RECLAMATION
Managing Water in the West

Finding of No Significant Impact

Inland Avian Predation Management Plan

PN-FONSI 14-03

Pacific Northwest Regional Office
Boise, Idaho

U.S. Department of the Interior
Bureau of Reclamation

January 2014

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Background

The development of the Inland Avian Predation Management Plan (IAPMP) is a requirement of the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) 2008 Federal Columbia River Power System (FCRPS) Biological Opinion (BiOp), as updated in 2010, Reasonable and Prudent Alternative Actions 47 and 68. As FCRPS Action Agencies, the U.S. Army Corps of Engineers, Walla Walla District (Corps) led the development the IAPMP with the cooperation of the U.S. Bureau of Reclamation, Pacific Northwest Region (Reclamation).

The IAPMP proposes to implement actions over five years using a phased approach to reduce avian predation-related loss of federal Endangered Species Act (ESA)-listed juvenile salmonids in the inland Columbia River Basin above Bonneville Dam. Research, as detailed in the environmental assessment, indicated that the greatest potential for increasing juvenile salmonid survival through the reduction in losses to avian predators on the Columbia River plateau (i.e., upstream of Bonneville Dam) would be gained by focusing management efforts on dissuading Caspian Terns (CATEs) from nesting at Goose Island (located at Potholes Reservoir in Grant County) and Crescent Island (located within McNary Reservoir on the Columbia River in Walla Walla County). Based on data, it is estimated that Goose Island CATES have had up to a 14.6% predation rate on upper Columbia River (UCR) steelhead, and 3% percent predation rate on UCR spring Chinook. The effectiveness of CATE dissuasion actions at Goose and Crescent islands would be enhanced by adaptive management actions to limit CATEs from forming new colonies and/or expanding existing colonies within the Columbia River Basin. The IAPMP also provides for the development of new nesting habitat or the enhancement of existing habitat to attract CATEs to areas outside the basin. The preferred alternative is described and evaluated in the draft IAPMP Environmental Assessment (EA) (Corps, January 2013). Reclamation would implement the proposed alternative and IAPMP at Goose Island and work jointly with the Corps to identify habitat outside of the basin in Phase 1 and develop the habitat in Phase 2, and engage in adaptive management within the framework in Phases 1 and 2.

Purpose and Need

The purpose of the action is to increase survival of ESA-listed juvenile salmonids by reducing predation-related losses from CATE colonies at Goose and Crescent islands through the development of an IAPMP, in accordance with the FCRPS BiOp. Management actions are focused on dissuasion of CATEs at Goose and Crescent islands, adaptive management actions to limit the formation and/or growth of other CATE colonies at other inland basin locations, and implementation of additional habitat to attract CATEs to areas outside the basin. In addition to providing substantial and achievable benefits to ESA-listed salmonids, the IAPMP actions are intended to minimize impacts to CATEs, which are protected under the Migratory Bird Treaty Act (MBTA), as well as impacts to other resources and species of concern. The need for action is based on the FCRPS Action Agencies' requirement to avoid jeopardizing the listed species pursuant to the FCRPS BiOp. Managing avian predators to address salmonid predation would add to and complement other recovery efforts and if successful at Goose Island could provide a survival benefit to UCR steelhead and spring Chinook of 11.4% and 3.0%, respectively.

Project Alternatives Considered and Preferred Alternative

The National Environmental Policy Act (NEPA) alternative development process is designed to allow consideration of the widest possible range of issues and potential management approaches. The Corps and Reclamation considered a broad range of potential avian predator management actions to develop the set of alternatives considered in the EA. The following four alternatives identify the types of management strategies the Corps and Reclamation could pursue to achieve the stated purpose and need:

Alternative A – No action.

Alternative B – Passive hazing (habitat modification) to dissuade CATE nesting on Goose and Crescent islands including adaptive management actions to limit CATEs from forming new colonies and/or expanding existing colonies within the Columbia River Basin; development of new nesting or improvement to existing CATE habitat (called "habitat enhancement") to attract CATES to areas outside the basin; and a phased approach due to the uncertainty associated with how CATEs would respond to passive hazing.

Alternative C – Passive hazing (Alternative B) combined with active hazing to prevent CATEs from nesting on Goose and Crescent Islands.

Alternative D – Passive and active CATE hazing (Alternative C) combined with limited CATE egg removal in support of non-lethal measures. (preferred alternative)

Due to the uncertainty associated with how CATEs would respond to habitat modifications and to facilitate an adaptive management framework, a phased approach was developed for the implementation of these actions where dissuasion efforts at Goose Island would be implemented in Phase 1 prior to dissuasion efforts at Crescent Island in Phase 2. The identification of CATE habitat enhancement nesting sites outside the Columbia River Basin would occur during Phase 1, for implementation during Phase 2, pending supplemental/tiered NEPA analysis.

Alternative D was selected as the preferred alternative because it best meets the purpose and need. It provides the most comprehensive set of actions for CATE management with the highest probability of successful dissuasion at Goose and Crescent islands, which would result in the largest reduction in avian predation losses of ESA-listed salmonids. The habitat modifications, combined with active hazing, would provide a high probability of success, while limited egg take would provide a contingency for unforeseen persistence of CATEs. Alternative D would have minimal impacts to the overall CATE metapopulation, other MBTA-protected birds, other ESA-listed species, and other environmental resources.

Environmental Effects for the Preferred Alternative

Fish & Wildlife
The preferred alternative would be expected to reduce the number of CATEs nesting in the inland Columbia River Basin. CATEs displaced from Goose and Crescent islands would have a high potential to find new nesting areas outside the basin due to their migratory life history traits and known tendency to travel long distances. Therefore, it is anticipated that the proposed action would have no significant impact on the CATE metapopulation. The preferred alternative would identify one or more habitat enhancement sites outside the basin for development as part of Phase 2. CATEs are covered by the Migratory Bird Treaty Act (MBTA). Dissuasion actions will occur outside the migratory bird nesting season for CATEs, therefore there would be no impacts to nests or eggs from that work. An annual MBTA permit from the U. S. Fish and Wildlife Service (USFWS) for take of up to 200 CATE eggs from Goose and Crescent islands and the at-risk islands combined will be requested jointly by the Corps and Reclamation upon approval of the IAPMP.

Some minor negative effects might occur on gull populations co-located with CATEs at Goose and Crescent islands, and at several at-risk islands in proximity to Goose and Crescent islands. Due to gulls' variable habitat requirements and the presence of adequate habitat throughout the Columbia River Basin, no significant impacts to gulls are anticipated. Similarly, there may be small negative temporal impacts to other bird species located at Goose and Crescent islands and at the at-risk islands. Habitat modifications at Goose and Crescent islands, and at the at-risk islands, would typically be performed outside of the nesting season in a manner such that no significant negative impacts to non-target bird species would occur.

Actions associated with the preferred alternative may have minor negative effects to non-ESA-listed salmonids and other fish. Due to dispersal of a relatively small number of CATEs across a wide geographic area, no significant impact to non-ESA-listed salmonids or other fish species would occur.

There may be minor effects to mammals located at Goose and Crescent islands and the at-risk islands from actions associated with the preferred alternative. These effects are expected to be minor and of a short duration such that no significant impacts to these resources would occur.

ESA-Listed Species
The preferred alternative would have positive effects on federally ESA-listed fish species, especially populations of UCR steelhead and Chinook salmon, as well as Snake River steelhead and sockeye salmon, which are impacted by CATE populations nesting on Goose and Crescent islands. The preferred alternative would have no effect on ESA-listed wildlife or plants.

Vegetation and Soils
There may be minor effects to vegetation and soils located at Goose and Crescent islands and the at-risk islands from actions associated with the preferred alternative. These effects are expected to be minor and of a short duration such that no significant impacts to these resources would occur.

Socioeconomic
Positive socioeconomic impacts are expected, especially with regard to commercial, recreational and tribal fisheries, due to decreased salmonid consumption by CATEs and anticipated increased returns of adult salmon.

Environmental Justice
The preferred alternative would not have a disproportionate effect on minority or low income populations and is, therefore, in compliance with the executive order.

Indian Trust Assets
No Indian Trust Assets were identified for the Goose Island project area.

Indian Sacred Sites
The Corps initiated consultation with relevant tribal governments regarding Indian Sacred Sites and other tribal resources on September 12 and 13, 2013, and is, therefore, in compliance with this executive order. No impacts to these sites or resources related to the preferred alternative are anticipated.

Other Environmental Resources
The preferred alternative would have no effect on floodplain/water elevation, water quality, greenhouse gas emissions, cultural resources, or the built environment.

Environmental Commitments

The EA identifies standard practices to minimize environmental impacts during implementation of dissuasion material on Goose Island, specifically dust control.

Consultation and Coordination

USFWS Coordination and Consultation

Biologists from the USFWS were consulted during preparation of a biological assessment, with the determination that the proposed project may affect, but is not likely to adversely affect, bull trout and bull trout–designated critical habitat. NMFS concluded that the proposed action would be covered under the existing FCRPS BiOp, as updated, and no further consultation would be necessary.

USFWS was also coordinated with during the development of the alternatives regarding the preferred alternative's impacts to the CATE metapopulation. Proposed implementation via the phased approach is a result of negotiations between the Action Agencies and USFWS.

Cultural Resources

Actions proposed for Goose and Crescent islands and possible active dissuasion at other islands throughout the inland Columbia Basin would not have any impacts on cultural resources. Proposals to develop habitat, or to conduct dissuasion activities other than active dissuasion at any of the at-risk islands may have impacts to cultural resources, and any decisions made regarding these activities would be subject to additional reviews under Section 106 of the National Historic Preservation Act (NHPA). The Corps prepared an archaeological report for the proposed project with a "no historic properties affected" determination and forwarded it to the Washington Department of Archaeology and Historic Preservation (WDAHP) in September 2013. The Corps received concurrence from the Washington Department of Archaeology and Historic Preservation on October 30, 2013, which covers dissuasion actions at Goose and Crescent islands. Concurrence from the Oregon State Historic Preservation Office was received on January 16, 2014.

Tribal Government Coordination and Consultation

Regular meetings involving regional partners, including affected regional tribes, were held from October 2010 through December 2013. Tribes were invited to contribute viewpoints and information on the development of the IAPMP during these meetings. Affected tribes were given early review of the draft public documents on October 25 through December 2, 2013.

The Corps consulted with the affected regional tribes and provided the NHPA Section 106 archeological report for the preferred alternative in October 2013 for the tribes' concurrence on the finding of "no historic properties affected."

Public Involvement

The draft IAPMP and EA were made available to the interested public and federal, state and local agencies for a review and comment period from October 30 through December 2, 2013 via the Corps website. The Corps also made their draft Finding of No Significant Impact document available during this time for review and comment.

Public comments were received from individual citizens, Tribes, federal and state agencies, conservation entities, and resource management entities. Comments ranged from expressing a preference for the no action alternative to eliminate any impact to CATEs to other comments that indicated Alternative D was not aggressive or immediate enough, some even supporting lethal take of CATEs, due to the impact on listed fish and the immense expenditures to protect these species.

Findings and Decision

Based on a thorough review of the comments received and analysis of the environmental impacts, mitigation measures, and implementation of all environmental commitments as presented in the Final EA and this FONSI, Reclamation has concluded that the preferred alternative will have no significant effect on the human environment or natural and cultural resources. Reclamation, therefore, concludes that preparation of an Environmental Impact Statement is not required, and that this FONSI satisfies the requirements of NEPA. Reclamation will implement the proposed alternative and IAPMP at Goose Island and work jointly with the Corps to identify habitat outside of the basin in Phase 1 and develop the habitat in Phase 2, and engage in adaptive management within the framework in Phases 1 and 2.

Recommended:

1/22/14

Jim Taylor
Regional NEPA Specialist
Pacific Northwest Region
U.S. Bureau of Reclamation

Date

Approved:

Lorri Lee

1/24/14

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Regional Director
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Date

US Army Corps
of Engineers®
Walla Walla District

Inland Avian Predation Management Plan
Environmental Assessment

January 2014

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ACRONYMS

AMP	Adaptive Management Plan
APD	Avian Predation Deterrent
BiOp	FCRPS 2008 Biological Opinion and 2010 Supplement
BMP	best management practice
BPA	Bonneville Power Administration
C&S	ceremonial and subsistence
CAGU	California gull
CATE	Caspian tern
CBP	Columbia Basin Project
CCP	Comprehensive Conservation Plan
cy	cubic yards
Corps	U.S. Army Corps of Engineers
DAHP	Washington Department of Archaeology and Historic Preservation
DCCO	Double-crested cormorant
DPS	Distinct Population Segment
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FCRPS	Federal Columbia River Power System
FEIS	Final Environmental Impact Statement
fmsl	feet above mean sea level
FONSI	Finding of No Significant Impact
FPOM	Fish Passage Operations and Management
FWCA	Fish and Wildlife Coordination Act
GHG	greenhouse gasses
IAPMP	Inland Avian Predation Management Plan
IAPWG	Inland Avian Predation Working Group
IBA	Important Bird Area
ITA	Indian Trust Asset
IUCN	International Union for Conservation of Nature
LCR	Lower Columbia River

MBTA	Migratory Bird Treaty Act
MCR	Middle Columbia River
MSA	Magnuson-Stevens Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	NOAA's National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPCC	Northwest Power and Conservation Council
NWR	National Wildlife Refuge
ODFW	Oregon Department of Fish and Wildlife
OPSW	Oregon Plan for Salmon and Watersheds
PCBs	Polychlorinated Biphenyls
PIT Tag	Passive Integrated Transponder Tag
PRCC	Priest Rapids Coordinating Committee
PUD	Public Utility District
Reclamation	U.S. Bureau of Reclamation
RBGU	Ring-billed gull
RM&E	Research, Monitoring and Evaluation
ROD	Record of Decision
RPA	Reasonable and Prudent Alternative
SHPO	State Historic Preservation Office
SPCC	spill prevention, control, and countermeasure
SR	Snake River
TCP	Traditional Cultural Property
TFAS	treaty fishing access sites
TMDL	total maximum daily load
UCR	Upper Columbia River
USDA	U.S. Department of Agriculture
USDA-WS	U.S. Department of Agriculture - Wildlife Services
USFWS	U.S. Fish and Wildlife Service
WDFW	Washington State Department of Fish and Wildlife

SECTION 1.0 PURPOSE OF AND NEED FOR ACTION

1.1 Introduction

This Inland Avian Predation Management Plan (IAPMP) Environmental Assessment (EA) addresses a set of proposed actions to reduce avian predation on federal Endangered Species Act (ESA)-listed salmonids in the inland Columbia River Basin above Bonneville Dam. This EA identifies a purpose and need, develops and evaluates a set of alternatives to meet the purpose and need, considers the trade-offs of the alternatives and selects a preferred alternative. The IAPMP (Appendix A) was developed as a guide for the implementation of the preferred alternative in this EA and includes detailed recommendations for implementation, monitoring, and adaptive management.

