia River steelhead out-migrate as yearlings in the spring. Predation rates by cormorant nesting on East Sand Island indicate that an average of six percent (range = three-11 percent) of available Upper Columbia River steelhead smolts were annually consumed by cormorants during 2004-2013.

Upper Willamette River Steelhead

This DPS includes all naturally spawned winter-run steelhead populations in the Willamette River, Oregon, and its tributaries upstream from Willamette Falls to the Calapooia River, Oregon (NOAA 2011a). Hatchery stocks are not included in the DPS. Upper Willamette River steelhead out-migrate as yearlings in the spring. There are no PIT tag-based predation rate estimates or smolt consumption estimates available for this DPS. Regardless, it is reasonable to assume cormorant predation on Upper Willamette River steelhead is roughly comparable to that of other steelhead DPSs originating upstream of the Lower Columbia River Basin (Middle Columbia River, Upper Columbia River, and Snake River basins), which ranges from two to 17 percent of available fish per year.

Other ESA-listed Fish Species outside of the Columbia River Basin

Ten fish species, representing eleven different ESA-listed ESUs or DPSs, occur in regions other than the Lower Columbia River Basin and are potential prey to cormorants within the subregions of the affected environment. Bull trout and Pacific eulachon, addressed in the previous section, also occur in areas other than the Lower Columbia River Basin. A shortened description for these two species is provided herein. It is important to note that many of the ESA-listed fish described are anadromous or marine species, and, as such, they may occur in several different regions during their life cycle. Empirical data regarding cormorant predation on ESA-listed fish outside of the Lower Columbia River Basin are generally lacking. With the exception of a few temporally limited studies within a few Oregon Coast estuaries, little to no empirical data are available to estimate rates of cormorant predation on these fish species. Where data are available, they are provided. When not available, the potential for cormorants to impact ESA-listed fish is primarily based on the spatial and temporal overlap between cormorants in each subregion and critical habitat designations of ESA-listed fish within those subregions. Discussion is focused on the juvenile life stage of each ESA-listed ESU or DPS (with the exception of Pacific eulachon) and assumes predation takes place within the subregion of interest.

Bocaccio Rockfish

This DPS includes fish within the Puget Sound and Georgia Basin (NOAA 2013), the eastern section of the Salish Sea subregion. Rockfish have internal fertilization and bear live young (viviparous). Following birth, larvae are found close to the surface in pelagic waters (NOAA 2013). Larvae and juveniles then temporarily settle in nearshore shallow water habitat before moving to deep water (50 to 750 feet; NOAA 2013), below the foraging depth reported for cormorants (Dorr et al. 2014). Based on their use of deep water habitat and large size at reproduction (typically more than 16 inches), interactions between bocaccio and cormorants in the Salish Sea subregion are likely minimal, although larvae and juveniles may be susceptible to cormorant predation.

Bull Trout

This DPS includes all bull trout within the contiguous United States (USFWS 2014a). Bull trout that occur in streams along the Washington Coast and Salish Sea subregions exhibit a resident, fluvial, adfluvial, and anadromous life history (USFWS 2014a). Bull trout susceptibility to cormorant predation may be greater for migratory fish compared with resident fish, especially for bull trout that utilize estuaries.

Canary Rockfish

This DPS includes fish within Puget Sound and Georgia Basin (NOAA 2013), the eastern section of the Salish Sea subregion. Similar to bocaccio, larvae canary rockfish are pelagic and then move to nearshore rocky areas to rear as juveniles (NOAA 2013). Juvenile canary rockfish are typically found in water 40 to 60 feet deep, but may use shallower water, particularly at night (NOAA 2013). Sub-adults and adults then move to deep water (more than 100 feet), outside the foraging depth reported for cormorants (Dorr et al. 2014). Based on their use of deep water habitats and the large size of fish at reproduction (more than 16 inches), interactions between canary rockfish and cormorants in the Salish Sea subregion are likely minimal, although larvae and juvenile canary rockfish may be susceptible to cormorant predation.

Puget Sound Chinook Salmon

This ESU includes all naturally spawned Chinook salmon from rivers and streams flowing into Puget Sound, including westward along the Strait of Juan de Fuca to the Elwha River and north along the Strait of Georgia in Washington (NOAA 2011a). Select hatchery stocks are also included in the ESU. Substantial variation occurs in the amount of time juvenile Chinook spend in freshwater and estuarine environments before entering the ocean. Most Puget Sound Chinook salmon out-migrate as

subyearlings and may spend several months rearing in estuaries, including use of tidal marshes, dikes, and ditches. During their first ocean year, juvenile Puget Sound Chinook salmon can remain in nearshore marine habitats (NOAA 2011a). Extended use of estuaries and nearshore marine environments by juvenile Puget Sound Chinook suggests they could be vulnerable to cormorant predation.

Hood Canal Chum Salmon

This ESU includes all naturally spawned summer-run chum salmon in Hood Canal and its tributaries, as well as those in the Olympic Peninsula rivers between Hood Canal and Dungeness Bay, Washington (NOAA 2011a). Select hatchery stocks are also included in the ESU. Hood Canal chum salmon out-migrate shortly after hatching as fry in late winter (February–March) and rear in deltas and estuaries, which support a diverse array of habitats (tidal channels, mudflats, marshes, and eelgrass meadows; NOAA 2011a). Juveniles remain in estuary and delta habitats for several weeks before entering the ocean. Similar to Puget Sound Chinook salmon, use of estuary and delta habitats by juvenile chum suggests they could be vulnerable to cormorant predation.

Oregon Coast Coho Salmon

This ESU includes all naturally spawned coho salmon in Oregon coastal streams south of the Columbia River and north of Cape Blanco, Oregon (NOAA 2011a). The hatchery stock from Cow Creek is included in the ESU. Juveniles out-migrate as yearlings in the spring. ODFW is concerned that cormorants may be significantly impacting coastal salmonid populations and is partway through a three-year study to assess the impacts of cormorant predation on salmonid populations along the Oregon coast. Based on current analyses, results to date indicate that juvenile salmonids in coastal estuaries are susceptible to cormorant predation.

Southern Oregon/Northern California Coast Coho Salmon

This ESU includes all naturally spawned coho salmon in coastal streams between Cape Blanco, Oregon, and Punta Gorda, California (NOAA 2011a). Select hatchery stocks are also included in the ESU. Juveniles out-migrate as yearlings in the spring. No empirical data to evaluate Southern Oregon/Northern California Coast coho predation by cormorants in the Oregon Coast subregions are currently available. Data from Adrean (2013) and Clements et al. (2012), however, suggest that coho smolts along the northern Oregon Coast may be vulnerable to cormorant predation in estuary environments, and estuaries with cormorant colonies exist in this subregion (e.g., Rogue River Estuary, Oregon).

Pacific Eulachon

This DPS includes eulachon from the Mad River in northern California to the Elwha River in Washington; an area referred to as the southern eulachon DPS. Eulachon larvae out-migrate to the ocean shortly after hatching and spend the majority (more than 95 percent) of their lives in the ocean (NOAA 2011b). Although little is known about the movement of larvae and juvenile eulachon, they are believed to be widely distributed in the ocean and are typically found in deep water (60 to 450 feet; NOAA 2011b). Along the Oregon and Washington Coast, adult eulachon return to spawn in late winter to early spring (NOAA 2011b). No empirical data to evaluate eulachon predation by cormorants in the Oregon Coast, Washington Coast, and Salish Sea subregions currently exist. Due to their small size, eulachon are susceptible to cormorant predation throughout their life cycle. There is little temporal overlap, however, between the cormorant nesting season (April to September) and the eulachon spawning run, and juvenile eulachon may be too dispersed in the open ocean and deep in the water column to be susceptible to cormorant predation.

Ozette Lake Sockeye Salmon

This ESU includes all naturally spawned sockeye salmon in Ozette Lake, Washington, and streams and tributaries connected to Ozette Lake. Two hatchery stocks, Umbrella Creek and Big River, are also part of the ESU (NOAA 2011a). Juveniles rear in Ozette Lake and out-migrate via the Ozette River as yearlings in the spring (NOAA 2011a). No empirical data exist to evaluate Ozette Lake sockeye predation by cormorants along the Washington Coast subregion. The out-migration timing and size of Ozette Lake sockeye, however, suggest they could be susceptible to cormorant predation, especially if juvenile sockeye reside or congregate in or near the Ozette River estuary or other habitats where cormorants dispersed from East Sand Island forage.

Puget Sound Steelhead

This DPS includes all naturally spawned steelhead in streams in the river basins of the Strait of Juan de Fuca, Puget Sound, and Hood Canal, Washington, bounded to the west by the Elwha River and to the north by the Nooksack River and Dakota Creek. Hatchery winter-run steelhead stocks from the Green River and Hamma are included in the DPS. Puget Sound steelhead out-migrate as yearlings in the spring. Little is known about estuary and nearshore marine habitat use following out-migration, but steelhead smolts are believed to move offshore more quickly as compared with Puget Sound Chinook and Hood Canal chum salmon (NOAA 2011a).

Yelloweye Rockfish

This DPS includes fish within Puget Sound and Georgia Basin (NOAA 2013), the eastern section of the Salish Sea subregion. Compared with bocaccio and canary rockfish, juvenile yelloweye rockfish are typically found in deep water (around 100 feet; NOAA 2013), outside the foraging depth reported for cormorants (Dorr et al. 2014). Yelloweye rockfish are also considered solitary and are rarely found in groups or aggregations (NOAA 2013). Based on their presence in deep water for the vast majority of their lives, including the juvenile life stage, and the large size of fish at reproduction, interactions between yelloweye rockfish and cormorants in the Salish Sea subregion are likely minimal, although larvae fish may be susceptible to cormorant predation.

APPENDIX G. Literature Cited

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APPENDIX H. U.S. Fish and Wildlife Service Application Form; Special Double-crested Cormorant (Migratory Bird Treaty Act; 50 CFR 21.28)

<p>FWS Form 3-200-90 (Rev. 10/2020) U.S. Department of the Interior</p> 	<p style="text-align: center;">FEDERAL FISH AND WILDLIFE PERMIT APPLICATION FORM <i>Special Double-Crested Cormorant</i> <i>(Migratory Bird Treaty Act; 50 CFR 21.28)</i></p> <p style="text-align: center;">U.S. FISH AND WILDLIFE SERVICE Division of Migratory Bird Management</p>	<p style="text-align: right;">OMB Control No. 1018-0175 Expires ##/##/####</p> 																						
<p>TYPE OF REQUEST</p> <p><input type="checkbox"/> New Application <input type="checkbox"/> Renewal <input type="checkbox"/> Amendment</p> <p>If requesting a renewal or amendment, please provide the permit #: _____</p> <p>BEFORE FILLING OUT THIS FORM, please access the Return Addresses (to obtain the email/postal mail addresses where this form can be returned), and read the form Frequently Asked Questions and instructions on page 6 of this form. Please retain the "NOTICES" page for your records.</p> <p>NOTE: A Federal Special Double-Crested Cormorant permit is available only to a State or Tribal fish and wildlife management agency responsible for migratory bird management on lands and waters under their jurisdiction. Anyone conducting activities under authority of this permit must be listed as a subpermittee. Subpermittees must be at least 18 years old. Nonlethal methods to resolve conflicts must be attempted before lethal take occurs.</p> <p>Complete Sections A or B, and C, D, and E of this application. U.S. address may be required in Section C, see instructions for details. See instructions on last page for information on how to make your application complete and help avoid unnecessary delays.</p>																								
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2.a. Mailing Address (include if different than physical address; include name of contact person if applicable)																								
2.b. City	2.c. State	2.d. Zip code/Postal code:	2.e. County/Province	2.f. Country																				
<p>D. All applicants MUST complete</p> <p>1. Processing fees – none required. Tribal and State agencies, and those acting on behalf of such agencies, are exempt from the processing fee (50 CFR 13.11(d)(3)(i)).</p> <p>2. Do you currently have or have you ever had any Federal Fish and Wildlife permits?</p> <p>Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, list the number of the most current permit you have held or that you are applying to renew/re-issue: _____</p> <p>3. Certification: I hereby certify that I have read and am familiar with the regulations contained in Title 50, Part 13 of the Code of Federal Regulations and the other applicable parts in subchapter B of Chapter I of Title 50, and I certify that the information submitted in this application for a permit is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to the criminal penalties of 18 U.S.C. 1001.</p>																								
<p>Signature of applicant/Principal Officer (No stamped signatures. Electronic signatures accepted.)</p>		<p>Date of signature (mm/dd/yyyy)</p>																						
<p>Please continue to next page</p>																								
<p>Page 1 of 6</p>																								

SECTION E

Please provide the information requested below. We may request additional information as appropriate to the activities you are requesting (50 CFR 13.21(d)). You should be as thorough and specific as possible in your responses. Incomplete applications will be returned. If additional space is required, add additional sheets to your application submission. You may use as many additional sheets as needed. Please number pages accordingly using the page number box provided at the bottom of the sheet, and the corresponding question number.