The development of an IAPMP is a requirement of the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) 2008 Federal Columbia River Power System (FCRPS) Biological Opinion as updated in the 2010 Supplemental FCRPS Biological Opinion (referred to collectively as the BiOp unless the date is specified). The EA identifies actions to reduce predation on salmonids in the inland Columbia River Basin and focuses on the management of Caspian terns (CATEs) at Goose and Crescent Islands, habitat enhancement to attract CATEs to areas outside the Columbia River Basin, and adaptive management actions to limit the formation of incipient colonies within the basin. The IAPMP and Adaptive Management Plan (AMP) are included as an appendix to this document (Appendix A) which can be referenced for additional details on implementation.

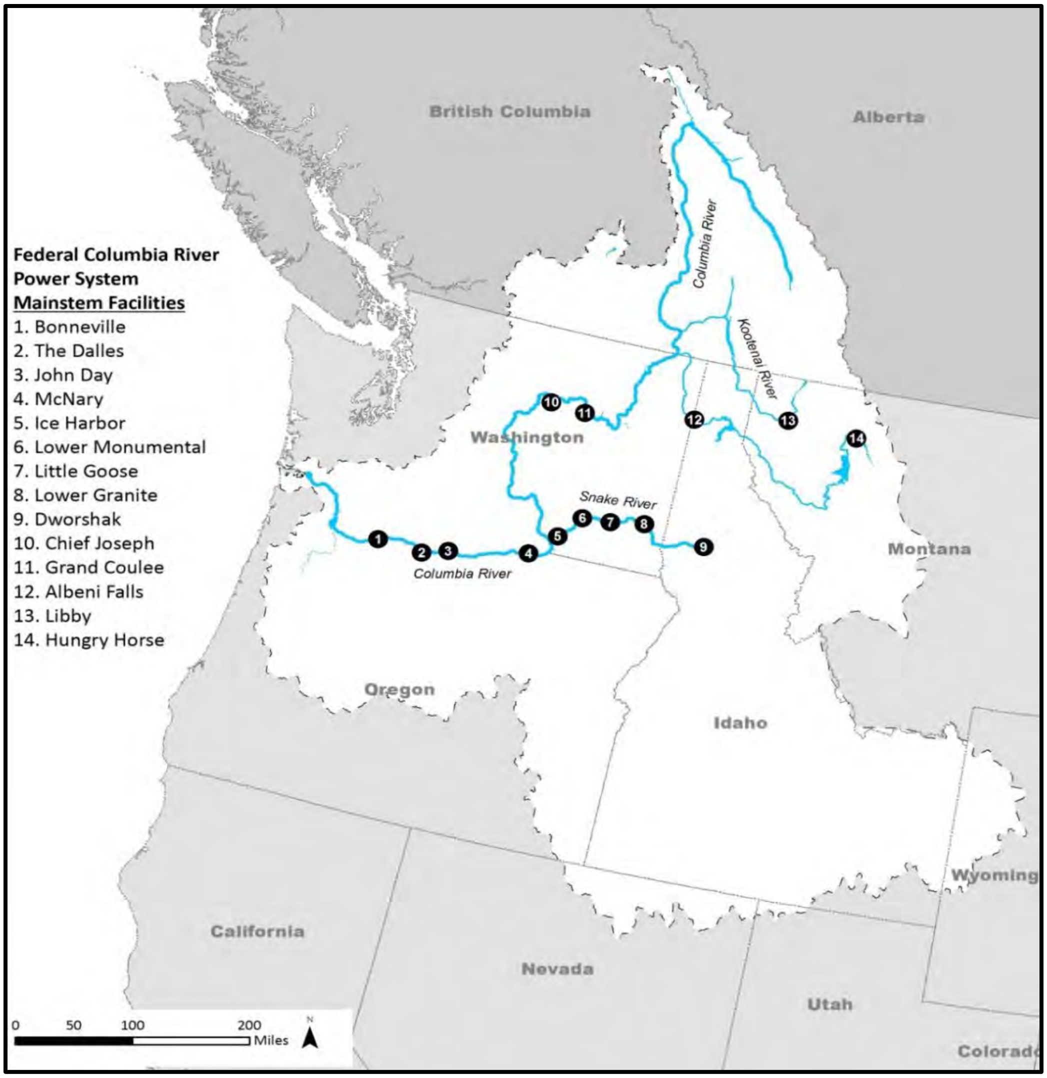
1.2 Background

1.2.1 Federal Columbia River Power System

The FCRPS comprises 14 federal multipurpose hydropower projects (Figure 1-1). The 12 projects operated and maintained by the U.S. Army Corps of Engineers (Corps) are Bonneville, The Dalles, John Day, McNary, Chief Joseph, Albeni Falls, Libby, Ice Harbor, Lower Monumental, Little Goose, Lower Granite, and Dworshak Dams. The U.S. Bureau of Reclamation (Reclamation) operates and maintains the following FCRPS projects: Hungry Horse Project and the Columbia Basin Project, which includes Grand Coulee Dam. Congress authorized the construction of the FCRPS projects and directed the Corps and Reclamation to operate and maintain these projects for multiple purposes including flood control throughout the Columbia River Basin, navigation in the Columbia and Snake Rivers, hydropower generation, irrigation, fish and wildlife, water quality, municipal and industrial water supply, and recreation.

The BiOp, which covers the operation of the FCRPS through 2018, recommended a Reasonable and Prudent Alternative (RPA) to avoid jeopardizing the continued existence of the species and adverse modification of designated critical habitat for 13 species of salmon and steelhead affected by FCRPS operation. The BiOp attempts to address FCRPS operational effects on ESA listed fish through what is called an “All H approach” that addresses hydropower impacts, tributary and estuary habitat improvement, hatchery operations, and harvest techniques and includes efforts to reduce juvenile and adult salmonid losses from predation by birds, other fish, and marine mammals (FCRPS 2008).

The BiOp requires the three FCRPS Action Agencies (the Corps, Reclamation, and Bonneville Power Administration [BPA]) to ensure that their actions meet certain standards when the actions affect “endangered” or “threatened” species as defined by the ESA. The overall predation management objective for all affected salmonid evolutionarily significant units (ESUs) and distinct population segments (DPSs) is to improve the survival of juvenile and adult fish as they pass through the FCRPS.



Source: Adapted from FCRPS Biological Assessment, August 2007.

Figure 1-1. Federal Columbia River Power System Mainstem Facilities.

The RPA in the BiOp included specific actions to address inland avian predation including:

- RPA Action 47: Inland Avian Predation; the Action Agencies will develop an avian management plan for Corps-owned lands and associated shallow-water habitat.
- RPA Action 68: Monitor and Evaluate Inland Avian Predators; the Action Agencies will monitor avian predator populations in the mid-Columbia River, evaluate their impacts on outmigrating juvenile salmonids, and develop and implement a management plan to decrease predation rates, if warranted.

In accordance with the August 2, 2011, U.S. District Court for the District of Oregon Order, the BiOp was remanded to NMFS. In response, NMFS prepared the 2014

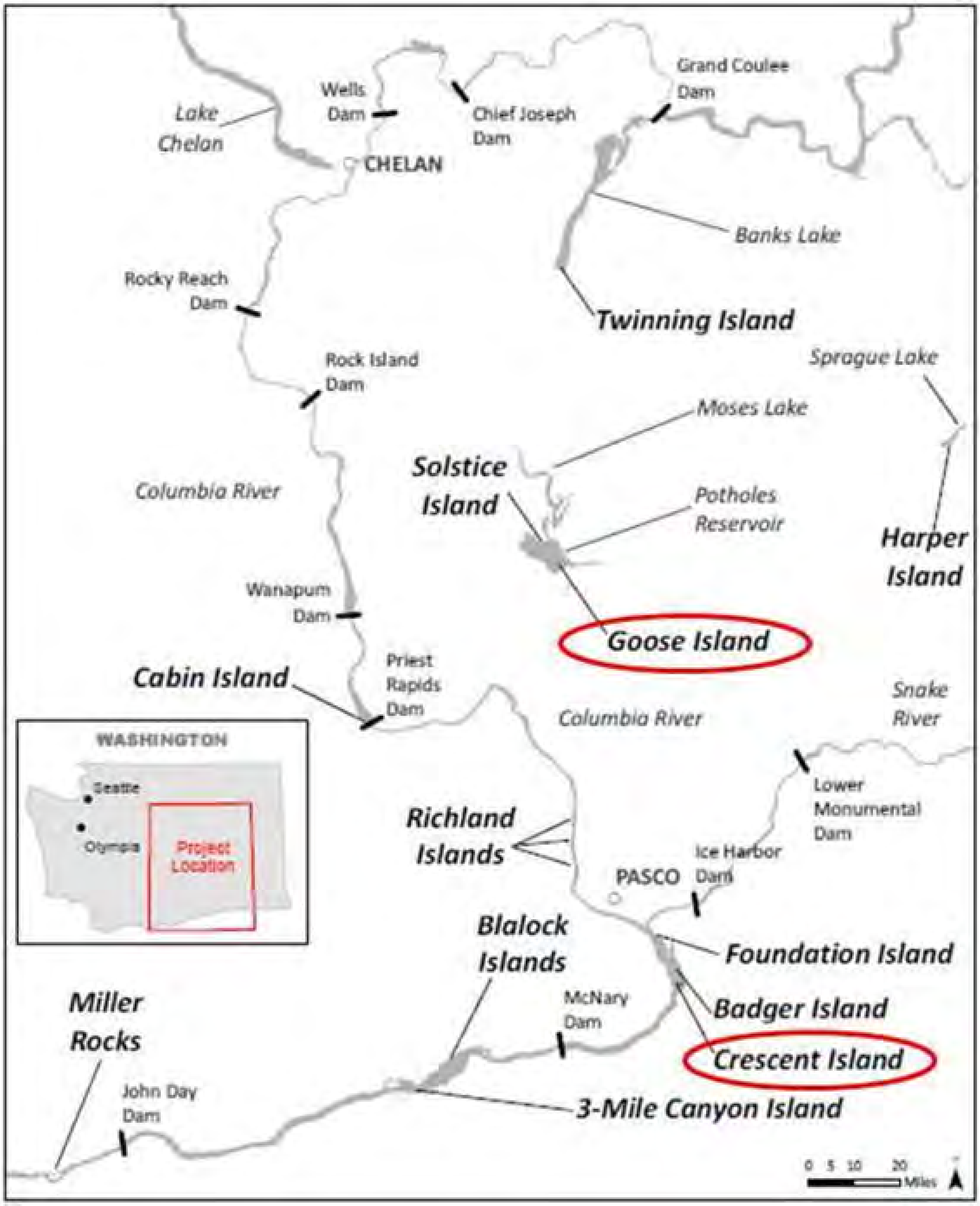
Supplemental BiOp, which was released on January 17, 2014. It contains the following reference to the IAPMP:

- The 2008 BiOp (RPA Action 47) also required the Action Agencies to develop an inland avian predator management plan. This plan and an associated Environmental Assessment are expected in early 2014, which will be in time for limited implementation prior to the 2014 nesting season. At this time, only Caspian terns nesting on Goose Island in Potholes Reservoir and Crescent Island in the Columbia River are slated for management action (e.g., reductions in nesting habitat). Survival benefits to Upper Columbia River (UCR) steelhead and spring Chinook would begin to increase once nesting dissuasion actions begin in early 2014 (up to the currently estimated survival benefits of 11.4 percent and 3.0 percent, respectively, in subsequent years). Additional benefits to Upper Columbia and Snake River ESUs/DPSs may follow once alternative tern habitat can be developed outside the Columbia River basin and nesting dissuasion actions begin at Crescent Island (expected 3 to 4 years after the Goose Island management action).

This statement is consistent with the benefits described at Goose and Crescent Islands under the proposed actions' phased approach outlined in this EA and proposed IAPMP. For the purposes of the IAPMP, Action Agencies means only the Corps and Reclamation.

1.2.2 Research and Studies

Between 2004 and 2009, up to 93,000 colonial waterbirds from five different species were documented to be nesting each year in the inland Columbia River Basin region (Lyons et al. 2011a). These species include CATEs, double-crested cormorants (DCCO), American white pelicans, California gulls (CAGU), and ring-billed gulls (RBGU), nesting at 18 different colonies at 12 geographic locations (Figure1-2). Recent research found that these waterbirds together consumed well over one million juvenile salmonids annually during that same time period (Lyons et al. 2011b). These studies stated that although inland colonies are much smaller than their Columbia River estuary counterparts, inland colonies can be much more dependent on salmonids for food and have a higher per capita impact on salmonids. The greater reliance on salmonids, in tandem with a lower diversity of salmonid stocks in comparison to the estuary, is responsible for the unexpectedly high impact on particular ESA-listed salmonid populations.



Source: Modified from Roby et al. 2013.

Figure 1-2. Project area in the inland Columbia River Basin showing the locations of active and former breeding colonies of piscivorous colonial waterbirds.

The Corps commissioned a study, hereinafter referred to as the Benefits Analysis, to assess the effects of potential inland avian management activities on increasing the average annual salmonid population growth rates (Lyons et al. 2011a). The Benefits Analysis became the biological basis for the development of the IAPMP, and is hereby incorporated into this EA by reference.[1] The Benefits Analysis focused primarily on the five species of colonial waterbirds mentioned above. Data were collected from the 18 different breeding colonies used by these five species during 2004 to 2010 (Adkins et al. 2011). The goal of the Benefits Analysis was to estimate benefits to salmonid populations from potential reductions in avian predation by colonies of piscivorous waterbirds in the inland Columbia River Basin region. Using predation rate data for inland bird colonies (i.e., upstream of Bonneville Dam) and the framework of a simple deterministic population growth model, potential changes in juvenile salmonid survival due to reductions in avian predation was translated into increases in the average annual population growth rate referred to as lambda (λ).

This Benefits Analysis identified nesting colonies of CATEs at Goose and Crescent Islands as major contributors to ESA-listed salmonid predation in the inland Columbia River Basin (Lyons et al. 2011a). In 2012, these colonies had over 400 pairs of nesting CATEs each (Roby et al. 2013), and are the two largest CATE colonies in the inland region. The number of CATE pairs at Crescent Island has fluctuated between 200 in 1996 and 720 at the highest in 2001 (Adkins et al. 2011; Roby et al. 2011a; Roby et al. 2013; USFWS 2013a personal communication). At Goose Island, CATEs began nesting in 2004 when there were 191 pairs and increased to a high of 487 pairs in 2009 Adkins et al. 2011; Roby et al. 2011a; Roby et al. 2013) (Figure 1-3, Table 3-4).

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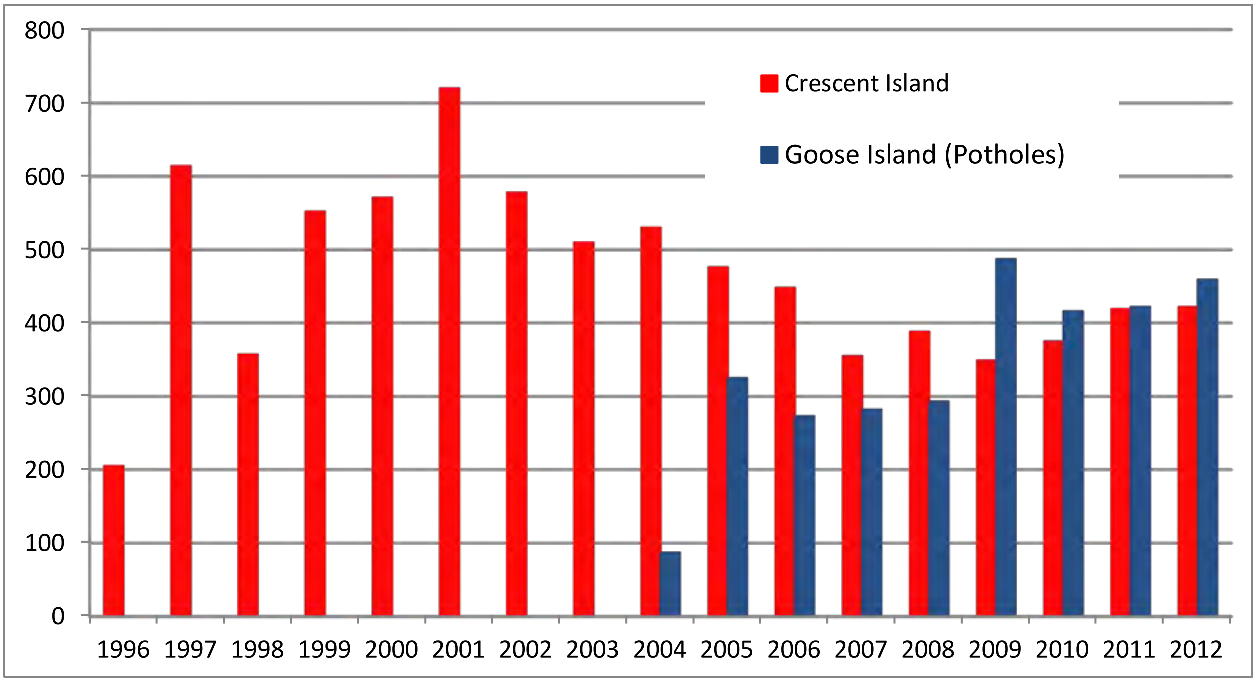
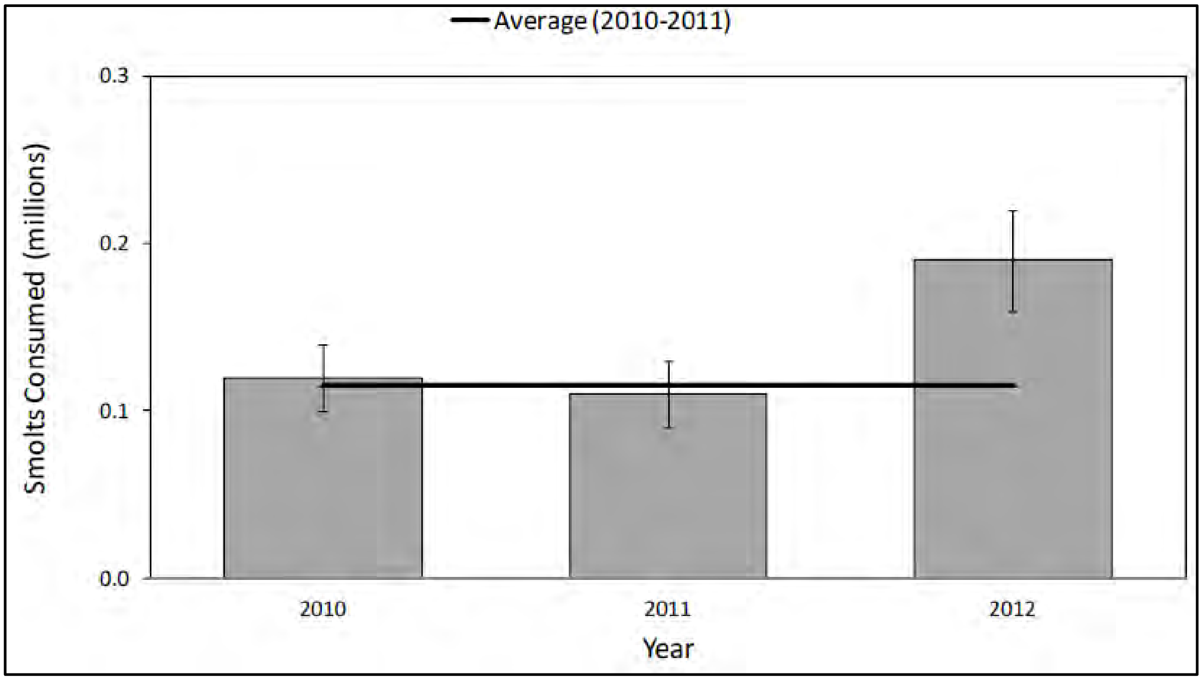
[1] http://www.salmonrecovery.gov/Files/Comprehensive%20Evaluation/Lyons-etal_2011_Benefits-Reduction-Avian-Predation-Columbia-Plateau.pdf



Source: Adkins et al. 2011; Roby et al. 2011a; Roby et al. 2013.

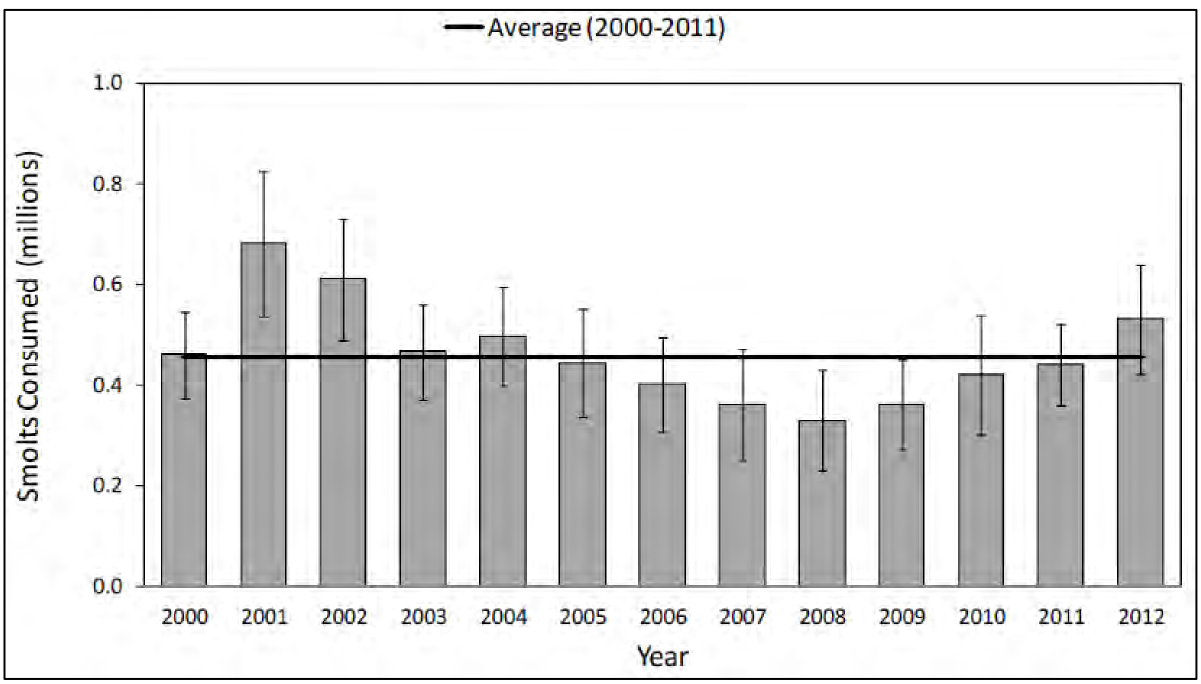
Figure 1-3. Numbers of CATE pairs at Goose and Crescent Islands, 1996 to 2012.

In 2012, the Goose Island CATE colony consumed an estimated 180,000 to 200,000 juvenile salmonids from the Columbia River (Figure 1-4). For Goose Island, this was the highest point estimate for smolt consumption since data collection started in 2010. In 2012, the Crescent Island CATE colony consumed an estimated 420,000 to 640,000 juvenile salmonids (see Figure 1-5). For Crescent Island, this was the highest point estimate for smolt consumption since 2002 (Roby et al. 2013). When CATE numbers at Crescent Island (Figure 1-3) are compared with estimated total annual consumption (Figure 1-5), a correlation can be seen between numbers of CATEs at a colony and total annual consumption; as estimated population drops from 2001 to 2007, total annual consumption also drops. This correlation between colony size and consumption rates at Goose and Crescent Islands is expected to continue for the foreseeable future, due in part to the more stable nature of the food source along interior Washington rivers than on the coast, and assuming conditions (e.g., water levels, transport of salmonids by barge around dams) on the Snake and Columbia Rivers remain similar.



Source: Roby et al. 2013

Figure 1-4. Estimated total annual consumption of juvenile salmonids by Goose Island CATEs from 2010 to 2012 based on fish identified in bill-loads on-colony and bioenergetics calculations. Error bars represent 95% confidence intervals.



Source: Roby et al. 2013

Figure 1-5. Estimated total annual consumption of juvenile salmonids by Crescent Island CATEs from 2000 to 2012 based on fish identified in bill-loads on-colony and bioenergetics calculations. Error bars represent 95% confidence intervals.

As described in Section 4.1.1 below, the estimate of predation rate by CATEs nesting at Goose Island/Potholes Reservoir in 2012 (17.0 percent) was higher than the estimate in 2011 (12.7 percent), and was the second highest estimate since this study began in 2008.

Based on PIT tag recovery data, it is estimated that Goose Island CATEs have had up to a 14.6 percent predation rate on Upper Columbia River steelhead and Crescent Island CATEs up to a 2.7 percent predation rate on Snake River steelhead (Table 1-1). Predation rates were calculated based on (1) the percentage of PIT-tagged smolts detected passing hydroelectric dams that were subsequently recovered on a downstream bird colony and (2) the probability of recovering PIT tags deposited on each bird colony" (Evans et al. 2011a). In comparison to CATEs, predation rates on salmonids by other bird species, when adjusted to account for the portion of juvenile salmonid transported around the inland Columbia River Basin waterbird colonies, appear to be much lower (less than 2 percent) (Lyons et al. 2011b).

Table 1-1. Predation rates on ESA-listed salmonid populations by select avian colonies from 2007 to 2010, adjusted to account for fraction of the ESU transported around the Columbia Plateau waterbird colonies as part of the Corps juvenile salmonid transportation program

		Chinook (%)			Sockeye	Steelhead (%)	
Bird	**Island**	**SR[b] (sp/su)**	**SR[b] (fall)**	**UCR[c] (sp)**	**SR[b]**	**SR[b]**	**UCR[c]**
CATE	Goose	-	-	3.0	-	-	14.6/11.4[a]
CATE	Crescent	0.6	0.6	0.4	0.6	2.8	2.7/2.3[a]
CATE	Blalock	0.1	<0.1	0.1	≤0.1	<0.4	0.7
DCCO	Foundation	0.8	0.4	<0.1	1.1	1.6/1.4[a]	0.1
Gulls[d]	Miller Rocks	0.3	0.3	0.4	0.6	1.2	1.6

Source: Lyons et al., 2011a.

Notes:

a Hatchery reared fish/wild fish where there was a significant difference

b SR=Snake River

c UCR=Upper Columbia River

d Both ring-billed and CAGU

The Benefits Analysis concluded the greatest benefits to ESA-listed salmonids (steelhead populations in particular) would result from reducing predation by CATEs at the Goose and Crescent Island colonies. The largest potential benefits in reducing predation by a single colony is at Goose Island, with up to a 4.2 percent increase in λ for UCR steelhead and a 0.7 percent increase in λ for UCR Chinook (see Benefits Analysis, Table 8 [Lyons et al. 2011a]). The maximum λ benefits for Crescent Island is 0.7 percent for Upper Columbia River steelhead and 0.5 percent for Snake River steelhead. The potential benefits to Snake River steelhead were lower, in part, because large portions of juvenile salmonids are transported downstream in barges and are therefore unavailable to avian predators in the mid-Columbia River. Furthermore, there is a broader array of salmonid ESUs within the foraging range of CATE nesting at Crescent Island such that CATE consumption rates by individual ESU are generally lower than predation rates on UCR steelhead for CATE nesting at Goose Island. These reductions in predation rates and increase to λ assume the entire colony would be dissuaded from Goose Island and not relocate elsewhere within the foraging range of the Columbia River Basin. The Benefits Analysis also identified that λ may be influenced by the hypothesis that avian predators disproportionately consume smolts that are less likely to survive to adulthood, indicating that smolt mortality from avian predation is partly compensatory (i.e., avian predators consume smolts that would likely die anyway due to another cause such as non-avian predation or disease) and not fully additive (i.e., smolt mortality is only due to avian predation). If this is the case, the population growth rates (λ) identified above would be reduced. At this time, there are no specific studies published that help quantify the level of compensatory mortality associated with avian predation in the Columbia River Basin. Therefore, due to this uncertainty, the benefits used for comparison of alternatives in this EA assumed zero compensatory mortality similar to other comparative analyses made within the BiOp.