If you are requesting renewal, all required reporting must be up to date or the renewal will not be processed. The report form can be found at <https://www.fws.gov/forms/3-202-56.pdf>. If you are requesting renewal, you still need to complete the entire application and provide all the requested information.

- 1) Describe the history of double-crested cormorant conflicts in your state or tribal lands. Include locations(s) that are historically areas for conflict and, for each location, the type of conflict experienced (aquaculture/hatchery, human health and safety, property damage, tle species protection, and/or wild and stocked fish). As appropriate, include the size/description of the area affected, how long this conflict has been occurring, what time of year the conflict occurs, and what time of year you will be conducting management activities, visit <https://earthexplorer.usgs.gov/>
- 2) For each location(s), describe the non-lethal methods that you have used previously and/or plan on implementing, including (a) active hazing (e.g. horns, pyrotechnics, propane cannons, etc.), (b) passive deterrents (e.g. netting, exclusion devices, nest deterrents, etc.), (c) habitat management (e.g. vegetative barriers, grass management, prey management, etc.), and (d) practice changes (e.g. water level management, fish release timing, etc.).
- 3) Describe your proposed double-crested cormorant management activities, including the number of double-crested cormorants you propose to take by life-stage (i.e. adults, active nests, etc.) and the method you propose to use (i.e. shooting, nest-destroy, egg-oiling, etc.).

- 4) Describe your long-term plans to eliminate or significantly reduce the continued killing of double-crested cormorants or destruction of eggs/nests.
 - 5) The name and telephone number of the individual in your agency who will be in charge of the double-crested cormorant management activities authorized under your permit.
 - 6) **Subpermittees:** Anyone who will be assisting you with the permitted activities or acting as your agent must either have their own Federal migratory bird permit for the activity or be identified by you, in writing, as a subpermittee under your permit. Subpermittees must be at least 18 years old. As the primary permittee, you will be responsible for ensuring that your subpermittees are properly trained and adhere to the terms of your permit. Provide the name of any subpermittees who will be conducting activities under your permit. Include the name and contact information of any commercial company that may be contracted to conduct the work.

- 7) By requesting this permit, I acknowledge that, if a permit is issued, the State/Tribe will be responsible for the following:
- (a) A record keeping system for tracking take that includes: the specific location (GPS coordinates in decimal degrees), the county, a description of the non-lethal methods implemented and their general efficacy for resolving the conflict, the number of double-crested cormorants and, if applicable, non-target species taken, the method of take, and the purpose of take relevant to the type of conflict (aquaculture, health, t/e, property, stocked fish). Take data must be current, sufficient to ensure tracking within authorized take limits and update at least every 30 days.
 - (b) Activities that fall outside the scope of this permit require a separate Depredation permit. Activities may not occur under both a Depredation permit and this permit.
 - (c) An outreach plan for communicating with the public the activities occurring under this permit, including the implementation non-lethal methods.
 - (d) The Principal Officer is responsible for ensuring all subpermittees (employees and contractors) are fully informed and briefed regarding the regulatory requirements and conditions of this permit.
 - (e) Anyone taking birds under this permit must be skilled in double-crested cormorant identification. Non-target take of any other avian species must be reported to your permit office with your annual report including species, number, and description of events.
- 8) You must retain records legibly written or reproducible in English relating to the activities conducted under your permit for at least 5 years after the date of expiration of your permit. Is the physical address you provided in Section C on page 1 of this application the address where your records will be kept? Yes No If "no," provide the physical address:
- 9) I acknowledge that I have read the form [Instructions](#) and [Frequently Asked Questions](#), and have accessed the page with the [Return Addresses](#) to obtain the address where I should return this form. I have also filled out all fields and questions in this application. Check this box to acknowledge.

NOTICES

PRIVACY ACT STATEMENT

Authority: The information requested is authorized by the following: the Bald and Golden Eagle Protection Act (16 U.S.C. 668), 50 CFR 22; the Endangered Species Act (16 U.S.C. 1531-1544), 50 CFR 17; the Migratory Bird Treaty Act (16 U.S.C. 703-712), 50 CFR 21; the Wild Bird Conservation Act (16 U.S.C. 4901-4916), 50 CFR 15; the Lacey Act: Injurious Wildlife (18 U.S.C. 42), 50 CFR 16; Convention on International Trade in Endangered Species of Wild Fauna and Flora (TIAS 8249), 50 CFR 23; General Provisions, 50 CFR 10; General Permit Procedures, 50 CFR 13; and Wildlife Provisions (Import/export/transport), 50 CFR 14.

Purpose: The collection of contact information is to verify the individual has an eligible permit to conduct activities that affect protected species. The information the individual provides helps the FWS monitor and report on protected species and assess the impact of permitted activities on the conservation and management of species and their habitats.

Routine Uses: The collected information may be used to verify an applicant's eligibility for a permit to conduct activities with protected wildlife; to provide the public and the permittees with permit related information; to monitor activities under a permit; to analyze data and produce reports to monitor the use of protected wildlife; to assess the impact of permitted activities on the conservation and management of protected species and their habitats; and to evaluate the effectiveness of the permit programs. More information about routine uses can be found in the System of Records Notice, Permits System, FWS-21.

Disclosure: The information requested in this form is voluntary. However, submission of requested information is required to process applications for permits authorized under the listed authorities. Failure to provide the requested information may be sufficient cause for the U.S. Fish & Wildlife Service to deny the request.

PAPERWORK REDUCTION ACT STATEMENT

In accordance with the Paperwork Reduction Act (44 U.S.C. 3501), the U.S. Fish and Wildlife Service collects information necessary to monitor take and disposition of migratory birds, under the applicable laws governing the requested activity, for which a permit is requested, and to respond to requests made under the Freedom of Information Act and the Privacy Act of 1974. Information requested in this form is purely voluntary. However, submission of requested information is required in order to process applications for permits authorized under the above laws. Failure to provide all requested information may be sufficient cause for the U.S. Fish and Wildlife Service to deny the request. According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. OMB has approved this collection of information and assigned Control No. 1018-0175.

ESTIMATED BURDEN STATEMENT

We estimate public reporting for this collection of information averages:

Original submission - paper-based: 16 hours
Amended submission - paper-based: 4 hours
Original submission - electronic: 14 hours
Amended submission - electronic: 3 hours

These estimates include time for reviewing instructions, gathering and maintaining data and completing and reviewing the form. Direct comments regarding the burden estimate or any other aspect of the form to the Service Information Clearance Officer, Fish and Wildlife Service, U.S. Department of the Interior, 5275 Leesburg Pike, MS: PRB (JAO/3W), Falls Church, VA 22041-3803, or via email at Info_Coll@fws.gov. Please do not send your completed form to this address.

FREEDOM OF INFORMATION ACT STATEMENT

For organizations, businesses, or individuals operating as a business (i.e., permittees not covered by the Privacy Act), we request that you identify any information that should be considered privileged and confidential business information to allow the Service to meet its responsibilities under Freedom of Information Act (FOIA). Confidential business information must be clearly marked "Business Confidential" at the top of the letter or page and each succeeding page and must be accompanied by a non-confidential summary of the confidential information. The non- confidential summary and remaining documents may be made available to the public under FOIA [43 CFR 2.28 – 2.33].

PERMIT APPLICATION FORM INSTRUCTIONS

The following instructions pertain to an application for a U.S. Fish and Wildlife Service permit. The General Permit Procedures in 50 CFR 13 address the permitting process. For simplicity, all licenses, permits, registrations, and certificates are referred to as a permit.

GENERAL INSTRUCTIONS:

- Complete all blocks/lines/questions in Sections B, C, D, and E.
- An incomplete application may cause delays in processing or may be returned to the applicant. Be sure you are filling in the appropriate application form for the proposed activity.
- Print clearly or type in the information. Illegible applications may cause delays.
- Sign the application. Faxes or copies of the original signature will not be accepted.
- Mail the original application to the address at the top of page one of the application or if applicable on the attached address list.
- Keep a copy of your completed application.
- Please plan ahead. Allow at least 60 days for your application to be processed. Some applications may take longer than 90 days to process. (50 CFR 13.11)
- Applications are processed in the order they are received.
- Additional forms and instructions are available from <https://www.fws.gov/birds/policies-and-regulations/permits.php>

ALL APPLICANTS SKIP SECTION A AND COMPLETE SECTION B:

This permit is not available to individuals.

Section B. Complete if applying as a State agency or Tribe:

- Enter the complete name of the State or Tribal wildlife agency. Provide contact phone number(s) for the agency.
- **Principal Officer** is the person responsible for the State or Tribal agency's application and any permitted activities. Often the principal officer is a State Director or Tribal Natural Resources Director. **Primary Contact** is the person at the business, corporation, public agency, Tribe, or institution who will be available to answer questions about the application or permitted activities. Often this is the preparer of the application.

ALL APPLICANTS COMPLETE SECTION C:

- For all applications submitted, a physical U.S. address is required.
- **Mailing address** is address where communications from USFWS should be mailed if different than applicant's physical address.

ALL APPLICANTS COMPLETE SECTION D:

Section D.1 Application processing fee:

- An application processing fee is not required at the time of application because State and Tribal wildlife agencies are exempted under 50 CFR 13.11(d)(3)(i).
- Documentation of fee exempt status is not required for Federal, Tribal, State, or local government agencies.

Section D.2 Federal Fish and Wildlife permits:

- List the number(s) of your most current FWS permit or the number of the most recent permit if none are currently valid.

Section D.3 CERTIFICATION:

- The Principal Officer named in Section B must sign and date the application. This signature binds the applicant to the statement of certification. This means that you certify that you have read and understand the regulations that apply to the permit. You also certify that everything included in the application is true to the best of your knowledge. Be sure to read the statement and re-read the application and your answers before signing.

ALL APPLICANTS COMPLETE SECTION E.