In comparison to CATE nesting at Goose Island and Crescent Island, the incremental benefits to ESA-listed salmonids are expected to be substantially lower through reductions in predation by other avian predators within the inland Columbia River Basin including CATEs at Blalock Islands, DCCOs at Foundation Island, and gulls nesting on Miller Rocks. Based on the best available data and information identified above and further described below in this EA, the management of these other inland waterbird colonies appears to provide only marginal or undetectable reductions in predation and population growth rate increases.

Based on these results, it was determined that the greatest potential for increasing juvenile salmonid survival by managing inland avian predators would be gained by focusing management efforts on CATEs at Goose and Crescent Islands. Efforts to reduce predation by other existing or incipient piscivorous waterbird colonies may warrant consideration in the future based on data obtained through the adaptive management portion of the IAPMP or through other data sources and appropriate supplemental/tiered NEPA analysis.

1.3 Purpose and Need

The purpose of the proposed action is to increase survival of ESA-listed juvenile salmonids by reducing predation-related losses from CATE colonies at Crescent and Goose islands through development and implementation of an IAPMP, in accordance with the BiOp. The effectiveness of CATE dissuasion at Goose and Crescent Islands would be enhanced by actions to limit CATEs from forming new colonies and/or expanding existing colonies within the Columbia River Basin. The IAPMP should include habitat enhancement measures to attract CATEs to areas outside the basin, and adaptive management dissuasion actions to limit the formation or expansion of incipient colonies within the basin. In addition to providing substantial and achievable benefits to ESA-listed salmonids, the IAPMP actions should minimize impacts to CATEs, which are protected under the Migratory Bird Treaty Act (MBTA), as well as other resources and species of concern, in compliance with all applicable laws. The IAPMP should make use of adaptive management and a phased approach to implementation to allow for a major portion of the benefits to be realized early during implementation (consistent with the Draft 2013 Supplemental BiOp described in Section 1.2.1), while additional information is garnered and uncertainties are resolved through adaptive management. The need for action is based on the Action Agencies' requirement to avoid jeopardizing the listed species pursuant to the BiOp. Additional benefits for ESA-listed salmonids would be achieved in later years of implementation and may involve appropriate supplemental/tiered NEPA analysis.

1.4 Project Authority and Responsibility

1.4.1 U.S. Army Corps of Engineers

The Corps is responsible for the implementation of actions of the BiOp that pertain to the operation and/or maintenance of Corps civil works projects that may affect ESA-listed species. The responsibility of the Corps regarding management of inland avian predation in the Columbia River arises from implementation of the BiOp. Specifically, RPA Action 47 states: "The FCRPS Action Agencies will develop an avian management plan (for double-crested cormorants, Caspian terns, and other avian species as determined by research, monitoring, and evaluation [RM&E]) for Corps-owned lands and associated shallow water habitat." Although the BiOp required the IAPMP to address predation by "other avian species," the 2014 Supplemental FCRPS BiOp (released January 17, 2014) acknowledges that "no reductions in avian-caused mortality rates were assumed" in the 2008 analysis and "only Caspian terns nesting on Goose Island in Potholes Reservoir and Crescent Island in the Columbia River are slated for management action (e.g., reductions in nesting habitat)" through 2018. Initial analyses were conducted on numerous avian species to determine potential benefits, CATE colonies in the inland basin were found to have the highest rates of predation and the highest potential for achieving benefits to salmonids. The Corps and Reclamation intend to carry out inland avian predator management actions, as analyzed in this EA, by addressing CATE predation on ESA-listed salmonids from colonies at Goose and Crescent Islands. The Corps's authority for the proposed action is Section 511(c) of the Water Resources Development Act of 1996, as amended. This provides the authority for the Corps to implement the results of research and development activities to reduce nesting populations of avian predators on and in the vicinity of dredge spoil islands in the Columbia River Basin. Funding for the implementation of specific actions at Crescent Island, new nesting habitat outside the basin, and at-risk islands by the Corps, to reduce avian predation, is subject to Congressional appropriation.

1.4.2 U.S. Bureau of Reclamation

Reclamation, as an FCRPS Action Agency, is cooperating in the scoping and development of the IAPMP and regulatory documentation, and is responsible for the implementation of RPA actions of the BiOp that pertain to the operation and/or maintenance of Reclamation Project facilities. The BiOp, (specifically RPA Action 68, see Section 1.2.1) requires the Action Agencies to monitor and evaluate avian predators on mid-Columbia River salmonids, as well as develop a management plan to be implemented as warranted. Through monitoring, the Goose Island CATE colony was identified as contributing to predation-related losses of ESA-listed Columbia River salmonids. Therefore, action by Reclamation would be undertaken in conjunction with the Corps's management plan under RPA Action 47.

The Reclamation authority for management action comes from Section 14 of the Reclamation Project Act of August 1939 (43 USC 389), and specific authority for action at Goose Island which is within the Columbia Basin Project is provided by the Columbia Basin Project Act of March 10, 1943 (57 Stat. 14, 15 USC 835). Funding for the implementation of specific actions by Reclamation to reduce avian predation is subject to Congressional appropriation.

1.5 Scope of Analysis

The scope of effects analysis for IAPMP alternatives includes areas within the inland Columbia River Basin, from Bonneville Dam to Chief Joseph Dam and including related adjacent inland areas in Oregon and Washington. As identified in the Purpose and Need, the focus of initial management actions is on Goose and Crescent Islands. However, the geographic scope also includes at-risk islands where there is a probability of incipient CATE colony expansion or new establishment within the inland Columbia River Basin. This EA involves site-specific evaluation of potential environmental effects for the actions that can be defined at this time. The potential effects associated with dissuasion at both Goose and Crescent Islands and potential adaptive management actions at ten at-risk islands are evaluated at a site-specific level. Evaluation of potential effects associated with development of new nesting habitat outside the basin and actions to limit the formation of incipient colonies at inland locations other than the at-risk sites are addressed in this EA to a level possible at this time (see Section 4). Given potential sites where these actions may occur are wide-ranging from southern California to Alaska and the potential effects could differ widely depending on the site(s) that are selected, these actions will also require a subsequent supplemental/tiered NEPA analysis prior to implementation.

Crescent Island and several other at-risk islands are managed by the U.S. Fish and Wildlife Service (USFWS) as part of the McNary National Wildlife Refuge. Crescent Island was transferred to the USFWS from the Corps in 2007 as documented in Public Law 110-114. However, by this law, the Corps maintains the ability to carry out management of avian predation management on juvenile salmonids at these locations.

SECTION 2.0 ALTERNATIVES

2.1 Alternative Development

The Corps and Reclamation considered a broad range of potential avian predator management actions throughout the inland basin area in the preparation of this EA. The array of potential actions considered under the BiOp (RPA Action Nos. 47 and 68) were broken down largely by nesting colony, with each one typically having a range of specific actions.

Ultimately, as identified in Section 1 above, the Corps and Reclamation decided to focus on developing an IAPMP to manage CATEs at Goose and Crescent Islands. The IAPMP has four objectives:

- Reduce CATE consumption of ESA-listed salmonids including Upper Columbia and Snake River steelhead, Chinook salmon, and sockeye salmon in the inland basin.
- Dissuade CATEs nesting on Goose and Crescent Islands and at-risk islands if necessary.
- Preclude the establishment of incipient CATE nesting colonies on Crescent Island during Phase 1.
- Provide conditions suitable for CATE colony establishment outside of the inland basin.

These management actions presented the most robust benefits to salmonids (primarily Upper Columbia River [UCR] steelhead, UCR spring Chinook and Snake River [SR] steelhead) in the inland Columbia River Basin region. This conclusion was based primarily upon the potential to positively affect salmonid population growth rate estimates presented in the Benefits Analysis (Lyons et al. 2011a).

2.2 Description of Alternatives

Three action alternatives were identified as potentially satisfying the stated purpose and need. A “No Action” alternative (although not satisfying the stated purpose and need) is included as required by NEPA to provide a baseline to compare other reasonable alternatives. The following four alternatives are analyzed in this EA:

- Alternative A – no action.
- Alternative B – passive hazing (habitat modification) to dissuade CATE nesting on Goose and Crescent Islands including: adaptive management actions to limit CATEs from forming new colonies and/or expanding existing colonies within the Columbia River Basin; development of new nesting or improvement to existing CATE habitat (called “habitat enhancement”) to attract CATEs to areas outside

the basin; and, a phased approach due to the uncertainty associated with how CATEs would respond to passive hazing.

- Alternative C – passive hazing (Alternative B) combined with active hazing to prevent CATEs from nesting on Goose and Crescent Islands.
- Alternative D – passive and active CATE hazing (Alternative C) combined with limited CATE egg removal in support of non-lethal measures (Preferred Alternative).

2.2.1 Alternative A: No Action

Under the No Action Alternative an IAPMP would not be developed for the inland Columbia River Basin and no new actions to reduce avian predation would take place. The current range of avian predation management actions would continue for the foreseeable future.[2] No habitat-related management actions for avian predation in the project area would be implemented under this alternative. The CATE colonies at Goose and Crescent Islands would likely continue at their current population numbers. No habitat management or other dissuasion methods would be implemented on CATEs within the inland basin by the Action Agencies. Nesting habitat would likely continue to be present for CATEs at these locations similar to what currently exists. It is likely that these CATE colonies would continue to consume salmonids present in the Columbia River Basin following existing trends. Additionally, the potential for members of extant CATE colonies at Goose and Crescent Islands, as well as other locations such as East Sand Island, to relocate to other locations, including those designated in this EA as at-risk islands, would not be hindered by Action Agency management actions directed at CATEs in the inland Columbia River Basin.

2.2.2 Alternative B: Habitat Modifications to Dissuade CATE Nesting

Actions in Alternative B consist of habitat alterations to create unfavorable nesting conditions for CATEs at Goose and Crescent Islands. This alternative also includes adaptive management actions to limit CATEs from forming new colonies and/or expanding existing colonies within the Columbia River Basin as well as development of new or improvement to existing CATE nesting habitat (called “habitat enhancement”) to

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[2] Current (ongoing) dam-based avian predation control actions including hazing efforts (both lethal and non-lethal) and bird deterrent installations are related, but separate, actions and outside the scope of this EA. New/future dam-based actions (if any) would be identified in coordination with the Fish Passage Operations and Management (FPOM) team and separate supplemental/tiered NEPA analysis (if required).

attract CATEs to areas outside the basin. Due to the uncertainty associated with how CATEs would respond to habitat modifications, these actions would be implemented in a phased approach, which includes:

- Phase 1 Actions
  - On Goose Island, place a network of rope and flagging to prevent CATE nesting.
  - If needed, formation of incipient CATE colonies on Crescent Island will be prevented by using a network of rope and flagging.
  - Willows will be experimentally planted on Crescent Island to evaluate their survival.
  - If necessary, dissuasion actions (i.e., rope and flagging) will be implemented on at-risk islands where incipient CATE colonies attempt to establish.
  - CATE habitat enhancement site research and supplemental/tiered NEPA analysis will be completed.
- Phase 2 Actions
  - Habitat enhancement site(s) will be prepared to attract CATE nesting.
  - If determined to be appropriate by U.S. Bureau of Reclamation, Goose Island substrate may be modified by adding dissuasion material such as large cobble to act as a as a longer-term, more sustainable dissuasion method.
  - In order to dissuade the primary CATE colony on Crescent Island, vegetation will be planted and/or a berm may be constructed (passive hazing).
  - CATE dissuasion will be performed as needed on at-risk islands.

The phased approach has the following benefits that support the purpose and need for action (i.e., to reduce avian predation on ESA-listed salmonids in the inland Columbia River Basin):

- Allows the project to be implemented in an adaptive management context that acknowledges and addresses uncertainties associated with the proposed actions.
- Promotes flexible decision making through regular monitoring and assessment of data related to the anticipated outcomes of proposed actions and the potential to alter activities to better achieve the stated objectives.
- Allows for a major portion of the project benefits to salmonids to be achieved in Phase 1, while Phase 2 actions are either tested or more fully defined or while uncertainties are resolved through monitoring.

- Allows for cessation or reversal of Phase 1 actions, if necessary, through adaptive management.

As noted in the rationale, this phased approach is tied to the AMP described in the IAPMP (Appendix A). Through the use of adaptive management, uncertainties associated with the outcomes of the proposed actions will be monitored and actions may be adjusted to better achieve the desired outcomes. The phased approach allows for the potential to cease Phase 1 actions if impacts are different than anticipated in the EA or to alter Phase 1 or Phase 2 actions based on new information gathered through monitoring and analyses. While the EA discloses the impacts of potential adaptive management actions that are fully defined at this time, some actions may require future supplemental/tiered NEPA analysis. For additional information on monitoring plans and targets to be used for adaptive management, see the IAPMP (Appendix A).

The implementation timeline for these habitat modification phases is shown on Table 2-1. This table identifies the implementation sequence for the various actions in Phases 1 and 2. These actions would be initiated between the months of August and early March to fall outside of the CATE nesting season. It is anticipated that Year 1 would occur as early as 2014. The year these actions are actually initiated, however, would dependent on the availability of funding and the timing of planning efforts for Phase 2 activities and may occur earlier or later than indicated in the table.

The implementation of Phase 2 habitat modifications at Crescent Island and Goose Island would occur after the identification and development of habitat enhancement at location(s) outside the Columbia River Basin, which would require a follow-on supplemental/tiered NEPA process once appropriate site(s) are identified. If habitat enhancement efforts are not implemented, reversal of Phase 1 actions would be considered within the adaptive management framework of the IAPMP (see Appendix A).

It is anticipated that habitat enhancement would likely be implemented in Year 3. If the Action Agencies were able to accomplish this a year earlier, then the remaining Phase 2 actions could be implemented a year earlier. Following this logic, if habitat enhancement is delayed a year or more, so would the remaining Phase 2 actions such that Phase 2 actions would not be implemented until habitat enhancement efforts are ready for implementation.

Table 2-1. Estimated Phases and Actions Timeline for Alternative B

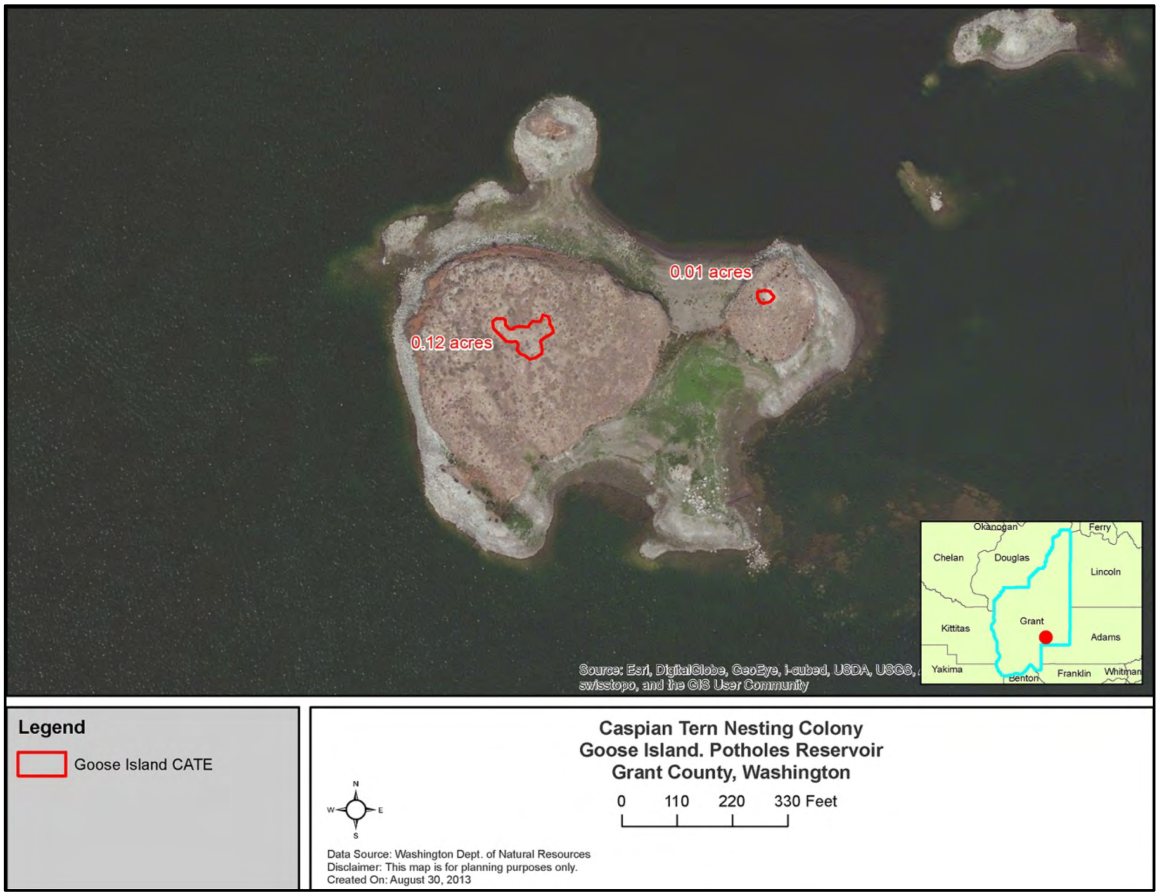
Action	Year 1	Year 2	Year 3	Year 4	Year 5
Phase 1					
On Goose Island, passive hazing of CATEs through modification of nesting areas with network of ropes and flagging.	X	X	X	(X)	(X)

Action	Year 1	Year 2	Year 3	Year 4	Year 5
If needed, formation of incipient CATE colonies on Crescent Island will be prevented by using passive hazing (ropes and flagging).		(X)	(X)		
Willows will be experimentally planted on Crescent Island to evaluate survival.	X				
CATE habitat enhancement site research and supplemental/tiered NEPA analysis will be completed.	X	(X)			
Phase 2					
Habitat enhancement site(s) will be prepared to attract CATE nesting.			X		
If necessary, Goose Island substrate may be modified by adding material such as large cobble as a lower maintenance dissuasion method.				(X)	(X)
To dissuade the primary CATE colony on Crescent Island, vegetation may be planted and/or a berm may be constructed (passive hazing).				X	(X)
Passive dissuasion for nesting CATEs will be performed as needed on at-risk islands in coordination with landowners.				(X)	(X)

Note: Parentheses indicate that action is implemented only if warranted.

2.2.2.1 Goose Island Habitat Modification Actions

Goose Island is approximately 4.9 acres and is sparsely vegetated with a plant community dominated by sagebrush. The CATE colony consists of two distinct colony areas in most years, nesting on elevated portions of the island consisting of bare sand in areas that, while surrounded by sagebrush, are locally sparsely vegetated (Figure 2-1). The west colony covers an area of 0.12 acre, and the east colony (which is not present in all years) covers an area of 0.01 acre. Throughout the island, surrounding the CATE nesting areas and occupying the majority of the island are nesting CAGU and RBGU, which nest at lower densities than CATEs and are more flexible in their nesting habits. Both gull species often nest on steeper slopes than CATEs and among and immediately adjacent to thicker and taller vegetation such as the sagebrush plants.

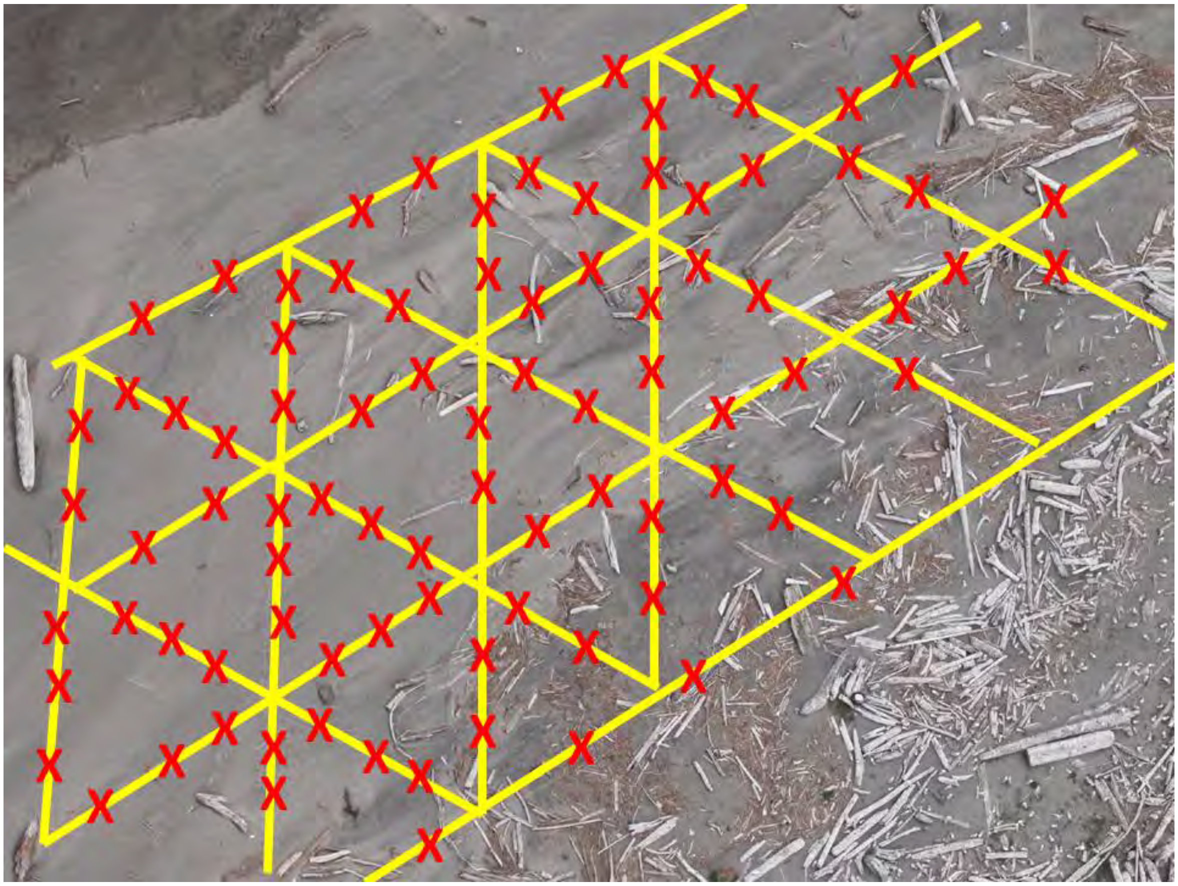


Source: BRNW 2011.

Figure 2-1. Locations of the CATE colonies on Goose Island, Potholes Reservoir.

Phase 1 – Rope and Flagging

In Phase 1, a network of rope and flagging supported by upright structures (e.g. posts) would be installed to dissuade CATEs from their existing nesting areas. Posts would be spaced at 10-foot intervals. Rope, approximately 0.25- to 0.5-inch in diameter, would be strung between the posts and elevated approximately 2 to 4 feet above the ground. Flagging material would then be inserted into the rope between each post so the flagging pieces hang down and flutter in the wind to act as a visual deterrent. Figure 2-2 shows a similar effective concept used for dissuasion of CATEs at East Sand Island (Columbia River estuary).



Source: BRNW 2012.

Figure 2-2. Layout of posts and flagging in the Columbia River estuary. Yellow lines designate yellow rope and a red "X" represents a length of flagging tied to the rope.

Covering the dissuasion areas on Goose Island with ropes and flagging was selected for use as part of Phase 1 as a proven and effective solution where soil characteristics and slope limit available options such as planting vegetation. In an attempt to prevent CATEs from expanding their nesting into areas immediately beyond their present colony location on Goose Island (into areas currently used by nesting gulls and other small plots where CATEs have attempted to nest in the past), the dissuasion area would be expanded to cover all likely potential nesting areas on the west (approximately 1.2 acres) and east (approximately 0.3 acre) colonies. The total dissuasion area of the east and west colonies would be approximately 1.5 acres.

If CATEs begin nesting beyond this initial installation area, additional dissuasion measures (e.g., rope and flagging) would be necessary. Locations would be determined based on reconnaissance efforts with additional, post, rope, and flagging expected to cover up to an additional 1.0 acre.

Phase 1 rope and flagging would occur in Year 1 and continue until determined to be unnecessary or until more permanent substrate modifications are implemented.

Phase 2 – Substrate Modifications

In Phase 2, Reclamation may consider the option to implement a more permanent and less maintenance-intensive dissuasion method for Goose Island: placement of baseball-size (or larger) cobble or boulders to create an unsuitable nesting substrate for the CATEs. This new substrate would cover the same area where rope and flagging was deployed in Phase 1 and may be implemented in Years 4 and 5.

The cobble/boulder material would come from an established and cleared pit near Potholes Reservoir and would be hauled to Goose Island by helicopter or boat and then be spread across the nesting area by a labor crew of up to 10 people.

As an adaptive management strategy, if monitoring indicated that CATE nesting continued along the fringes of the new substrate, substrate modification would be broadened to include these new nesting areas. It is anticipated that this additional adaptive management action could add an additional acre of habitat dissuasion beyond areas covered in Phase 1.

2.2.2.2 Crescent Island Habitat Modification Actions

Crescent Island is approximately 7.5 acres with a mix of dense upland shrub habitat, some trees, and bare ground. The island currently contains one CATE colony nesting on approximately 0.1 acre on the northeast side of the island (Figures 2-3, 2-4, and 2-5). CATEs nest in areas that are unvegetated, surrounded by CAGU and RBGU which typically nest at lower densities than CATEs, including immediately adjacent to and amongst shrubs and herbaceous plants.

Source: BRNW 2011.

Figure 2-3. Crescent Island. Location of primary CATE colony (red outline). Location of 2012 failed incipient colony (dotted white outline).

Source: Normandeau Associates, 15 August 2012.

Figure 2-4. Crescent Island showing CATE nesting area (white area) in the northeast part of the island.


Source: BRNW 2011.

Figure 2-5. CATE nesting area on the northeastern part of Crescent Island. Nesting gulls surround the CATEs.

Phase 1 Actions

Rope and Flagging to Preclude Development of Incipient Colonies

The Crescent Island Colony would be monitored during nesting seasons to ascertain whether CATEs and gulls dissuaded from other nesting locations such as Goose Island attempt to relocate to Crescent Island. Monitoring of CATEs at Crescent Island will include observation of nesting behavior. If CATEs attempt to nest in areas outside the existing colony, temporary dissuasion measures (e.g., a network of rope and flagging as described above) would be installed to dissuade CATEs and limit this expansion. For example, monitoring of nesting activities during Year 2 will provide the basis for determining whether dissuasion activities are necessary within season or during to the following nesting season (i.e., Year 3). Actual dissuasion locations would be determined based on on-site monitoring efforts. Rope and flagging would be expected to cover no more than 0.5 acre away from the primary CATE colony. No dissuasion activities within the primary CATE colony (e.g., current 0.1 acre area as depicted in Figure 2-3) would occur during Phase 1 activities.

Vegetation Test Planting

In Year 1, as part of Phase 1, a small patch of willow whips (*Salix exigua* or similar native species) would be planted on the northeast end of the island, at least 100 feet from the existing CATE colony. The purpose of this test would be to determine if the whips can be planted with a high probability of rooting success without the need for soil excavation (i.e., to a depth close enough to the water table). Soil excavation in this area may be needed to facilitate establishment of vegetation by decreasing the distance between the root zone and the water table. An estimated 75 willow whips would be planted, approximately 1 foot apart to a depth of up to 4 to 6 feet to facilitate this test. Experimental planting techniques may include planting whips at different depths, using different sizes, using different watering schemes, or other methods yet to be determined. The Phase 1 experimental plantings are designed to assess the effectiveness of planting techniques with potential ancillary benefits of precluding the formation of incipient CATE colonies. The results of this test action will inform adaptive management efforts and actions taken as part of Phase 2 including soil excavation and berm creation.