APPENDIX I. U.S. Fish and Wildlife Service Special Double-crested Cormorant Annual Report Form (Migratory Bird Treaty Act; 50 CFR 21.28)

FWS Form 3-202-56 (Rev. 10/2020) U.S. Department of the Interior		OMB Control. No. 1018-0175 Expiration Date: #####					
 ANNUAL REPORT – SPECIAL DOUBLE-CRESTED CORMORANT Return to: U.S. Fish and Wildlife Service <small>BEFORE FILLING OUT THIS FORM, please access the Return Addresses (to obtain the email/postal mail addresses where this form can be returned)</small>							
Permittee: _____ Mailing Address: _____ City: _____ State _____ Zip _____ Telephone Number: _____ Email Address: _____ <input type="checkbox"/> Check here if reporting a change of name, address, or contact information		Permit Number: _____ Report for Calendar Year: _____ Report Due Date: _____ <div style="border: 1px solid black; padding: 5px;"> Office Use Only Date Completed Report Rec'd in Regional Office _____ / _____ / _____ Initials: _____ </div>					
<p>INSTRUCTIONS: Type or print the information requested below for all birds taken or held under your permit during the year covered by this report and return the completed report to the above address by the due date. Use of this form is not mandatory, but the same information must be submitted, including a signed certification statement. You MUST SIGN AND DATE the certification statement for your report to be complete. Filing an annual report is a condition of your permit. Failure to file a timely report can result in permit suspension. If you had no activity under your permit during the report year, state "No activity" on the form.</p> <p>For the take of double-crested cormorants, indicate the purpose of the take in the "Purpose" column of the form below using one of the following codes (one code per line):</p> <ul style="list-style-type: none"> Aquaculture. Depredation of fish at State- or Tribal-owned or operated aquaculture facilities, including hatcheries Health. Reduce realized and potential impacts to human health and safety (for example, collisions of airplanes with birds, fecal contamination of urban wetlands) T/E. Reduce impacts to threatened or endangered species listed under the Endangered Species Act of 1973, and listed species identified in State- or Tribal-specific legislation as threatened or endangered, or, species listed as Species of Greatest Conservation Need in State Wildlife Action Plans Property. Reduce or prevent damage to State- or Tribal-owned property and assets Stocked Fish. Reduce or prevent depredation of wild and publicly stocked fish managed by State fish and wildlife agencies or federally recognized tribes and accessible to the public 							
Location (GPS Coordinates in Decimal Degrees)	Purpose (one code per line) Aquaculture, Health, T/E, Property, Stocked Fish	Non-lethal Methods Implemented	Month Taken	QUANTITY*			Disposition (e.g., buried; incinerated; euthanized & donated)
				Killed	Nests [†] Oiled/Added ^{**}	Nests [†] Destroyed ^{***}	

*For nests, include number of nests where eggs were present, not the number of eggs. Do not include inactive nests (i.e., nests with no eggs).

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 of Permittee/Principal Officer (No stamped signatures. Electronic signatures accepted.) *Date of Signature (mm/dd/yyyy)*

Page 1 of 3

SUPPLEMENTAL SHEET - SPECIAL DOUBLE-CRESTED CORMORANT PERMIT ANNUAL REPORT

¹For nests, include number of nests where eggs were present, not the number of eggs. Do not include inactive nests (i.e., nests with no eggs).

Page 2 of 3

NOTICES

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ESTIMATED BURDEN STATEMENT

We estimate public reporting for this collection of information averages:

Paper-based submission: 1 hour (reporting) and 16 hours (recordkeeping)
Electronic submission: 45 minutes (reporting) and 16 hours (recordkeeping)

These estimates include time for reviewing instructions, gathering and maintaining data and completing and reviewing the form. Direct comments regarding the burden estimate or any other aspect of the form to the Service Information Clearance Officer, Fish and Wildlife Service, U.S. Department of the Interior, 5275 Leesburg Pike, MS: PRB (JAO/3W), Falls Church, VA 22041-3803, or via email at Info_Coll@fws.gov. Please do not send your completed form to this address.

FREEDOM OF INFORMATION ACT

For organizations, businesses, or individuals operating as a business (i.e., permittees not covered by the Privacy Act), we request that you identify any information that should be considered privileged and confidential business information to allow the Service to meet its responsibilities under FOIA. Confidential business information must be clearly marked "Business Confidential" at the top of the letter or page and each succeeding page and must be accompanied by a non-confidential summary of the confidential information. The non-confidential summary and remaining documents may be made available to the public under FOIA [43 CFR 2.26 – 2.33].

Intra-Service Section 7 Biological Evaluation Form

I. Region: Legacy Regions 1, 2, 3, 4, 5, 6, and 8

II. Service Activity:

Migratory Birds and State Programs Section 7 Consultation on the 2020 Environmental Impact Statement for Double-crested Cormorant Management.

III. Pertinent Species and Habitat: (organized by Legacy Region)

A. Listed species and/or critical habitat within the action area:

* Denotes species with critical habitat designations

PACIFIC NORTHWEST

Cormorant management under the proposed action is not authorized for the Commonwealth of the Northern Mariana Islands, Hawaii, Guam, and other Pacific possessions. Therefore, no listed species in those areas will be affected by the proposed action.

Greater sage-grouse	(<i>Centrocercus urophasianus</i>) [C]
Marbled murrelet	(<i>Brachyramphus marmoratus</i>) (Washington, Oregon, and California Populations) [T]*
Northern spotted owl	(<i>Strix occidentalis caurina</i>) [T]*
Short-tailed albatross	(<i>Phoebastria albatrus</i>) [E]
Streaked Horned Lark	(<i>Eremophila alpestris strigata</i>) [T]*
Western snowy plover	(<i>Charadrius nivosus nivosus</i>) [T]
Yellow-billed cuckoo	(<i>Coccyzus americanus</i>) [T]

SOUTHWEST

Attwater's greater prairie chicken	(<i>Tympanuchus cupido attwateri</i>) [E]
Mexican spotted owl	(<i>Strix occidentalis lucida</i>) [T]
Red-cockaded woodpecker	(<i>Picoides borealis</i>) [E]
Least tern	(<i>Sterna antillarum</i>) [E]
Northern aplomado falcon	(<i>Falco femoralis septentrionalis</i>) [E]
Brown pelican	(<i>Pelicanus occidentalis</i>) [E]
Southwestern willow flycatcher	(<i>Empidonax traillii extimus</i>) [E]
Black-capped vireo	(<i>Vireo atricapillus</i>) [E]
Golden-cheeked warbler	(<i>Dendroica chrysoparia</i>) [E]
Whooping crane*	(<i>Grus americana</i>) [E]
Piping plover*	(<i>Charadrius melanotos</i>) [T]
Yellow-billed cuckoo	(<i>Coccyzus americanus</i>) [T]
Yuma clapper rail	(<i>Rallus longirostris yumanensis</i>) [E]
Eskimo curlew	(<i>Numenius borealis</i>) [E]
Concho water snake*	(<i>Nerodia paucimaculata</i>) [T]

MIDWEST (Legacy Region 3)

Piping plover*	(<i>Charadrius melanotos</i>) [T]
Least tern	(<i>Sterna antillarum</i>) (Interior population) [E]

Whooping crane*	(<i>Grus americana</i>) [E]
Kirtland's warbler	(<i>Dendroica kirtlandii</i>) [E]
Red knot	(<i>Calidris canutus rufa</i>) [T]
Lake Erie water snake	(<i>Nerodia sipedon</i>) [T]
Houghton's goldenrod	(<i>Solidago houghtonii</i>) [T]
Dwarf lake iris	(<i>Iris lacustris</i>) [T]
Pitcher's thistle	(<i>Cirsium pitcheri</i>) [T]
SOUTHEAST (Legacy Region 4)	
Ivory-billed woodpecker	(<i>Campephilus principalis</i>) [Extinct?]
Red-cockaded woodpecker	(<i>Picoides borealis</i>) [E]
Mississippi sandhill crane*	(<i>Grus canadensis pulla</i>) [E]
Piping plover*	(<i>Charadrius melanotos</i>) [E]
Least tern	(<i>Sterna antillarum</i>) (Interior population) [E]
Everglade snail kite*	(<i>Rostrhamus sociabilis plumbeus</i>) [E]
Wood stork	(<i>Mycteria americana</i>) [E]
Brown pelican	(<i>Pelicanus occidentalis</i>) [E]
Black-capped vireo	(<i>Vireo atricapillus</i>) [E]
Cape Sable seaside sparrow*	(<i>Ammodramus maritimus mirabilis</i>) [E]
Florida grasshopper sparrow	(<i>Ammodramus savanarum floridanus</i>) [E]
Roseate tern	(<i>Sterna dougallii</i>) [T]
Bald eagle	(<i>Haliaeetus leucocephalus</i>) [T]
Audubon's crested caracara	(<i>Polyborus plancus auduboni</i>) [T]
Florida scrub jay	(<i>Aphelocoma coerulescens</i>) [T]
Whooping crane*	(<i>Grus americana</i>) [NEP]
Bachman's warbler	(<i>Vermivora bachmanii</i>) [Extinct?]
Red knot	(<i>Calidris canutus rufa</i>) [T]
Florida salt marsh vole	(<i>Microtus pennsylvanicus dukecampbelli</i>) [E]
Ringed map turtle	(<i>Graptemys oculifera</i>) [T]
Yellow-blotched map turtle	(<i>Graptemys flavimaculata</i>) [T]
Atlantic salt marsh snake	(<i>Nerodia clarkii taeniata</i>) [T]
Louisiana pine snake	(<i>Pituaphis ruthveni</i>) [T]
Trispot darter*	(<i>Etheostoma trisella</i>) [T]
NORTHEAST (Legacy Region 5)	
Piping plover*	(<i>Charadrius melanotos</i>) [T]
Roseate tern	(<i>Sterna dougallii</i>) [E]
Red-cockaded woodpecker	(<i>Picoides borealis</i>) [E]
Red knot	(<i>Calidris canutus rufa</i>) [T]
Atlantic salmon	(<i>Salmo salar</i>) [E]
Atlantic sturgeon	(<i>Acipenser oxyrinchus oxyrinchus</i>) [E]
MOUNTAIN-PRAIRIE (Legacy Region 6)	
Least tern	(<i>Sterna antillarum</i>) (Interior population) [E]
Northern Great Plains piping plover*	(<i>Charadrius melanotos</i>) [T]
Whooping crane*	(<i>Grus americana</i>) [E]
Eskimo curlew	(<i>Numenius borealis</i>) [E]
Black-capped vireo	(<i>Vireo atricapillus</i>) [E]

Mexican spotted owl*	(<i>Strix occidentalis lucida</i>) [T]
Southwestern willow flycatcher*	(<i>Empidonax traillii extimus</i>) [E]
CALIFORNIA (Legacy Region 8)	
California condor	(<i>Gymnogyps californianus</i>) [E]*
California clapper rail	(<i>Rallus longirostris obsoletus</i>) [E]
Coastal California gnatcatcher	(<i>Polioptila californica californica</i>) [T]*
California least tern	(<i>Sterna antillarum browni</i>) [E]
Inyo California towhee	(<i>Pipilo crissalis eremophilus</i>) [T]*
Least Bell's vireo	(<i>Vireo bellii pusillus</i>) [E]*
Light-footed clapper rail	(<i>Rallus longirostris levipes</i>) [E]
Marbled murrelet	(<i>Brachyramphus marmoratus</i>) (Washington, Oregon, and California Population) [T]*
Northern spotted owl	(<i>Strix occidentalis caurina</i>) [T]*
Southwestern willow flycatcher (<i>Empidonax traillii extimus</i>)	[E]*
Streaked horned lark	(<i>Eremophila alpestris strigata</i>) [T]
Western snowy plover; Pacific Coast population	(<i>Charadrius nivosus nivosus</i>) [T]*
Yellow-billed cuckoo (Western U.S. DPS) (<i>Coccyzus americanus</i>)	[T]
Yuma clapper rail	(<i>Rallus longirostris yumanensis</i>) [E]

B. Proposed species and/or proposed critical habitat within the action area

NONE

C. Candidate species within the action area:

Lesser prairie chicken (*Tympanuchus pallidicinctus*) [C]

IV. Geographic area and action: The Service is currently basing decisions on impacts to the cormorant population from take under two frameworks. One framework addresses the take of cormorants for certain purposes in the central and eastern United States, including the District of Columbia, and uses a Potential Biological Removal (PBR) model to evaluate the cumulative take on the cormorant subpopulations that occur in the central and eastern United States. As discussed previously, there are generally five cormorant subpopulations in the United States with three subpopulations (Atlantic flyway, Mississippi/Central flyways, and Florida) occurring in the central and eastern United States. The second framework addresses the take of cormorants in the Pacific Flyway and uses a PBR model developed by the Service to evaluate the cumulative take of cormorants in the Pacific flyway.

Central and Eastern United States Cormorant Framework

The geographical scope of the cormorant framework for the central and eastern states encompasses Alabama, Arkansas, Connecticut, Delaware, the District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Vermont, Virginia, West Virginia, and Wisconsin.

Pacific Flyway Cormorant Framework (Western cormorant subpopulation)

The geographical scope of the cormorant framework for the Western subpopulation encompasses Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

This analysis includes actions to reduce cormorant damage and threats of damage to wild and publicly stocked fisheries stocked by state agencies or federally recognized tribes, aquaculture facilities (including hatcheries), terrestrial wildlife and their habitats including state, federal, or tribally listed threatened and endangered species and species of conservation concern, rare plant communities, property, and risks to human health and safety associated with cormorants.

V. Location: Cormorants affected by this analysis are associated with damage management of cormorants on their breeding grounds, winter grounds, and in areas where cormorants may come into conflicts while migrating between these locations. This analysis includes actions to reduce cormorant damage and threats of damage to aquaculture, terrestrial wildlife and their habitats including state, federal, or tribally listed threatened and endangered species and species of conservation concern, rare plant communities, property, and risks to human health and safety associated with cormorants.

Breeding habitat (March - July): Ponds and lakes (natural and artificial), slow-moving rivers, lagoons, estuaries, and open coastlines. Small rocky or sandy islands if available. Nests built in trees, on structures, or on the ground. Also nests on emergent vegetation in marshes. Nesting trees and structures usually standing in or near water, on islands, in swamps, or on tree-lined lakes. Roosts and resting places often on exposed sites such as rocks or sandbars, pilings, wrecks, high-tension wires, or trees near favored fishing sites.

Wintering habitat (November - February): Ponds and lakes (natural and artificial), rivers, lagoons, estuaries, coastal bays, marine islands, and open coastlines for feeding, loafing, and roosting sites. On the coast, sandbars, shoals, coastal cliffs, offshore rocks, channel markers, and pilings are used for roosting. Roosts on perching sites such as trees, utility poles, or fishing piers. Birds wintering along the lower Mississippi River often roost in isolated cypress swamps.

Migrating habitat: During migration, cormorants can be found in any of the areas listed above.

VI. Description of Proposed Action:

The Service developed a Potential Take Limit (PTL) model to evaluate allowable take of cormorants in the contiguous 48 states. This model is based on the PTL models described by Runge et al. (2004). The PTL model allows the Service to integrate biologic and policy elements into the decision-making process of authorizing the take of cormorants to manage damage and to manage the cormorant population. The PTL model estimates the maximum allowable annual take of cormorants; however, the maximum allowable take is not a prescribed take level for cormorants. The PTL model predicts the maximum allowable annual take that corresponds with a biologically sustainable level of annual take based on knowledge of cormorant population dynamics, and under the current policy relative to the issuance of migratory bird permits. Further, while the Service uses the PTL model to identify maximum allowable take, individual migratory bird permits themselves are not a means to manage cormorant populations.

In all analyzed alternatives in this FEIS (except the no action alternative), maximum allowable take would be permitted up to 121,504 cormorants per year, nationally. The Service would base allocation of this level of allowable lethal take under any alternative on the maximum allowable take of the cormorant population, as well as historical and proposed needs where conflicts occur. Standard permit conditions and permitting procedures are included in [Appendix D](#). The Service would identify monitoring requirements that could be used to assess the effects of lethal take on cormorant populations and to ensure take is commensurate with population status. Monitoring can also improve future decisions regarding allowable take and how that allowable take could be determined. States, tribes and other partners can provide assistance and information. In addition to annually reporting the amount of take that occurred, the Service would produce a report every five years, and additionally as necessary, that provides analyses from population monitoring efforts and other status information.

In addition to annually reporting the amount of take that occurred under each alternative, the Service would also produce a report every five years that provides analyses from population monitoring efforts and other status information. This report would be provided to the public to promote transparency of decision making and evaluation of the effectiveness of this conflict management tool. This report would include, but not be limited to: (1) updated cormorant population status and trends; (2) reported lethal take of cormorants nationally and by cormorant subpopulation; (3) an updated PTL model; (4) the state of the conflict and need for continued management, as reported by requests for depredation permits (both individually, programmatically by participating states and tribes; and (5) a conflict management decision and justification for either continued management or a proposed new management approach, if appropriate and needed.

Under each alternative considered, the Service would continue the issuance of depredation permits (50 CFR 21.41), special purpose permits (50 CFR 21.27), and scientific collection permits (50 CFR 21.23) as appropriate. Responsible entities conducting activities under these various permits (such as airports or public health officials) would be required to annually report all take of cormorants under their authorized management activities. The Service would ensure that authorized take resulting from any alternative and all other permit types would not exceed the amount necessary to maintain cormorant populations at sustainable levels.

This biological evaluation assesses the impacts of Alternative A in the FEIS on threatened and endangered species listed under the ESA. Alternative A would establish a new permit option under 50 CFR part 21 (special double-crested cormorant permit) that would be available to state and tribal wildlife agencies in the 48 contiguous United States to manage conflicts specifically associated with double-crested cormorants on state or tribal-managed lands. Under this permit, the Service would authorize states and tribal wildlife agencies to conduct lethal take of double-crested cormorants that is normally prohibited on lands within their respective jurisdictions. The Service will only issue this permit when it is expected to reduce conflicts involving depredation at state- and tribal-owned or operated aquaculture facilities (including hatcheries); impacts to health and human safety; impacts to threatened and endangered species (as listed in under ESA of 1973) and state-listed species identified in their state- or tribal-specific legislation as threatened or endangered; damage to state or tribal property; and depredations of wild and publicly stocked fisheries stocked by state agencies or federally recognized tribes.

Those states and tribes not wishing to obtain this new permit could apply for depredation permits (50 CFR 21.41) to address conflicts with cormorants within the scope of conflicts established in the no action alternative, which does not include wild or publicly stocked fisheries. Commercial aquaculture facilities experiencing conflicts associated with cormorants could continue to apply for individual depredation permits (50 CFR 21.41).

In this alternative, the Service would base allocation of this level of allowable lethal take to participating states and tribes on the maximum allowable take of the cormorant population where the state or tribe is located, as well as historical and proposed needs of the state or tribe. Any state or tribe may request this permit; however, they would not be required.

The intent of this alternative is to allow state wildlife management agencies and tribes sufficient flexibility within predefined guidelines to address conflicts caused by cormorants within their respective boundaries. In general, aquaculture is the cultivation of aquatic animals and/or plants in natural or controlled aquatic environments for commercial or conservation efforts. In the case of this action, *aquaculture* references any state- and tribal-owned or operated aquaculture facility (including hatcheries) or program that produces fish, or other aquatic organisms, which are susceptible to cormorant predation or impact during any stage of production, and/or immediately following release into natural or controlled environments. In most cases, states and tribes are better able to assess site-specific conflicts and the need for control efforts than is the Service. Commercial aquaculture facilities experiencing conflicts associated with cormorants could continue to apply for individual depredation permits (50 CFR 21.41).

Under this alternative, the Service would maintain primary authority for the management of cormorant populations, but the individual states and tribes would be authorized to implement the provisions of this alternative within the guidelines established by the Service. States and tribes issued this new special permit would be expected to prioritize their allotted take to entities/instances most in need of conflict resolution, and they would be encouraged to conduct monitoring to assess the efficacy of control activities. States and tribes would be responsible for compiling all take conducted by them and their authorized subpermittees under this special permit and report that take annually to the Service.

Special permit conditions that may be considered for protection of non-target species, as appropriate to the needs of the species and site-specific conditions, would include but not be limited to conducting actions during an optimal time in the nesting season to reduce negative impacts to co-nesting species. The Service added specific conditions for piping plover (*Charadrius melanotos*), interior least tern (*Sterna antillarum*), and wood stork (*Mycteria americana*) to all of the alternatives in order to protect these specific listed and sensitive species.

To protect piping plovers, interior least terns, and wood storks that nest or have colonies in or near areas where cormorant damage management could occur, the following conservation measures are implemented within any geographic area where ESA protection applies:

- All control activities must occur more than 1500 feet from active wood stork nesting colonies, more than 1000 feet from active wood stork roost sites, and more than 750 feet from feeding wood storks.

- Discharge or use of firearms (without noise suppression) to kill or harass cormorants or use of other harassment methods must occur more than 1000 feet from active piping plover or interior least tern nests or colonies, more than 1500 feet from active wood stork nesting colonies, more than 1000 feet from active wood stork roost sites, and more than 750 feet from feeding wood storks.
- Other control activities such as egg oiling, CO₂ asphyxiation, egg destruction, or nest destruction must occur more than 500 feet from active piping plover or interior least tern nests or colonies, more than 1500 feet from active wood stork nesting colonies, more than 1000 feet from active wood stork roost sites, and more than 750 feet from feeding wood storks.

Description of Proposed Lethal Take Methods

Shooting cormorants is a highly target-specific technique that is believed to reinforce non-lethal harassment. In the case of cormorants, shooting is always conducted with shotguns or rifles. When used by trained personnel, the risk of shooting and directly taking nontarget species is minimal. Shooting can be conducted from a distance and while this quality minimizes the likelihood of direct human disturbance to species co-occurring with Cormorants, the noise associated with gunfire could cause indirect disturbance.

Egg oiling and destruction: Cormorant eggs have been destroyed in attempts to reduce recruitment into populations and to eliminate colonies at specific locations. Egg oiling is a method of suppressing reproduction of nuisance birds by spraying a small quantity of food grade vegetable oil on eggs in nests. The oil prevents exchange of gases and causes asphyxiation of developing embryos. The EPA has ruled that use of corn oil for this purpose is exempt from registration requirements under the Federal Insecticide, Fungicide, and Rodenticide Act (the public resource depredation order authorizes only the use of corn oil). This method is extremely target specific. However, it requires direct physical contact with cormorants, their eggs, or their nests, which necessitates immediate human presence at nest and roost sites. Such control efforts are typically conducted on foot by a small number of personnel in order to minimize incidental disturbance of other species, especially at nest colonies.

Nest destruction: Nest removal is the removal of nesting materials during the construction phase of the nesting cycle. Nest destruction on the ground simply involves the physical breakup of nest structures. Tree nests present a greater challenge. Nests can be destroyed manually or by use of high pressure water to dislodge nests from trees.

Cervical dislocation: Cervical dislocation is sometimes used to euthanize birds which are captured by hand or in live traps and when relocation is not a feasible option. The bird is stretched and the neck is hyper-extended and dorsally twisted to separate the first cervical vertebrae from the skull. The American Veterinary Medical Association approves this technique as a humane method of euthanasia. In the case of cormorants, this is a secondary technique that will generally be used only when damage control personnel are already on site using other methods such as egg oiling.

CO₂ asphyxiation: CO₂ is sometimes used to euthanize birds that are captured by hand or in live traps and when relocation is not a feasible option. Live birds are placed in a container such as a plastic five-gallon bucket or chamber and sealed shut. CO₂ gas is released into the bucket or chamber and birds quickly die after inhaling the gas. This method is approved as a euthanizing agent by the American Veterinary Medical Association. In the case of cormorants, this is a secondary technique that will generally be used only when damage control personnel are already on site using other methods such as egg oiling.

VII. Determination of effects:

A. Explanation of effects of the action on species and critical habitats in items III. A, B, C:

* Denotes species with critical habitat designations

Legacy Region 1

No migratory bird hunting seasons are authorized for the Commonwealth of the Northern Mariana Islands, Guam, and other Pacific possessions. Therefore, no listed species in those areas will be affected by the proposed action.

Greater sage-grouse (*Centrocercus urophasianus*) [C]: No accidental shooting of greater sage-grouse (inclusive of the Columbia Basin DPS) is expected due to the tremendous difference between these two species. No significant lethal-related disturbance effects to the grouse are expected.

Effect Determination: No affect.

Marbled Murrelet (*Brachyramphus marmoratus*) (Washington, Oregon, and California Populations) [T]: The marbled murrelet is a small diving seabird that breeds along the Pacific coast of North America from the Aleutian Archipelago and southwestern Alaska to central California. It forages almost exclusively in the nearshore marine environment, but flies inland to nest in mature conifer trees located in forest stands with old-growth forest characteristics. Marbled murrelet nesting occurs over an extended period from late March to late September. Marbled murrelets visit their inland sites throughout the year, aside from during their pre-basic molt period in fall and early winter.

The marbled murrelet occurs in several coastal locations containing cormorants. Permittees are unlikely to mistake a marbled murrelet for a cormorant, as it is not similar in appearance. Noise associated with cormorant management activities are unlikely to significantly alter breeding of murrelets. Any temporary displacement of murrelets during cormorant management activities is not expected to result in a measurable adverse effect to murrelet breeding, foraging, or loafing because they are likely to simply move away from the disturbance and continue their loafing or feeding activities elsewhere.