Phase 2 Actions

Unlike Goose Island, Crescent Island hosts abundant trees, shrubs, and herbaceous plants on parts of the island due to the soil profile and proximity of the ground surface elevation to the existing water table. Use of vegetation as a deterrent measure is anticipated to provide a more robust, cost-effective, long-term deterrent to nesting than posts, rope, flags, or other passive hazing actions (e.g., silt fencing) alone.

Phase 2 actions at Crescent Island would include additional measures to support vegetation planting including silt fencing (which will help with vegetation establishment) and the placement of large woody debris to improve dissuasion efforts while vegetation becomes established. Phase 2 habitat modifications would take place on both the CATE nesting area and less intensely on areas currently occupied by gulls where CATEs have previously attempted to nest in small numbers. Overall, these habitat modifications are designed to prevent CATEs from nesting on Crescent Island by providing visual barriers and reducing the amount of large open patches of bare ground preferred by CATEs for nesting.

Berm Creation

If the test willow plantings (Phase 1) are not successful, approximately 800 cubic yards (cy) of soil would be removed to a depth of up to 2 feet over approximately 15,000 square feet using small earthmoving equipment. Excavation of soil would facilitate establishment of vegetation by decreasing the distance between the root zone and the water table.

Rather than being removed from the island, the excavated soil would be used to create a 4-foot-tall berm, which would provide a visual barrier to the water for CATEs that might attempt to nest along the northeast edge of the island (Figure 2-6). Furthermore, the berm would provide an immediate visual barrier to CATEs before the planted vegetation could become established. To deter CATEs and other piscivorous waterbirds such as DCCO from nesting on the berm, it would be armored with rock, such as cobble or riprap, using an in-house source (Reclamation has some nearby rock pits) or a commercial source from a preapproved facility. If the test willow plantings are successful, soil excavation and berm construction would not be necessary and willow plantings, as described below, extending over the berm footprint.

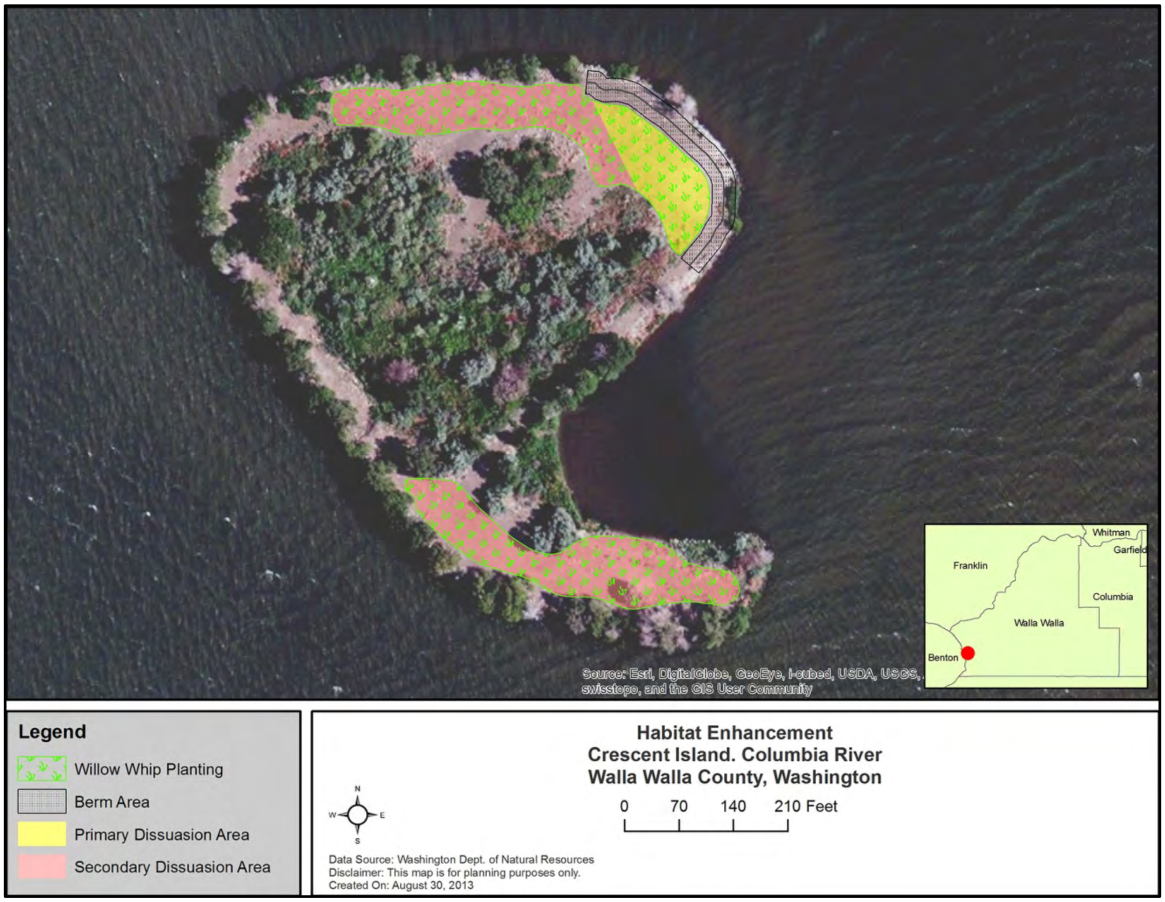
Vegetation Plantings

Coyote (narrowleaf) willow (*Salix exigua*), or another suitable native willow species, would be planted in rows across the primary and secondary dissuasion areas approximately 1 foot apart, to a depth of up to approximately 4 feet to facilitate access to groundwater. Willows would be planted in rows 10 feet apart at the primary dissuasion area and 15 feet apart in the secondary dissuasion areas (other open areas of the island where gulls and a few CATEs nest). The 15-foot separation of rows is anticipated to allow gulls to continue to nest while discouraging CATEs from nesting.

As noted above, excavation and berm creation in the primary dissuasion area is dependent on test results during Phase 1. If excavation of soil and berm creation is determined to not be necessary, willow planting will be expanded to cover the berm footprint identified in Figure 2-6. Excavation would not be required in the secondary dissuasion areas due to the slightly lower ground elevations in these areas and tolerance for slightly lower planting success.

Holes for willow whips would be dug up to 4 feet deep using equipment such as a water jet stinger. Willow whips would generally be at least 7 feet long, but likely 8 feet long or longer so that they project at least 4 feet above the ground.

Rows of approximately 4-foot-high mesh wire fencing would be placed around the perimeter of the primary dissuasion area and around the water-facing side of the secondary dissuasion area (Figure 2-6) and/or protective tubing would be placed around individual plants to prevent damage from beaver or other animals. The exact amount of wire fencing and/or protective tubing would be determined based on final site layout including the positions of the willows and the silt fences. Maintenance and replacement of plant protection would continue for 5 years after planting, or as necessary, to ensure a high survival rate of willows. Willow whips would generally be planted in February when willows are dormant to maximize successful establishment. Also, hunters often use the island until the end of January, but would be gone in February and there is no danger of disturbing bird species of concern because nesting begins in March (Glass 2012 personal communication).



Source: BRNW 2011.

Figure 2-6. Sketch of berm and planting in the primary dissuasion area (northeast corner of island) and planting in secondary dissuasion areas.

Silt Fence and Large Woody Debris

Silt fence has been very effective at dissuading CATEs from nesting on dredge spoil islands in the Columbia River estuary (Figure 2-7) (Roby et al. 2002). After a nesting area becomes so obstructed that visibility significantly declines, CATEs abandon the site (Roby et al. 2002). Silt fencing accomplishes this goal, but is only effective for as long as the fencing lasts. In addition, silt fence is beneficial in encouraging the establishment of native vegetation by providing protection for the soil from wind and trapping rainwater for emerging vegetation.

Source: USFWS 2005a. Photograph credit: Tim Jewett.

Figure 2-7. CATE colony on Rice Island (2000) with silt fencing used to prevent CATE nesting. Prior to 2000 and before the fencing was installed, nesting terns occupied the entire area shown in this photograph.

Silt fence would be erected in rows 10 feet apart at the primary dissuasion area and less densely (15 feet apart) in secondary dissuasion areas. Silt fences would be placed between planted rows of willow. The more conservative 10-foot spacing is denser than the minimum 15-foot spacing previously used to dissuade CATEs from nesting at Rice Island (Roby et al. 2002). This closer spacing would be used due to potential for repetitive efforts by CATEs to nest in this area, combined with the potential for some willow plantings to fail. In the secondary dissuasion areas, the 15-foot intervals would dissuade CATE nesting while still allowing gull nesting (Roby et al. 2002).

To minimize maintenance, high quality materials would be used to construct silt fencing. Landscape fabric would typically be used for silt fencing because it is more resistant to weathering by wind, rain, and sun. The silt fence would generally have a minimum height of 3 feet and would be attached to fencing posts.

In addition to silt fence, woody debris collected on the island would be placed in piles, 3 to 5 feet tall and several feet wide, around the perimeter of the island and between silt fences on the secondary dissuasion areas (Figure 2-6). This would create a visual barrier that would make the island less favorable for nesting CATEs. The actual height, width, and distribution of woody debris piles would depend on the final amount of debris available on site at the time of construction. Currently there is downed woody debris at several locations around the island, particularly along the western side. Most of this downed debris could be moved or realigned on the southern part of the island. Standing dead trees along the perimeter of the island would remain standing for use as perches for bald eagles and other raptors. In addition to this existing source of dead woody vegetation, live Russian olive trees (*Elaeagnus angustifolia)* or shrubs are extensive on the island and could be cut and utilized for these debris piles. Debris piles are anticipated to be created in Year 4 or 5 as part of Phase 2 activities and would not be an ongoing maintenance activity. Silt fences are anticipated to be installed in Year 3 and would only be required until vegetation is established, after which they will be removed.

Plantings and silt fencing would be monitored for success in meeting overall project objectives. No additional planting is anticipated unless substantial (greater than 75 percent) plant failure occurs and overall project objectives (e.g., CATE dissuasion objectives) are not being met. If this occurs, then willow whips (or another native species as approved by Corps and USFWS) would be planted to restore the original plant density. If silt fencing becomes damaged, it would be repaired or replaced as needed. Both additional willow plantings and silt fence repairs would generally occur before CATEs begin to nest on the island.

As an adaptive management strategy, if monitoring indicated that CATE nesting continues along the fringes of or within the treated areas, additional habitat-related dissuasion measures would be implemented in future years. These could include more intensive planting of vegetation or placement of larger cobble or boulder substrate. It is anticipated that these contingency actions would occur on the fringes of the existing modified areas and would total less than an additional 0.5 acre.

2.2.2.3 At-Risk Islands (Incipient Colonies) Habitat Modifications

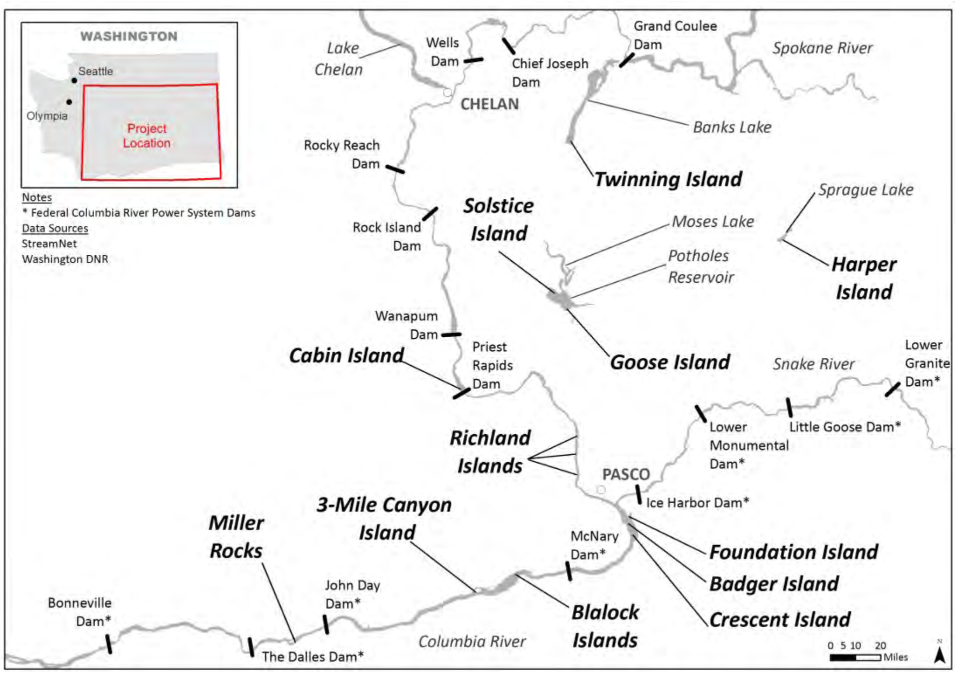
As a result of dissuasion activities at Goose and Crescent Islands, it is possible that existing small CATE colonies may expand or new CATE colonies may develop. These colonies could grow to a size that would reduce the benefits gained at Goose and Crescent Islands and would continue to have a sizeable impact on ESA-listed salmonids. As an adaptive management strategy, ten islands have been identified which have the highest risk for incipient colonies to develop. These ten at-risk islands include Blalock Islands, Badger Island, Three-mile Canyon Island, Richland Islands (18 and 20), Foundation Island, Miller Rocks, Twinning Island, Solstice Island, and Cabin Island (Figure 2-8).

Cabin Island is currently owned by WDFW, and through a 25-year agreement with Reclamation, which began in 2003, WDFW has management responsibilities for wildlife resources on Reclamation lands in the Columbia Basin that include parts of Potholes Reservoir and Banks Lake including Goose, Solstice, and Twinning islands.

Harper Island, located within Sprague Lake, was identified as a potential at-risk island. This island is privately owned and WDFW has specific fishing regulations to reduce human disturbance around the island. The Action Agencies may inform the owner about dissuasion actions that would be appropriate and encourage them to consider the implementation of these actions. For all other at-risk islands, where necessary, the Corps and Reclamation would coordinate with the land management agency as soon as possible to obtain clearance and agreements for any and all potential adaptive management actions on their properties.

If CATE colonies at any of these at-risk locations grow to a size of 40 nesting pairs, the predation impacts would be reevaluated and, if warranted, landowners would be notified and dissuasion measures (rope and flagging similar to Goose Island) would be implemented (see the IAPMP for additional information on AMP targets). The earliest these actions could be initiated would be Year 2 (proposed to be 2015) and would be continued until determined unnecessary.

Aerial images for each of these at-risk islands are shown in Appendix E.



Source: Modified from Roby et al. 2013.

Figure 2-8. Location of at-risk Islands along the mid-Columbia River and in the Columbia and inland basin.

2.2.2.4 Out-of-Basin Habitat Enhancement

The effectiveness of actions developed as part of the IAPMP to increase salmonid smolt survival depends not only on successful dissuasion of CATEs at Goose and Crescent

Islands but also on the ability to prevent CATEs from forming new colonies on the Columbia and Snake rivers of such a size as would reduce those benefits. For example, a colony of approximately 40 pairs on an island within the inland basin would initiate an investigation into the potential effects of the colony on ESA-listed salmonids. The development of new CATE nesting habitat or enhancement of existing nesting habitat (referred to as habitat enhancement sites) to attract CATEs to areas outside the basin, therefore, would be an important component of CATE management within the Columbia River Basin. Site identification and completion of the necessary planning requirements would occur as part of Phase 1 activities (e.g., plans and specs, supplemental/tiered NEPA, ESA consultation as appropriate,) while implementing of habitat enhancement activities would occur as soon as feasible as part of Phase 2.

Habitat Enhancement Metrics

Metrics for success of habitat enhancement conducted as part of this proposed management effort would be similar to measures taken by the Corps for the Columbia River estuary CATE dissuasion plan (USFWS 2005a) and in Seto et al. (2003). The criteria for this plan, as modified from the estuary plan, Seto et al. (2003) and Collis et al. (2012), are as follows:

- Contains sufficiently available, suitable nesting habitat to support approximately 1,000 nesting CATE pairs, does not experience frequent flooding or drought events, and has suitable base substrates.
- Has no long-term expensive operations and maintenance requirements.
- Is in sufficient proximity to a relatively stable and abundant prey source for CATEs.
- Is located in an area with minimal potential conflicts with ESA-listed fish (and other) species.
- Potential mammalian and avian predators and human disturbances are absent, not a limiting factor, or controllable.

To provide adequate nesting habitat for the number of CATEs dissuaded from Goose and Crescent Islands, as well as room for nesting gulls that may nest around the periphery of a new CATE colony, a 2:1 habitat creation to removal ratio was established for the IAPMP. This 2:1 ratio would create new nesting habitat covering an area of approximately 0.5 acre, roughly twice the size of the colony areas at Goose and Crescent Islands. This habitat would also be available for CATEs from other locations to utilize for nesting outside the Columbia River Basin.

Implementation of Phase 2 habitat modification at Crescent Island and possible additional habitat modification at Goose Island would occur after the identification and implementation of a suitable habitat enhancement site(s) outside the Columbia River Basin. As noted in the following section, numerous potential sites have been investigated to date but a suitable and implementable site has been yet to be identified. At this time, potential sites are geographically dispersed ranging from southern California to Utah to the Puget Sound and many places in between. The affected environment of these locations and thus the potential resources that could be affected differ substantially amongst sites. As such, until a site can be identified, potential site-specific effects of developing habitat enhancement site(s) cannot be evaluated. This EA, therefore, addresses only potential general effects based on available information (see Section 4). Additional supplemental/tiered NEPA documentation would be prepared prior to the implementation of habitat enhancement in Phase 2. Implementation of this habitat enhancement is currently scheduled to occur in Year 3. The actual implementation year, however, would be subject to how quickly a new habitat site could be identified, when supplemental/tiered NEPA documentation is completed, and the availability of funding.

Site Assessment Study

To assist the Action Agencies in development of the IAPMP, Oregon State University conducted a habitat enhancement site assessment study using existing information on biological factors throughout the breeding range of CATEs in western North America to assess potential locations alternative nesting sites for CATEs currently nesting within the inland Columbia River Basin region (Collis et al. 2012).

A total of 145 current, former, or potential CATE colony sites were identified in western North America (Alaska to northwestern Mexico, west of the Continental Divide). Movement data of CATEs banded throughout the Columbia River Basin, including Crescent Island and Goose Island during 2005-2011, indicated connectivity across an extensive array of sites throughout coastal and interior western North America. Specifically, CATEs banded at Crescent Island or Goose Island were re-sighted at nesting or roosting locations in Alaska, British Columbia, Washington, Oregon, California, Idaho, Utah, and northwestern Mexico.

Of these 145 sites, many would not be available to be used as habitat enhancement sites due to conflicts with ESA-listed fish species (Table 2-2). Future studies for habitat enhancement sites will evaluate effects on ESA-listed species, both fish and other animals and plants.

Table 2-2. Potential locations of alternative nesting sites that will not be considered for development of habitat enhancement sites due to ESA-listed fish conflicts

Region/Colony or Roost	ESA-listed fish conflict	Lat.	Long.
Coastal Washington			
Bellingham Bay - Port of Bellingham	Likely[a]	48.747	-122.488
Padilla Bay - Unnamed Island	Likely	48.475	-122.532
Strait of Juan de Fuca - Smith and Minor islands	Likely	48.323	-122.822
Strait of Juan de Fuca - Dungeness Spit	Likely	48.166	-123.137
Strait of Juan de Fuca - Protection Island	Likely	48.128	-122.925
Puget Sound - Jetty Island	Likely	48.007	-122.228
Puget Sound - Seattle Waterfront (Pier 90)	Likely	47.636	-122.382
Puget Sound - Bremerton (Sinclair Inlet)	Likely	47.548	-122.652
Puget Sound - Tacoma Waterfront	Likely	47.254	-122.422
Grays Harbor - Unnamed Island	Likely	46.967	-124.003
Grays Harbor - Sand Island	Likely	46.963	-124.063
Grays Harbor - No Name Island	Likely	46.954	-124.045
Willapa Bay - Snag islands	Possible[b]	46.669	-123.968
Willapa Bay - Gunpowder Sands	Possible	46.683	-124.033
Interior Washington			
Banks Lake - Goose Island	Possible	47.647	-119.291
Banks Lake - Twinning Island	Possible	47.625	-119.303
Sprague Lake - Harper Island	Possible	47.248	-118.086
Coastal Oregon			
Tillamook Bay	Likely	45.516	-123.919
Coos Bay - Unnamed Island	Likely	43.386	-124.298
Interior Oregon			
Upper Klamath Lake - Williamson River Delta	Likely	42.465	-121.957
Upper Klamath Lake - Upper Klamath NWR	Likely	42.515	-122.058
Idaho			
Island Park Reservoir		44.406	-111.536
Minidoka NWR - Tern Island		42.664	-113.451
Bear Lake NWR - Unnamed Island		42.160	-111.296
Utah			
Great Salt Lake - Minerals Complex		41.314	-112.302
Great Salt Lake - Bear River Migratory Bird Refuge		41.429	-112.213
Neponset Reservoir		41.380	-111.130
Utah Lake - Rock Island	Likely	40.176	-111.801
Coastal California (North)			
Humboldt Bay - Sand Island	Likely	40.840	-124.124
San Francisco Bay - Brooks Island	Likely	37.900	-122.361
San Francisco Bay - Waterfront (Agua Vista Park)	Likely	37.768	-122.384

Region/Colony or Roost	ESA-listed fish conflict	Lat.	Long.
San Francisco Bay - Hayward Regional Shoreline	Likely	37.629	-122.144
Monterey Bay - Elkhorn Slough	Likely	36.814	-121.743
Coastal California (South)			
Los Angeles Harbor - Terminal Island (Pier 400)	Possible	33.717	-118.248
Huntington Beach - Bolsa Chica Ecological Reserve	Possible	33.695	-118.042
Newport Beach - Upper Newport Bay Ecological Reserve	Possible	33.648	-117.886
San Diego Bay - San Diego Bay NWR (Salt works)		32.600	-117.106
Interior California (North)			
Clear Lake - Clear Lake NWR	Likely	41.860	-121.170
Meiss Lake - Butte Valley Wildlife Area	Possible	41.859	-122.049
Goose Lake	Possible	41.962	-120.486

Source: Collis et al. 2012

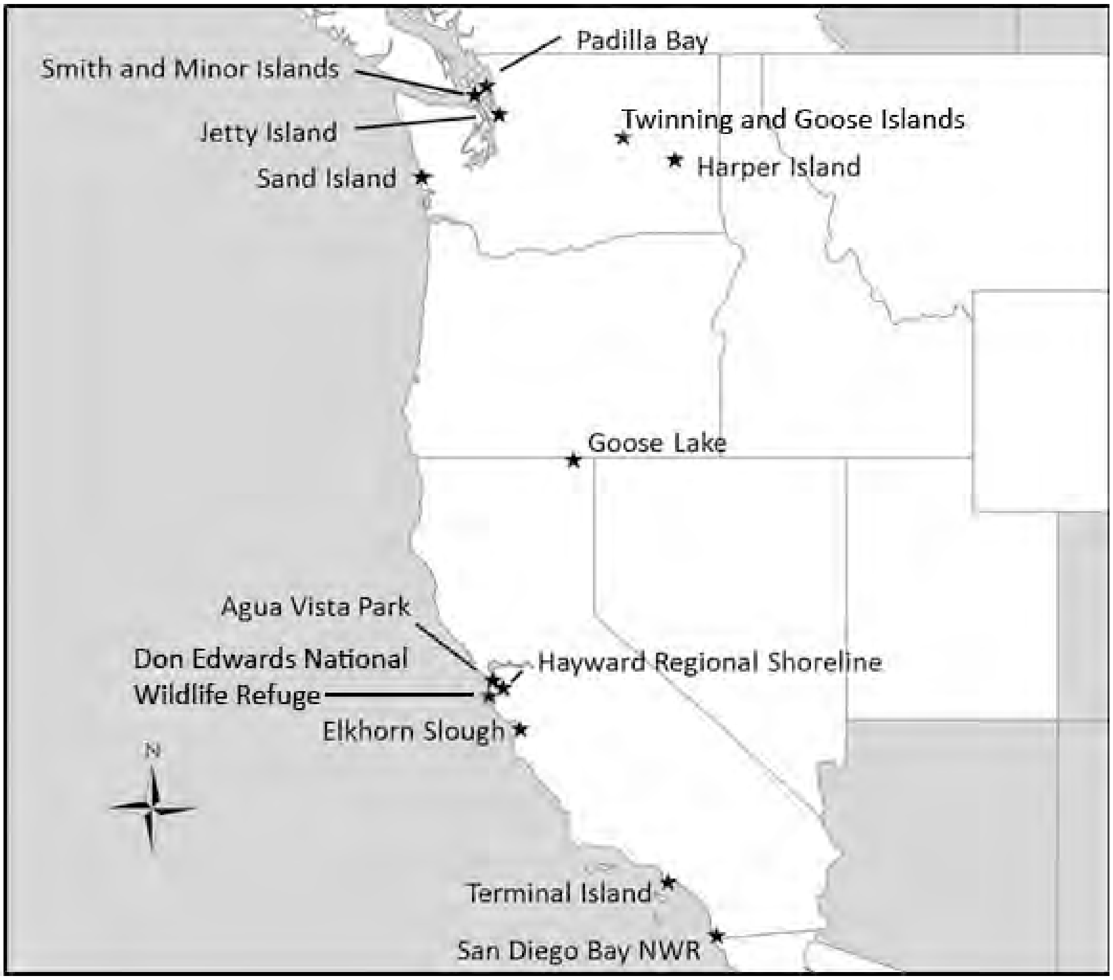
a ESA-listed fish prey species are present at the site.

b ESA-listed fish prey species are present within the potential foraging range of the site.

Evaluations of the 145 potential alternative nesting sites for CATEs identified by the study were conducted via literature review, colonial waterbird atlases, online databases, and extensive discussions with academic, federal, state, non-governmental, and provincial biologists across western North America (Collis et al. 2012). Results suggested that during the time the site assessment report was prepared in 2011 and 2012, 41 of these sites (28 percent) had management potential (Collis et al. 2012).

Biological characteristics for the 41 sites with apparent management potential were then used to assess the suitability of each site to attract CATEs to nest, the potential constraints at the site for sustaining a CATE colony, and considerations for enhancing the site to accommodate a CATE breeding colony. Of the 41 sites that were considered to have management potential, 13 were considered to have high overall suitability as alternative CATE colony sites (Figure 2-9).

Each of these 13 sites, however, ranked poorly in at least one suitability criterion, indicating that some biological conflicts or constraints exist at even the most suitable management sites. For instance, at some of the 13 highly suitable sites there is potential geographic overlap between a new or expanded CATE breeding colony and ESA-listed fish species. CATE diet data were generally lacking at the majority of these potential colony sites; thus, potential conflicts were evaluated based on spatial overlap alone.



Source: Modified from Roby et al. 2012.

Figure 2-9. Location of high-suitability CATE habitat enhancement sites between southern California and northern Washington.

Additional Habitat Enhancement Studies

Preliminary evaluations of these sites were conducted by the Action Agencies and members of the IAPWG Based on these evaluations, each site demonstrated one or more concerns, leading to the need for further analysis and consideration of a wider array of potential sites within the western North America metapopulation. These concerns are identified in Table 2-3.