Effect Determination: Not likely to adversely affect.

Marbled Murrelet Critical Habitat

Effects of the Action on the Primary Constituent Elements of Designated Critical Habitat for the Marbled Murrelet

The action area includes approximately 3,698,100 ac (1,497,000 ha) of critical habitat for the marbled murrelet in Washington, Oregon, and California. The PCEs of marbled murrelet critical habitat are defined as "(1) individual trees with potential nesting platforms, and (2) forested areas within 0.5 mi (0.8 km) of individual trees with potential nesting platforms, and with a canopy height of at least one-half the site-potential tree height. This includes all such forest, regardless of contiguity." These PCEs will not be affected by implementation of the proposed action because those regulations do not include a habitat alteration component, and the proposed action will not cause alteration of the above habitat conditions.

Effect Determination: No effect.

Northern Spotted Owl (*Strix occidentalis caurina*) [T]: The northern spotted owl is a dark brown, medium-sized owl with a barred tail and white spots on the head and breast. It inhabits mature and old-growth forests from northwestern California to southwestern British Columbia. Northern spotted owls begin courtship activities in late February or March, and most eggs hatch in late April or May, and the majority of young fledge in June. The northern spotted owl occurs in several coastal locations within Region 1 where hunting for band-tailed pigeons and mourning doves may occur. The northern spotted owl's nocturnal habitats, its silhouette, size, and color make it highly unlikely that it would be mistaken for a cormorant. Noise associated with the proposed action will occur outside of the owl forest habitat.

Effect Determination: Not likely to adversely affect.

Northern Spotted Owl Critical Habitat

Effects of the Action on the Primary Constituent Elements of Designated Critical Habitat for the Northern Spotted Owl

The action area includes approximately 9,557,969 ac (3,876,064 ha) of critical habitat for the northern spotted owl in Washington, Oregon, and California. The PCEs of northern spotted owl critical habitat are described as:

1. Forest types that may be in early-, mid-, or late-seral stages and that support the northern spotted owl across its geographical range. These forest types are recognized based on the dominant tree species occurring within the forest: (a) Sitka spruce; (b) western hemlock; (c) mixed conifer and mixed evergreen; (d) grand fir; (e) Pacific silver fir; (f) Douglas-fir; (g) white fir; (h) Shasta red fir; (i) redwood/Douglas-fir (in coastal California and southwestern Oregon); and (j) the moist end of the ponderosa pine coniferous forests zone at elevations up to approximately 3,000 ft (900 m) near the northern edge of the northern spotted owl's range and up to approximately 6,000 ft (1,800 m) at the southern edge of its range.

2. Habitat that provides for nesting and roosting. In many cases the same habitat also provides for foraging (PCE 3). Nesting and roosting habitats provide structural features for nesting, protection from adverse weather conditions, and cover to reduce predation risks for adults and young. This PCE is found throughout the geographical range of the northern spotted owl because stand structures at nest sites tend to vary little across the northern spotted owl's range. These habitats must provide for the following habitat conditions: (a) sufficient foraging habitat to meet the home range needs of territorial pairs of northern spotted owls throughout the year; (b) stands for nesting and roosting that are generally characterized by (i) a moderate to high canopy cover (60 to over 80 percent), (ii) multilayered, multispecies canopies with large, 20-30 in (51-76 cm) or greater dbh overstory trees, (iii) high basal area that is greater than 240 ft²/ac (55 m²/ha), (iv) high diversity of different diameters of trees, (v) a high incidence of large, live trees with various deformities (e.g., large cavities, broken tops, mistletoe infections, and other evidence of decadence), (vi) large snags and large accumulations of fallen trees and other woody debris on the ground, and (vii) sufficient open space below the canopy for northern spotted owls to fly.

3. Habitat that provides for foraging, which varies widely across the northern spotted owl's range in response to variable ecological conditions and disturbance regimes that influence vegetation structure and prey species distributions. That variation is reflected in the PCEs for northern spotted owl foraging habitat for four recognized ecological zones within the geographical range of the northern spotted owl as described on pages 71901-71902 of the final rule designating northern spotted owl critical habitat (77 FR 71876).

Note that PCE 1 must occur in concert with PCE 2, 3, or 4.

The above PCEs will not be affected by implementation of the proposed action because the regulations do not include a habitat alteration component, and it does not alter the habitat conditions described above.

Effect Determination: No effect.

Short-tailed Albatross (Phoebastria albatrus)[E]: The short-tailed albatross is the largest of the north Pacific albatrosses (adult wingspan can reach over seven feet), with a prominent pink bill and white body. Immature birds are dark.

The short-tailed albatross nests exclusively on a few small volcanic islands off the coast of Japan but is an occasional visitor to the waters off the Pacific coast of the U.S. from California to Alaska. Almost all short-tailed albatross sightings in the lower 48 states, which are very rare, have occurred out at sea. Therefore, it is extremely unlikely that proposed action activities would occur in areas occupied by short-tailed albatross.

Effect Determination: No effect.

Streaked Horned Lark (Eremophila alpestris strigata) [T]: The streaked horned lark occurs on Columbia River islands where it is present year-round. For that reason, it could be present in the same areas as the proposed action. Due to its small size, silhouette, and flight pattern it is extremely unlikely to be misidentified with a cormorant. Although the proposed action-related disturbance of streaked horned larks may occur, such potential disturbance is not likely to rise to the level of an adverse effect.

Effect Determination: Not likely to adversely affect.

Streaked Horned Lark Critical Habitat

Effects of the Action on the PCEs of Designated Critical Habitat for the Streaked Horned Lark

The action area includes 4,629 ac (1,873 ha) of critical habitat for the species in two units (3 and 4) and 16 subunits in Washington and Oregon. Unit 3 covers the Washington Coast and Columbia River Islands (Damon Point, Midway Beach, Shoalwater Spit, Leadbetter Point, Rice Island, Miller Sands, Pillar Rock/Jim Crow, Welch Island, Tenasillahe Island, Whites/Brown, Wallace Island, Crims Island, and Sandy Island subunits). Unit 4 covers the Willamette Valley (Baskett Slough NWR, Ankeny NWR, and William L. Finley NWR subunits). The PCEs of streaked horned lark critical habitat are defined as “areas having a minimum of 16 percent bare ground that have sparse, low-stature vegetation composed primarily of grasses and forbs less than 13 in (33 cm) in height found in: (1) large 300 ac (120 ha), flat (0-5 percent slope) areas within a landscape context that provides visual access to open areas such as open water or fields, or (2) areas smaller than described in (1), but that provide visual access to open areas such as open water or fields.” These PCEs would not be affected by implementation of the proposed action because the action does not include a habitat alteration component, and would not alter the habitat characteristics of the PCEs described above.

Effect Determination: No effect.

Western Snowy Plover (*Charadrius nivosus nivosus*) [T]: The western snowy plover, a small shorebird, breeds primarily on coastal beaches from Washington to Baja California and winters in coastal areas from southern Washington to Central America. It is pale gray-brown above and white below, with a white hind-neck collar and dark lateral breast patches, forehead bar, and eye patches.

The western snowy plover nesting season extends from early March through late September. While some snowy plovers remain in their coastal breeding areas year-round, others migrate south or north for winter. Most plovers that nest inland migrate to the coast for the winter. The departure from inland nesting areas begins by early July and is completed, except for stragglers, by mid-October.

Due to its small size, silhouette, and flight pattern it is extremely unlikely that the western snowy plover would be confused with cormorants. Disturbance of nesting plovers is not anticipated due to conservation measures associated with other species added to the proposed action.

Effect Determination: No effect.

Yellow-billed Cuckoo (*Coccyzus americanus*) [T]: The yellow-billed cuckoo is a medium-sized bird that occurs in riparian habitats where waterfowl hunting may occur. This species has a slender, long-tailed profile, with a fairly stout and slightly down-curved bill. The tail feathers are boldly patterned with black and white below. The breeding season for the yellow-billed cuckoo generally begins with pair formation in mid-June and lasts until mid-August. Yellow-billed cuckoos annually migrate to wintering grounds in South America. Spring migration begins in late May and lasts until late June, and fall migration begins in late August and lasts until mid-September.

The discussion in the final listing rule (79 FR 59992) references that the species no longer breeds in western Canada and the northwestern continental United States (Washington, Oregon, and Montana), that the species occasionally occurs within historical breeding areas in Oregon, Washington, and British Columbia, and that available data suggest that if yellow-billed cuckoos still breed in Washington, the numbers are extremely low, with pairs numbering in the single digits. The chances of negative interactions as a result of the proposed action are so low as to be extremely unlikely. There is no proposed critical habitat for the yellow-billed cuckoo in Washington.

We do not anticipate adverse effects to this species as a result of the proposed action.

Effect Determination: No effect.

Legacy Region 2

Whooping Crane (*Grus americana*) [E]: Whooping cranes feed and roost in freshwater marshes, wet prairies, and upland grain fields. The wild population of whooping cranes is migratory, breeding in Canada (Northwest Territories) and wintering in and around the Aransas National Wildlife Refuge along the coast of Texas. In Region 2, whooping cranes and cormorants do not overlap in range during the breeding season. During the winter, when cormorants can be found near the Gulf coast, their ranges do overlap. During migration, they could overlap. However, habitat selection of the two species is slightly different with whooping cranes being more of a wetland and upland field bird and cormorants preferring deeper lakes, reservoirs, and streams. In the winter, most cormorants can be found at inland lakes and reservoirs and it is at such areas that control actions would occur. It is not likely that whooping cranes will be adversely affected by the proposed action.

Effect Determination: Not likely to adversely affect.

Attwater's Greater Prairie Chicken (*Tympanuchus cupido attwateri*) [E]: Unlike cormorants, this prairie chicken inhabits Texas coastal prairies. Incidental take associated with cormorant control actions is very unlikely because of these differences in habitat preferences. Furthermore, because of the critical endangered status of the Attwater's greater prairie chicken, they are carefully monitored and it is therefore unlikely that cormorant control would be conducted in an area where it would harm this species. It is not likely that Attwater's greater prairie chicken will be adversely affected by the proposed action.

Effect Determination: Not likely to adversely affect.

Red-cockaded Woodpecker (*Picoides borealis*) [E]: The mature pine forest preferred by these woodpeckers is very different from the preferred habitat of cormorants. The proposed action is not likely to result in adverse effects to this species.

Effect Determination: Not likely to adversely affect.

Least Tern (*Sterna antillarum*) (Interior population) [E]: In Region 2, least terns and cormorants overlap during the breeding season. Because of their different flight profile and pattern, it is unlikely that least terns could be confused with cormorants and taken directly. Since least terns are more likely to be found on beaches and sandbars than lakes and reservoirs where cormorants are more common, the probability of indirect take is low. However, control activities would occur more than 1000 feet from active interior least tern nests or colonies of least terns, avoiding any incidental take (i.e., harassment) of these species.

Effect Determination: Not likely to adversely affect.

Northern Aplomado Falcon (*Falco femoralis septentrionalis*) [E]: The northern aplomado falcon inhabits savanna/rangeland/grassland areas, making it unlikely to co-occur with cormorants. The proposed action is not likely to result in adverse effects to this species.

Effect Determination: Not likely to adversely affect.

Brown Pelican (*Pelicanus occidentalis*) [E]: Because of their different flight profile and pattern, and appearance, it is unlikely that brown pelicans could be confused with cormorants and taken directly. The proposed action is unlikely to disturb brown pelicans due to differences in location.

Effect Determination: Not likely to adversely affect.

Southwestern Willow Flycatcher (*Empidonax traillii extimus*) [E]*: The southwestern willow flycatcher is found in dense riparian associations of willow, cottonwood, button bush, and other deciduous trees and shrubs. The fact that this species is found in streams and marshes rather than lakes and reservoirs, make it not likely that the proposed action will adversely affect it.

Effect Determination: Not likely to adversely affect.

Mexican Spotted Owl (*Strix occidentalis lucida*) [T]: Its habitat preference is mixed-conifer forest, often in steep canyons, which is very different from cormorant-preferred habitat. It is not likely to be adversely impacted by the proposed action.

Effect Determination: No effect.

Black-capped Vireo (*Vireo atricapillus*) [E]: Preferred habitat is dense low thickets and oak scrub, which is very different from the preferred habitat of cormorants. This species is not likely to be adversely affected by the management techniques covered by the proposed action.

Effect Determination: No effect.

Golden-cheeked Warbler (*Dendroica chrysoparia*) [E]: This warbler inhabits oak-juniper woodlands in Texas only. It is not likely to be adversely affected by the proposed action.

Effect Determination: No effect.

Piping Plover (*Charadrius melanotos*) [T]*: The preferred habitat of piping plovers is sandy beaches, sandflats, dredge islands, and drained floodplains. In Region 2, the winter range of cormorants and this species may overlap along the Gulf coast. While the preferred nesting habitat of cormorants and piping plovers is different, they may be found in close enough proximity, but since control activities would occur more than 1000 feet from active piping plover or interior least tern nests or colonies, the proposed action is not likely to adversely affect this species.

Effect Determination: Not likely to adversely affect.

Eskimo Curlew (*Numenius borealis*) [E]: This species may be extinct. Preferred habitat on its wintering grounds is grasslands, pastures, plowed fields and, less frequently, marshes and mudflats. It is not likely to be adversely affected by the proposed action.

Effect Determination: Not likely to adversely affect.

Lesser Prairie Chicken (*Tympanuchus pallidicinctus*) [C]: The prairie chicken is an upland species found in short-, mid-, and tall-grass prairies and shrub steppes. The proposed action is not likely to adversely affect this species.

Effect Determination: No effect.

Yellow-billed Cuckoo (*Coccyzus americanus*) [T]: This species can be found in woodlands, thickets, orchards, and streamside groves. Because of differences in preferred habitat to that of cormorants, it is not likely to be adversely affected by the proposed action.

Effect Determination: No effect.

Concho Water Snake (*Nerodia paucimaculata*) [T]*: This species inhabits fast-flowing rocky streams and takes cover under rocks in water or in vegetation along the shore of the Concho River. Due to its limited distribution and the difference in its preferred habitat and that of cormorants, it is not likely to be adversely affected by the proposed action.

Effect Determination: No effect.

Louisiana Pinesnake (*Pituaphis ruthveni*) [T]: This snake is found in Region 2 only in extreme east-central Texas in longleaf pine savannah. The management techniques associated with the proposed action are not likely to adversely affect this species.

Effect Determination: Not likely to adversely affect.

Legacy Region 3

Piping Plover (*Charadrius melanotos*) [E]*: Great Lakes piping plovers nest on sandy beaches, sandflats, dredge islands, and drained floodplains. They are generally solitary nesters but may nest with terns. While the preferred nesting habitat of cormorants and piping plovers is different, they may be found in close enough proximity, but since control activities would occur more than 1000 feet from active piping plover or interior least tern nests or colonies, the proposed action is not likely to adversely affect this species.

Effect Determination: Not likely to adversely affect.

Least Tern (*Sterna antillarum*) (Interior population) [E]: This species usually forms colonies on bare or sparsely vegetated sand or dried mudflats along coasts or rivers. In Illinois and Iowa, cormorants may nest in proximity to least tern colonies along the Mississippi River. The species' preferred nesting habitats are different and direct take is unlikely due to dissimilarity of appearance. In addition, since control activities would occur more than 1000 feet from active piping plover or interior least tern nests or colonies, the proposed action is not likely to adversely affect this species.

Effect Determination: Not likely to adversely affect.

Whooping crane (*Grus americana*) [XN]*: Whooping cranes found within Region 3 belong to a recently introduced population in Wisconsin. This population is classified as a nonessential experimental population, and for section 7 purposes, whooping cranes are considered threatened on National Wildlife Refuge and National Park Service lands and proposed on all other lands. Habitat selection of the two species is slightly different with whooping cranes being more of a wetland and upland field bird and cormorants preferring deeper lakes, reservoirs, and streams. It is not likely that whooping cranes will be adversely affected by the proposed action.

Effect Determination: Not likely to adversely affect.

Kirtland's Warbler (*Dendroica kirtlandii*) [E]: This warbler is found in stands of dense scrubby jack pine. Its range does not overlap with that of cormorants and thus it is not likely to be adversely affected by the proposed action.

Effect Determination: Not likely to adversely affect.

Red Knot (*Calidris canutus rufa*) [T]: Red knots are coastal, long-distance migrants between breeding grounds in the Canadian Arctic and several wintering regions, including the Southeast United States (Southeast), the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America. Red knots differ in size, shape, and flight pattern from cormorants. It is not likely that red knots will be adversely affected by the proposed action.

Effect Determination: Not likely to adversely affect.

Lake Erie Water Snake (*Nerodia sipedon*) [T]: Lake Erie water snakes live on a group of limestone islands in western Lake Erie that are located more than one mile from the Ohio and Canada mainlands. Lake Erie water snakes found on those islands will not be adversely affected by the proposed action. To the contrary, biologists have speculated that abundant cormorant populations may be having a negative impact on this species and thus it could benefit from the proposed action.

Effect Determination: Not likely to adversely affect.

Houghton's Goldenrod (*Solidago houghtonii*) [T]: This plant is mostly limited to shoreline habitats on the northern shores of Lakes Michigan and Huron. It is found in sparsely vegetated, moist, sandy, interdunal depressions; rocky and cobbly shores; beach flats and calcareous beach sands; and seasonably wet alvar, occasionally in association with Pitcher's thistle and dwarf lake iris. Cormorants may be having negative effects upon the distribution of this species; thus the proposed action could benefit it.

Effect Determination: Not likely to adversely affect.

Dwarf Lake Iris (*Iris lacustris*) [T]: This plant is found almost exclusively on the northern shores of Lakes Michigan, Huron and Superior, most often in young, well-drained soils ranging from sands to gravels to sandy clay loam and organic-enriched sands. Cormorants may be having negative effects upon the distribution of this species; thus the proposed action could benefit it.

Effect Determination: Not likely to adversely affect.

Pitcher's Thistle (*Cirsium pitcheri*) [T]: This plant is found in a narrow band along the margins of Lakes Michigan, Huron, and Superior with 90% of sites occurring in Michigan and some sites occurring in Indiana and Wisconsin. The species is a regional endemic restricted to dune habitats in the western Great Lakes region and appears to establish itself only in very open, sandy soil. Cormorants may be having negative effects upon the distribution of this species; thus the proposed action could benefit it.

Effect Determination: Not likely to adversely affect.

Legacy Region 4

Ivory-billed Woodpecker (*Campetherus principalis*) [Extinct?]: Since this species is presumed extinct and found in different habitat than cormorants, it is not likely that the proposed action will adversely affect it.

Effect Determination: Not likely to adversely affect.

Red-cockaded Woodpecker (*Picoides borealis*) [E]: The mature pine forest preferred by these woodpeckers is very different from the preferred habitat of cormorants. Thus, the proposed action is not likely to result in adverse effects to this species.

Effect Determination: Not likely to adversely affect.

Mississippi Sandhill Crane (*Grus canadensis pulla*) [E]*: These cranes are confined to a fairly small section of Jackson County, Mississippi. Savannas are the preferred habitat of this crane and are inhabited year-round. Because of differences in preferred habitat and the limited geographic range of this species, it is not likely that the proposed action would adversely affect it.

Effect Determination: Not likely to adversely affect.

Piping Plover (*Charadrius melanotos*) [T]*: In Region 4, the Northern Great Plains subpopulation of piping plovers winters along the Gulf Coast states and the Atlantic Coast subpopulation winters along the Atlantic coast from Virginia south to North Carolina. Preferred winter habitat of this species is primarily sandy ocean beaches. While the preferred nesting habitat of cormorants and piping plovers is different, they may be found in close enough proximity, but since control activities would occur more than 1000 feet from active piping plover or interior least tern nests or colonies, the proposed action is not likely to adversely affect this species.

Effect Determination: Not likely to adversely affect.

Least Tern (*Sterna antillarum*) (Interior population) [E]: The interior population of the least tern breeds in isolated areas along the Missouri, Mississippi, Ohio, Red, and Rio Grande river systems, which include several states in Region 4. Since control activities would occur more than 1000 feet from active interior least tern nests or colonies, the proposed action is not likely to adversely affect this species.

Effect Determination: Not likely to adversely affect.

Everglade Snail Kite (*Rostrhamus sociabilis plumbeus*) [E]*: The Everglade snail kite can be found in a small portion of Florida. Its preferred habitat is large, shallow, inland freshwater marshes that support populations of apple snails. Cormorants prefer deeper waters than this species. It is not likely that the Everglade snail kite would be adversely affected by the proposed action.

Effect Determination: Not likely to adversely affect.

Wood Stork (*Mycteria americana*) [E]: Wood storks are birds of freshwater and brackish wetlands, primarily nesting in cypress or mangrove swamps. Habitat types and distributions in some areas overlap between cormorants and wood storks and thus we cannot exclude the likelihood of wood storks being incidentally taken (via harassment) by activities authorized by the proposed action. However, differences in their physical appearance make it unlikely that they would be directly taken. Also, specific permit conditions of protecting nesting sites are required during cormorant control.

Effect Determination: Not likely to adversely affect.

Brown Pelican (*Pelicanus occidentalis*) [E]: Because of their different flight profile and pattern, and appearance, it is unlikely that brown pelicans could be confused with cormorants and taken directly. The proposed action is unlikely to disturb brown pelicans due to differences in location.

Effect Determination: Not likely to adversely affect.

Cape Sable Sparrow (*Ammodramus maritimus mirabilis*) [E]*: The Cape Sable sparrow inhabits brushless, subtropical marshes of interior southern Florida, habitat that is different than the preferred habitat of cormorants. It is not likely that the proposed action would result in adverse effects to this species.

Effect Determination: Not likely to adversely affect.

Florida Grasshopper Sparrow (*Ammodramus savanarum floridanus*) [E]: The Florida grasshopper sparrow occurs in the prairie region of south-central Florida, inhabiting the stunted growth of saw palmetto, dwarf oaks, bluestems, and wiregrass. Because of these distinct habitat differences, it is not likely to be adversely affected by the proposed action.

Effect Determination: Not likely to adversely affect.

Black-capped Vireo (*Vireo atricapillus*) [E]: Preferred habitat is dense, low thickets and oak scrub, which is very different from the preferred habitat of cormorants. It is not likely to be adversely affected by the management techniques covered by the proposed action.

Effect Determination: Not likely to adversely affect.

Roseate Tern (*Sterna douglalli*) [T]: Roseate terns breed primarily on small, offshore islands. Their preferred habitat is coastal, but they differ in size, shape and flight pattern from cormorants. It is not likely that roseate terns will be adversely affected by the proposed action.

Effect Determination: Not likely to adversely affect.

Audubon's Crested Caracara (*Polyborus plancus audubonii*) [T]: Audubon's crested caracara is found in open grassland, prairie, pastures, or desert habitats. It is not likely to co-occur in habitat with cormorants and thus is not likely to be adversely affected by the proposed action.

Effect Determination: Not likely to adversely affect.

Florida Scrub Jay (*Aphelocoma coerulescens*) [T]: The Florida scrub jay is found only in Florida, inhabiting oak scrub on white, drained sand, in open areas without a dense canopy. Its upland habitat preferences make it not likely to be adversely affected by the proposed action.

Effect Determination: Not likely to adversely affect.

Whooping Crane (*Grus americana*) [XN]*: A non-migratory, introduced population of the whooping crane is found in a portion of Osceola County, Florida. Because of the critical status of this species and its limited geographic range, it is very unlikely that any cormorant management would be conducted near enough to cause incidental take. The proposed action is not likely to adversely affect whooping cranes.

Effect Determination: Not likely to adversely affect.

Bachman's Warbler (*Vermivora bachmanii*) [Extinct?]: This species not only has different preferred habitat than cormorants, but is believed to be extinct. The proposed action is not likely to adversely affect this species.

Effect Determination: Not likely to adversely affect.

Red Knot (*Calidris canutus rufa*) [T]: Red knots are coastal, long-distance migrants between their breeding grounds in the Canadian Arctic and several wintering regions, including the Southeast United States (Southeast), the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America. Red knots differ in size, shape, and flight pattern from cormorants. It is not likely that red knots will be adversely affected by the proposed action.

Effect Determination: Not likely to adversely affect.

Florida Salt Marsh Vole (*Microtus pennsylvanicus dukecampbelli*) [E]: The Florida salt marsh vole inhabits periodically flooded salt marshes within Waccasassa Bay in Levy County, Florida. Its very small population size and preference for herbaceous wetlands make it not likely to be adversely affected by the proposed action.

Effect Determination: Not likely to adversely affect.

Atlantic Salt Marsh Snake (*Nerodia clarkii taeniata*) [T]: This species inhabits coastal salt marshes and mangrove swamps in Florida. It may co-occur with cormorants, but due to its limited distribution, it is not likely to be adversely affected by the proposed action.

Effect Determination: Not likely to adversely affect.

Yellow-blotched Map Turtle (*Graptemys flavimaculata*) [T]: This species is restricted to the Pascagoula River drainage in Mississippi. Its preferred habitat is typically riverine with a moderate current and numerous basking logs. Because of its limited geographic range and differences in preferred habitat, it is not likely to be adversely affected by the proposed action.

Effect Determination: Not likely to adversely affect.

Ringed Map Turtle (*Graptemys oculifera*) [T]: This species occurs in the main channel of the Pearl River in Mississippi and Louisiana. Its preferred habitat is typically riverine with a moderate current and numerous basking logs. Because of its limited geographic range and differences in preferred habitat, it is not likely to be adversely affected by the proposed action.

Effect Determination: Not likely to adversely affect.

Louisiana Pinesnake (*Pituophis ruthveni*) [T]: The management techniques associated with the proposed action are not likely to adversely affect this species.

Effect Determination: Not likely to adversely affect.

Trispot Darter (*Etheostoma trisella*) [T]: The currently occupied habitat of the trispot darter is in streams and rivers that are considered to be too small for cormorants. It is unlikely these two species would consistently occur in the same areas. Therefore, it would be unlikely that this proposed action would occur in the trispot darter's critical habitat or in any place we would expect trispot darters to occur. Disturbance due to boating or wading would be extremely minor and infrequent due to its spatial distribution and habitat preferences.

Effect Determination: Not likely to adversely affect.

Legacy Region 5:

Piping Plover (*Charadrius melanotos*) [T/E]*: Piping plovers nest on sandy beaches, sandflats, dredge islands and drained floodplains. While the preferred nesting habitat of cormorants and piping plovers is different, they may be found in close enough proximity, but since control activities would occur more than 1000 feet from active piping plover or interior least tern nests or colonies, the proposed action is not likely to adversely affect this species.

Effect Determination: Not likely to adversely affect.

Roseate Tern (*Sterna dougallii*) [E]: Roseate terns breed locally along the Atlantic coast. They breed primarily on small offshore islands. Their preferred habitat is coastal, but they differ in size, shape, and flight pattern from cormorants. It is not likely that roseate terns will be adversely affected by the proposed action.

Effect Determination: Not likely to adversely affect.

Red Knot (*Calidris canutus rufa*) [T]: Red knots are coastal, long-distance migrants between their breeding grounds in the Canadian Arctic and several wintering regions, including the Southeast United States (Southeast), the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America. Red knots differ in size, shape, and flight pattern from cormorants. It is not likely that red knots will be adversely affected by the proposed action.

Effect Determination: Not likely to adversely affect.

Red-cockaded Woodpecker (*Picoides borealis*) [E]: The mature pine forest preferred by these woodpeckers is very different from the preferred habitat of cormorants. Thus, the proposed action is not likely to result in adverse effects to this species.

Effect Determination: Not likely to adversely affect.

Legacy Region 6:

Least Tern (*Sterna antillarum*) (Interior population) [E]: While the preferred habitat of cormorants and piping plovers is similar and may be found in close enough proximity, control activities would occur more than 1000 feet from active interior least tern nests or colonies, thus the proposed action is not likely to adversely affect this species.

Effect Determination: Not likely to adversely affect.

Piping Plover (*Charadrius melanotos*) [T]*: Because of the fact that their preferred habitat is different from that of cormorants, but may be found in close enough proximity, control activities would occur more than 1000 feet from active piping plover nests or colonies, thus the proposed action is not likely to adversely affect this species.

Effect Determination: Not likely to adversely affect.

Whooping Crane (*Grus americana*) [E]*: Whooping cranes are not likely to be adversely affected by the proposed action because of differences in preferred habitat between cormorants and whooping cranes.

Effect Determination: Not likely to adversely affect.

Black-capped Vireo (*Vireo atricapillus*) [E]: Preferred habitat is dense, low thickets and oak scrub, which is very different from the preferred habitat of cormorants. This species is not likely to be adversely affected by the management techniques covered by the proposed action.

Effect Determination: Not likely to adversely affect.

Eskimo Curlew (*Numenius borealis*) [E]: This species may be extinct. Preferred habitat on its wintering grounds is grasslands, pastures, plowed fields and, less frequently, marshes and mudflats. It is not likely to be adversely affected by the proposed action.

Effect Determination: Not likely to adversely affect.

Mexican Spotted Owl* (*Strix occidentalis lucida*) [T]: This owl is only found in mixed-conifer forest, often in steep canyons, which is very different from cormorant preferred habitat. It is not likely to be adversely impacted by the proposed action.

Effect Determination: Not likely to adversely affect.

Legacy Region 8:

California Condor (*Gymnogyps californianus*) [E]: The California condor is among the largest flying birds in the world. Adults weigh approximately 17 to 22 pounds and have a wing span up to 9.5 feet. Plumage is black, with prominent white under-wings and naked skin on the head and neck that ranges from gray to shades of yellow, red, and orange. Males and females cannot be distinguished by size or plumage. California condors nest in various types of rock formation including caves, crevices, overhung ledges, and potholes, and more rarely, in cavities in giant sequoia trees (*Sequoiadendron giganteum giganteus*). California condors are opportunistic scavengers, feeding only on the carcasses of dead animals. Typical foraging behavior includes long-distance reconnaissance flights, lengthy circling flights over a carcass, and occasionally hours of waiting at a roost or on the ground near a carcass. Seasonal foraging behavior shifts perhaps are the result of climatic cycles or due to changes in food availability. Condors maintain wide-ranging foraging patterns throughout the year, an important adaptation for a species that may be subjected to unpredictable food supplies.

The condor will not be mistaken for cormorants; therefore, direct mortality of California condor is not a concern. Condors will not forage in areas where the proposed action will occur and it is unlikely that condors will feed upon and therefore become exposed to lead from carcasses.

Effect Determination: Not likely to adversely affect.

California Condor Critical Habitat

Critical habitat for the California condor has been designated in Los Angeles, Ventura, Santa Barbara, San Luis Obispo, Kern, and Tulare Counties, California. Although hunting for migratory game birds will occur in these areas, habitat components essential to the conservation of the condor will not be affected by the proposed action.

Effect Determination: Not likely to adversely affect critical habitat.

California Clapper Rail (*Rallus longirostris obsoletus*) [E]: The California clapper rail, one of the largest rails, is a year-round resident of coastal salt and brackish marshes and tidal sloughs of San Francisco Bay and Suisun Bay. Males and females are similar in appearance, with olive brown back and wings marked by dark brown streaks; the breast is rusty cinnamon, and black and white bars crisscross its flanks. The breeding season of California clapper rails begins by February. Nesting starts in mid-March and extends into August. The end of the breeding season is typically defined as the end of August, which corresponds with the time when eggs laid during re-nesting attempts have hatched and young are mobile.

Although cormorants may occur in the same habitat with California clapper rails, it is not likely that California clapper rails would be confused with them because of their difference in appearance and behavior. Clapper rails are secretive, rarely fly, and spend most of their time hidden in thick marsh vegetation, while cormorants spend most of their time on the water surface or open shoreline. The Service does not anticipate that a temporary disruption of behavior patterns from proposed activities would be significant nor would it be likely to result in injury to individual birds.

Effect Determination: Not likely to adversely affect.

Coastal California Gnatcatcher (*Polioptila californica californica*) [T]: The coastal California gnatcatcher is a small, long-tailed member of the old-world warbler and gnatcatcher family, which is restricted to coastal southern California and Baja California, and is primarily found in coastal sage scrub communities. It is dark blue-gray above and grayish-white below. The tail is mostly black above and below. The male has a distinctive black cap, which is absent during the winter. The breeding season of the coastal California gnatcatcher extends from about February 15 through August 30, with the peak of nesting activity occurring from mid-March through mid-May.

Because of its relatively small size and difference in habitat preferences, it is extremely unlikely that the gnatcatcher would be mistaken for cormorants and the Service does not anticipate that a temporary disruption of behavior patterns from proposed activities would be significant nor would it be likely to result in injury to individual birds.

Effect Determination: Not likely to adversely affect.

Coastal California Gnatcatcher Critical Habitat

Critical habitat for the coastal California gnatcatcher was finalized in December 2007. Although hunting for migratory game birds may occur in designated critical habitat, the proposed action would not result in the removal, destruction, or adverse modification of habitat components essential to the conservation of the gnatcatcher.

Effect Determination: Not likely to adversely affect critical habitat.

California Least Tern (*Sterna antillarum browni*) [E]: The California least tern, the smallest member of the gull and tern family, is a migratory colonial nesting shorebird that occurs along the coastline of California from April to September, where it nests on sandy beaches or mudflats near the ocean. Least terns are also known to nest in the southern San Joaquin Valley. It is unlikely that least terns would be mistaken for cormorants because of their size, coloration, flight profile, and flight pattern.

Effect Determination: Not likely to adversely affect.

Inyo California Towhee (*Pipilo crissalis eremophilus*) [T]: This medium-sized, sparrow-like, nonmigratory songbird is restricted to riparian thickets and adjacent uplands in the remote southern Argus Mountains of Inyo County, California. Because this species occurs in a remote location, is limited in distribution, and because of the limited opportunities for migratory game bird hunting in this area (68 percent of its range is on Department of Defense lands), the Service expects that there is little overlap between the proposed action and the range of the species.

The Service proposed to delist the Inyo California towhee on November 4, 2013 (78 FR 65938). A final rule has not been published so the species remains listed as threatened.

Effect Determination: Not likely to adversely affect.

Inyo California Towhee Critical Habitat

Critical habitat for the Inyo California towhee has been designated in the Argus Range in Inyo County, California. For the reasons stated above, there is little, if any, overlap between the proposed action and towhee critical habitat. In the event that there is overlap, the proposed action is not expected to cause removal, destruction, or adverse modification of habitat components essential to the conservation of the towhee.

Effect Determination: Not likely to adversely affect.

Least Bell's Vireo (*Vireo bellii pusillus*) [E]: The least Bell's vireo is a small, migratory songbird that is seasonally present (mid-March to mid-September) in thickets of riparian vegetation in southern California and northern Baja California, Mexico. It is unlikely that vireos would be mistaken for cormorants because of their small size, coloration, flight profile, and flight pattern.

Effect Determination: Not likely to adversely affect.

Least Bell's Vireo Critical Habitat

Critical habitat for the least Bell's vireo has been designated along 10 riparian areas in southern California. Riparian woodland vegetation that generally contains both canopy and shrub layers and includes some associated upland habitats is very different than habitats preferred by cormorants.

Effect Determination: Not likely to adversely affect.

Light-footed Clapper Rail (*Rallus longirostris levipes*) [E]: The light-footed clapper rail is a year-round resident in coastal wetlands of southern California and northern Baja California, Mexico. The light-footed clapper rail is found in freshwater and saltwater marshes containing dense vegetation. The breeding season for the light-footed clapper rail is mid-March to mid-August. Mating pairs build an incubation nest for their eggs and usually one or more brood nests to serve as refuges for the young rails during high tide.

The Service does not expect any short-term temporary displacement from the proposed action to be significant to the rail's ability to feed, shelter, or breed because it would occur in very different areas.

Effect Determination: Not likely to adversely affect.

Marbled Murrelet (*Brachyramphus marmoratus*) (Washington, Oregon, and California Population) [T]: The marbled murrelet is a small, diving seabird that breeds along the Pacific coast of North America from the Aleutian Archipelago and southwestern Alaska to central California. It forages almost exclusively in the near-shore marine environment, but flies inland to nest in mature conifer trees located in forest stands with old-growth forest characteristics. Marbled murrelet nesting occurs over an extended period from late-March to late-September. Murrelets have been detected at inland sites throughout the year but it is believed that most individuals go out to sea for extended periods during the winter.

The marbled murrelet occurs in several coastal locations containing cormorants. Permittees are unlikely to mistake a marbled murrelet for a cormorant, as it is not similar in appearance. Noises associated with cormorant management activities are unlikely to significantly alter breeding of murrelets. Any temporary displacement of murrelets during cormorant management activities is not expected to result in a measurable adverse effect to murrelet breeding, foraging, or loafing because they are likely to simply move away from the disturbance and continue their loafing or feeding activities elsewhere.

Effect Determination: Not likely to adversely affect.

Marbled Murrelet Critical Habitat

Critical habitat for the marbled murrelet has been designated in old growth forests of Washington, Oregon, and California. The proposed action will have no effect on old growth habitat function or value and therefore will not affect marbled murrelet critical habitat.

Effect Determination: Not likely to adversely affect.

Northern Spotted Owl (*Strix occidentalis caurina*) [T]: The northern spotted owl is a dark brown, medium-sized owl with a barred tail and white spots on the head and breast. It inhabits mature and old growth forests from northwestern California to southwestern British Columbia. Spotted owls begin courtship activities in late February or March, most eggs hatch in late April or May, and the majority of young fledge in June.

The spotted owl's nocturnal habitats, its silhouette, size, and color make it highly unlikely that it would be mistaken for a cormorant. Noises associated with proposed action are unlikely to significantly alter breeding, feeding, or sheltering of owls because the proposed action will not occur in habitats of the spotted owl.

Effect Determination: Not likely to adversely affect.

Northern Spotted Owl Critical Habitat

Critical habitat for the northern spotted owl has been designated in old growth forests of Washington, Oregon, and California. The proposed action will have no effect on old growth habitat function or value and therefore will not affect northern spotted owl critical habitat.

Effect Determination: Not likely to adversely affect.

Southwestern Willow Flycatcher (*Empidonax traillii extimus*) [E]: The southwestern willow flycatcher is a small, migratory songbird that is seasonally present (May-September) in riparian woodlands of the Southwest, with over 90 percent of breeding sites occurring in Arizona, New Mexico, and southern California. It is unlikely to be mistaken for a cormorant because of its small size, coloration, flight profile, and flight pattern.

Effect Determination: Not likely to adversely affect.

Southwestern Willow Flycatcher Critical Habitat

Critical habitat for this species was designated on January 3, 2013. Critical habitat was designated in riparian woodland corridors in nine counties in southern California and three counties in southern Nevada. There is only a very limited potential for the proposed action to occur within designated critical habitat for the southwestern willow flycatcher.

Effect Determination: Not likely to adversely affect.

Streaked Horned Lark (*Eremophila alpestris strigata*) [T]: The streaked horned lark is a small, ground-dwelling songbird with conspicuous feather tufts, or "horns," on its head. Its back is heavily streaked with black, contrasting sharply with its deeply ruddy nape and yellow underparts. The streaked horned lark nests on the ground in sparsely vegetated sites in short-grass dominated habitats. Historically, this type of habitat was found in prairies in western Oregon and Washington. More recently, streaked horned larks have used manmade habitats for nesting, including fallow agricultural fields, lightly to moderately grazed pastures, seasonal mudflats, airports, and dredged material islands in the Columbia River. Streaked horned larks are also found in dune habitats along the coast. This migratory species is generally believed to winter in California, but documentation is lacking. The horned lark nesting season extends from March to June.

Although the streaked horned lark may occur in some of the proposed action areas, it is unlikely that it would be confused with cormorants due to its size, coloration, flight pattern, and distinct silhouette. Furthermore, its nesting season, when it is most vulnerable to disturbance, should not be affected by the proposed action. Although streaked horned larks may be disturbed on their wintering grounds, the Service does not anticipate that a temporary disruption of behavior patterns from proposed activities would be significant nor would it be likely to result in injury to individual birds.

Effect Determination: Not likely to adversely affect.

Western Snowy Plover; Pacific Coast population (*Charadrius nivosus nivosus*) [T]: The Pacific Coast subpopulation of western snowy plover (western snowy plover) breeds primarily on coastal beaches from Washington to southern Baja California, Mexico, and winters in coastal areas from southern Washington to Baja California, Mexico. Western snowy plovers are pale gray-brown above and white below, with a white hind-neck collar and dark lateral breast patches, forehead bar, and eye patches. The western snowy plover nesting season extends from early March through late September. While some western snowy plovers remain in their coastal breeding areas year-round, others move south or north for winter. Due to their small size, silhouette, and flight pattern, it is extremely unlikely that western snowy plovers would be confused with cormorants.

Effect Determination: Not likely to adversely affect.

Western Snowy Plover; Pacific Coast Subpopulation Critical Habitat

Critical habitat for the Pacific Coast subpopulation of the western snowy plover has been designated in coastal areas from mid-Washington to the Mexican border in California. The proposed action will have no effect on coastal habitat function or value and therefore will not affect designated critical habitat for the Pacific Coast subpopulation of the western snowy plover.

Effect Determination: No effect.

Yellow-billed Cuckoo (Western U.S. DPS) (*Coccyzus americanus*) [T]: The yellow-billed cuckoo is a medium-sized bird that occurs in riparian habitats where waterfowl hunting may occur. This species has a slender, long-tailed profile, with a fairly stout and slightly down-curved bill. The tail feathers are boldly patterned with black and white below. The breeding season for the yellow-billed cuckoo generally begins with pair formation in mid-June and lasts until mid-August. Yellow-billed cuckoos annually migrate to wintering grounds in South America. Spring migration begins in late May and lasts until late June, and fall migration begins in late August and lasts until mid-September.

The Services does not anticipate adverse effects to this species as a result of the proposed action because it differs in habitat preferences and cannot be mistake for a cormorant.

Effect Determination: No effect.

Yuma Clapper Rail (*Rallus longirostris yumanensis*) [E]: The Yuma clapper rail is a marsh bird with a short tail, long legs, a downcurved beak, and short, rounded wings that uses freshwater marsh habitats. Within Region 8, this species occurs year-round along the lower Colorado River and at the Salton Sea and is presumed to occur year-round on the Muddy River, Virgin River, Ash Meadows National Wildlife Refuge, and Pahranagat National Wildlife Refuge. The breeding season for Yuma clapper rails occurs from mid-March to July.

Although cormorants may occur in the same habitat with Yuma clapper rails, it is not likely that Yuma clapper rails would be confused with them because of their difference in appearance and behavior. Clapper rails are secretive, rarely fly, and spend most of their time hidden in thick marsh vegetation, while cormorants spend most of their time on the water surface or open shoreline. We do not anticipate that a temporary disruption of behavior patterns from proposed activities would be significant nor would it be likely to result in injury to individual birds.

Effect Determination: Not likely to adversely affect.

B. Explanation of actions to be implemented to reduce adverse effects:

All control activities are allowed if the activities occur more than 1500 feet from active wood stork nesting colonies, more than 1000 feet from active wood stork roost sites, and more than 750 feet from feeding wood storks.

Discharge/use of firearms to kill or harass double-crested cormorants or use of other harassment methods are allowed if the control activities occur more than 1000 feet from active piping plover or interior least tern nests or colonies; occur more than 1500 feet from active wood stork nesting colonies, more than 1000 feet from active wood stork roost sites, and more than 750 feet from feeding wood storks;

Other control activities such as egg oiling, cervical dislocation, CO₂ asphyxiation, egg destruction, or nest destruction are allowed if these activities occur more than 500 feet from active piping plover or interior least tern nests or colonies; occur more than 1500 feet from active wood stork nesting colonies, more than 1000 feet from active wood stork roost sites, and more than 750 feet from feeding wood storks;

At their discretion, agencies or their subpermittees may contact the Regional Migratory Bird Permit Office to request modification of the above measures. Such modification can occur only if, on the basis of coordination between the Regional Migratory Bird Permit Office and the Endangered Species Field Office, it is determined that no adverse effects to any of the listed species will occur. If adverse effects are anticipated from the control activities, either during the intra-Service coordination discussions described above or at any other time, the Regional Migratory Bird Permit Office will initiate consultation with the Endangered Species Field Offices

VIII. Effect determination and response requested:

A. Listed species/designated critical habitat:

Determination

No affect/no adverse modifications Concurrence

All species not otherwise listed in VIII. B, C

May affect, but is not likely to adversely Concurrence

PACIFIC NORTHWEST

- Greater sage-grouse
- Marbled murrelet
- Northern spotted owl
- Short-tailed albatross
- Streaked horned lark
- Western snowy plover

- Yellow-billed cuckoo

SOUTHWEST

- Attwater's greater prairie chicken
- Mexican spotted owl
- Red-cockaded woodpecker
- Least tern
- Northern aplomado falcon
- Brown pelican
- Southwestern willow flycatcher
- Black-capped vireo
- Golden-cheeked warbler
- Whooping crane
- Piping plover
- Yellow-billed cuckoo
- Yuma clapper rail
- Eskimo curlew
- Concho water snake

MIDWEST (Legacy Region 3)

- Piping plover
- Least tern
- Whooping crane
- Kirtland's warbler
- Red knot
- Lake Erie water snake
- Houghton's goldenrod
- Dwarf lake iris
- Pitcher's thistle

SOUTHEAST (Legacy Region 4)

- Ivory-billed woodpecker
- Red-cockaded woodpecker
- Mississippi sandhill crane
- Piping plover
- Least tern
- Everglade snail kite
- Wood stork
- Brown pelican
- Black-capped vireo
- Cape Sable seaside sparrow
- Florida grasshopper sparrow
- Roseate tern
- Bald eagle
- Audubon's crested caracara
- Florida scrub jay

- Whooping crane
- Bachman's warbler
- Red Knot
- Florida salt marsh vole
- Ringed map turtle
- Yellow-blotched map turtle
- Atlantic salt marsh snake
- Louisiana Pinesnake
- Trispot darter

NORTHEAST (Legacy Region 5)

- Piping plover
- Roseate tern
- Red-cockaded woodpecker
- Red knot

MOUNTAIN-PRAIRIE (Legacy Region 6)

- Least tern
- Northern Great Plains piping plover
- Whooping crane
- Eskimo curlew
- Black-capped vireo
- Mexican spotted owl
- Southwestern willow flycatcher

CALIFORNIA/NEVADA (LEGACY REGION 8)

- California condor
- California clapper rail
- Coastal California gnatcatcher
- California least tern
- Inyo California towhee
- Least Bell's vireo
- Light-footed clapper rail
- Marbled murrelet
- Northern spotted owl
- Southwestern willow flycatcher
- Streaked horned lark
- Western snowy plover; Pacific coast subpopulation
- Yellow-billed cuckoo (Western U.S. DPS)
- Yuma clapper rail

Is likely to jeopardize proposed species/ adversely modify proposed critical habitat

NONE X Concurrence

B. Proposed species/designated critical habitat:

Determination

No effect on proposed action/no adverse modifications of proposed critical habitat (see below)

NONE Concurrence

C. Candidate species:

Determination

No effect (see below)

Concurrence

Lesser prairie chicken

Is likely to jeopardize candidate species

Concurrence

NONE

Signature and Date

IX. Reviewing ESO Evaluation:

A. Concurrence Nonconcurrence _____

B. Formal consultation required _____

C. Informal consultation required _____

D. Informal conference required _____

E. Remarks

Signature and Date