Table 2-3. Results of Additional Evaluations on High-Suitable Habitat Enhancement Sites

Site Location	Concern
Padilla Bay - Unnamed Island	Privately owned island - Corps and Reclamation have no authority to purchase real estate or fund others to develop enhanced habitat. The island is connected to the mainland during low tide and would require costly site improvements to improve long-term CATE nesting success. Potential conflicts with ESA-listed salmonids.
Strait of Juan de Fuca - Smith and Minor Island	Formation of CATE colony at top of island conflicts with Coast Guard-required helipad use. Documented predator (bald eagle) concerns. Harbor seal haulout and pupping site limiting beach access during certain portions of the year. Site access is limited such that predator management efforts would be limited; monitoring of CATE colony would have to be done remotely (e.g., aerial surveys and video cameras).
Puget Sound - Jetty Island	High human use area. Potential for mammalian predation. Also, possible conflicts with ESA-listed salmonids (close proximity to the Snohomish River).
Grays Harbor - Sand Island	Conflicts with bald eagle disturbance. Site erosion problems. Conflicts with harbor seals and other waterbird species.
Banks Lake - Goose Island	High use area. Potential for mammalian predation. Insufficient foraging available. Potential for continued foraging on ESA-listed salmonids.
Banks Lake - Twinning Island	Same concerns as for Banks Lake Goose Island.
Sprague Lake - Harper Island	Concern on potential impacts to Snake River ESA-listed salmonid species and insufficient forage for 1000 pair CATE colony. Island is privately owned - Corps and Reclamation have no authority to purchase real estate or fund others to develop enhanced habitat. The lake is a high use area. Potential for mammalian predation.
Goose Lake, CA	Significant site preparation efforts would be required. Fluctuating water levels would likely result in created island being present in only certain years. Predators documented in the area.
San Francisco Bay - Agua Vista	High use area, possible human disturbance. Significant site preparation required.
San Francisco Bay - Hayward Regional Shoreline	Possible conflicts with existing conservation plans for other tern species.
Monterey Bay - Elkhorn Slough	Documented predator impacts causing previous nesting failures. Significant site preparation would be required. Contaminants documented at this site. Potential conflicts with ESA-listed fish and snowy plovers.
Los Angeles Harbor - Terminal Island (Pier 400)	Conflicts with conservation plans for least terns. Possible conflicts with ESA-listed fish.
San Diego Bay - San Diego Bay NWR (Salt works)	Significant site preparation required. Potential impacts to conservation plans for other waterbird species (snowy plover and least terns).
Don Edwards National Wildlife Refuge	High potential for CATE habitat. Mixed-use area may cause potential conflicts. Additional consultation with landowner is needed to determine potential resource concerns.

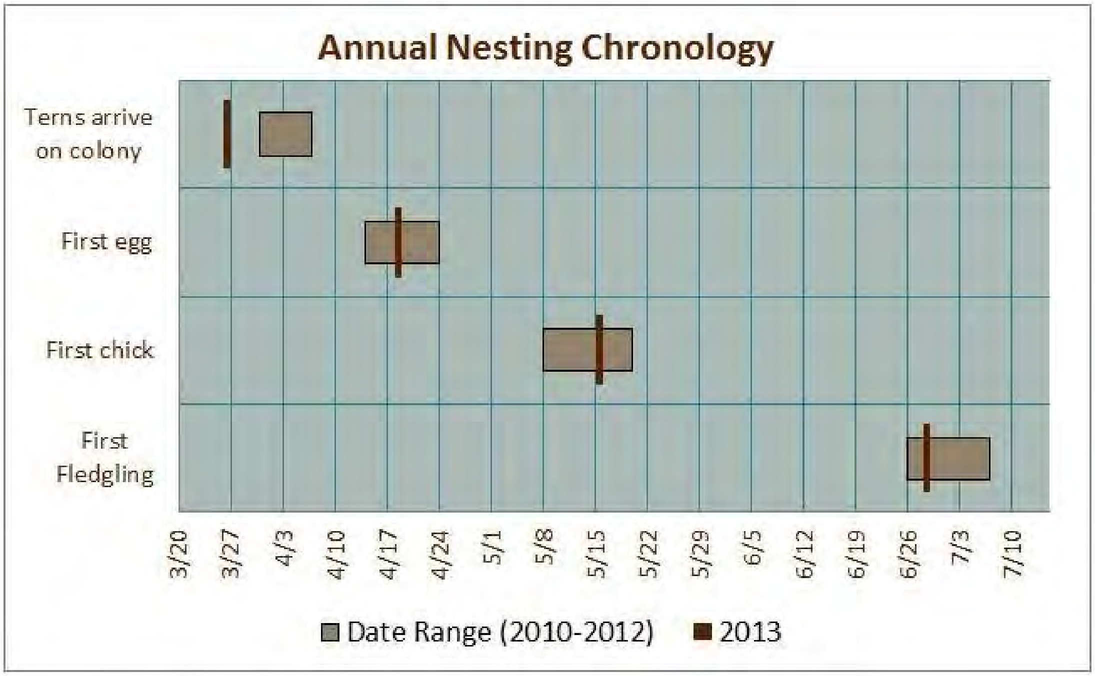
2.2.3 Alternative C: Habitat Modification (Alternative B) Combined with Active Hazing

This alternative would comprise all habitat modification elements described in Alternative B combined with a program of daily active hazing to physically discourage CATEs and gulls from nesting on Goose, Crescent and the at-risk islands. In Alternative C, active hazing actions would occur prior to and during the gull and CATE nesting season. Active hazing would be done in coordination with the respective landowner of each property.

Active daily hazing at Goose and Crescent Islands and the at-risk islands would commence upon the arrival of gulls and CATEs (Figures 2-10 and 2-11) and continue until first CATE or gull eggs are laid or early July if no eggs are laid. Active hazing would be discontinued if eggs from CATEs, gulls or any other birds are discovered in the vicinity of the hazing activity. During active hazing, all waterbirds that could potentially nest on the islands would be dissuaded from nesting if they are in areas potentially occupied by gulls or CATEs.

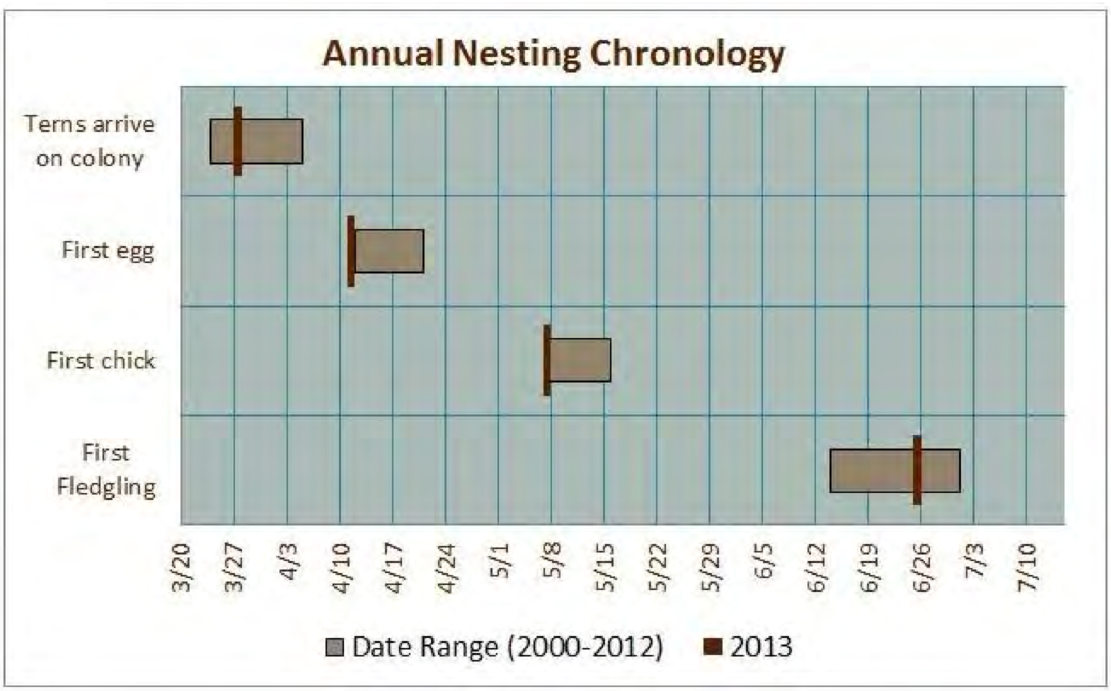
Active daily hazing would typically be conducted by two or more observers/hazers on foot to minimize disturbance to other species and to maximize coverage and effectiveness of the operation. Two or more people are recommended for hazing due to safety concerns associated with boating and field work. Hazers would cover all areas of each island where CATEs and gulls might be expected to occur (i.e., open and semi-open areas where nests were previously located). Observers would walk through the CATE and gull colony to disturb CATEs and gulls away from potential or actual nesting sites and to prevent nesting activities from initiating. In addition to hazing birds away from potential nest scrapes during hazing, hazers would fill in any scrapes that had been started by CATEs. Most CATEs lay eggs early in the morning (Roby 2012a personal communication), but hazing would be conducted throughout the day as necessary to minimize the likelihood that eggs may be laid.

To ensure maximum success of dissuasion actions, hazing would be conducted 7 days a week to ensure no new nests are started. As the presence of a person at a colony site may cause CATEs to abandon the area (Cuthbert and Wires 1999) and hazing levels are expected to be frequent enough to also discourage gulls, it is anticipated that frequent coverage of all areas potentially occupied by CATEs would discourage nesting. Hazing could be initiated in Year 1 and continue until the Action Agencies determine it is unnecessary. For example, hazing could be discontinued after Crescent Island Phase 2 habitat modifications appear to be sufficient to dissuade CATEs from nesting.



Source: BRNW 2013.

Figure 2-10. Annual nesting chronology of CATEs on the Goose Island breeding colony in Potholes Reservoir shown in 2013 relative to the 2010-2012 breeding season.



Source: BRNW, 2013.

Figure 2-11. Annual nesting chronology of CATEs on the Crescent Island breeding colony on the mid-Columbia River shown in 2013 relative to the 2010-2012 breeding season.

2.2.3.1 Island-Specific Implementation Considerations

Goose Island

Hazing would be initiated in Year 1 and would likely continue for a minimum of 3 years or until deemed unnecessary. For example, permanent substrate modifications could eliminate the need for hazing at Goose Island.

Crescent Island

Active Hazing would be as early as Year 2 as a tool to limit the formation of incipient CATE colonies. It would be expanded to cover all open areas of the island during Phase 2 as warranted to improve success of habitat modification efforts. Following the implementation of Phase 2, active hazing would likely take place for 2-3 years as vegetation becomes established. It is anticipated that vegetation would establish quickly due to climatic conditions, and CATEs would be persuaded not to nest by the presence of vegetation once it has become established. After that, the need for hazing would be reevaluated and would only continue if deemed warranted by agency personnel and subject to availability of funds.

At-Risk Islands (Incipient Colonies)

Daily active hazing would occur at any of the islands starting in Year 1, if warranted, and continue until deemed unnecessary.

2.2.4 Alternative D: Habitat Modification and Active Hazing (Alternative C) Combined with Limited Egg Removal (Preferred Alternative)

This alternative would comprise all habitat modification and active hazing elements described in Alternative C combined with limited CATE egg removal. A USFWS depredation permit for up to a maximum of 200 CATE eggs (from Goose, Crescent, and the at-risk islands combined) per year would be requested under this option, though it is possible that no egg collection would be necessary with daily hazing (Roby 2012b personal communication). Nest abandonment by other species would not be covered under the egg take permit so that once a gull or other bird lays an egg in the vicinity of the CATE hazing areas, all hazing activities would stop. The basis for the proposed management action of taking up to 200 CATE eggs per breeding season is based on recent Portland District Corps actions. Through the breeding season of 2012, fewer than nine eggs per year have been collected in support of Portland District hazing actions in the Columbia River estuary (Roby et al. 2013).

Egg removal would only be used after all other options have been exhausted. As eggs may potentially be laid throughout the nesting season, egg take could occur throughout the nesting season of any given year of the project. As staff conducts hazing activities on the islands, they would also search for and remove CATE eggs. The goal of this action, along with removing scrapes and nests, is to prevent the reestablishment of the colonies. Eggs would be collected and disposed of in a manner in compliance with the applicable USFWS permit.

The implementation timeline for the preferred alternative is shown on Table 2-4. This table identifies the implementation sequence for the various habitat modifications, hazing, and egg take actions in Phases 1 and 2. The habitat modifications would be implemented between the months of August and early March to fall outside of the CATE nesting season. It is anticipated that Year 1 would occur as early as 2014. The year these actions are actually initiated, however, would depend on a variety of factors including items such as the availability of funding, permits, and monitoring and evaluation results (particularly with respect to adaptive management actions).

The implementation of Phase 2 habitat modifications at Crescent Island and Goose Island would occur after the implementation of habitat enhancement at location(s) outside the Columbia River Basin, which would require a follow-on supplemental/tiered NEPA process. If habitat enhancement is not implemented, a decision to terminate and reverse Phase 1 action would be considered.

Table 2-4. Implementation Timeline for Alternative D (Preferred Alternative)

Action	Year 1	Year 2	Year 3	Year 4	Year 5
Phase 1					
On Goose Island, passive hazing will be combined with active hazing of CATEs and gulls, and, if needed, limited CATE egg take.	X	X	X	(X)	(X)
If needed, formation of incipient CATE colonies on Crescent Island will be prevented by using passive hazing and active hazing of CATEs and gulls, and, if needed, limited CATE egg take.		(X)	(X)		
Willows will be experimentally planted on Crescent Island to evaluate survival.	X				
Dissuasion will be performed as needed on at-risk islands in coordination with landowners.		(X)	(X)		
CATE habitat enhancement site research and supplemental/tiered NEPA analysis will be completed.	X	(X)			
Phase 2					
Habitat enhancement site(s) will be prepared to attract CATE nesting.			X		
If necessary, Goose Island substrate may be modified by adding material such as large cobble as a lower maintenance dissuasion method.				(X)	(X)
To dissuade the primary CATE colony on Crescent Island, vegetation may be planted and/or a berm may be constructed (passive hazing). As necessary, active hazing of CATEs and gulls, and, if needed, limited CATE egg take may be conducted.				X	(X)

Action	Year 1	Year 2	Year 3	Year 4	Year 5
CATE dissuasion will be performed as needed on at-risk islands in coordination with landowners.				(X)	(X)

Note: (X) is implemented only if warranted.

Monitoring is not included in the above timeline but is important for addressing uncertainties and determining progress towards objectives during implementation of the IAPMP. As part of the IAPMP, dissuasion islands would be monitored daily, or as warranted, for CATE nesting activity during the nesting season concurrently with hazing activities. At-risk islands would be monitored less frequently but at least twice during the nesting season for evidence of nesting CATEs. Once the CATE habitat enhancement sites have been identified (after the appropriate supplemental/tiered NEPA analysis has been completed) and prepared to receive nesting CATEs, it would be monitored during the ensuing CATE nesting season to assess the success of the habitat enhancement effort. Other Columbia River Basin islands not considered at-risk and but within the inland basin would be monitored by the Action Agencies or other partners. Areas outside the inland Columbia River Basin may be monitored by other entities not affiliated with this project. More details on implementation, monitoring and adaptive management are contained in the IAPMP (Appendix A).

2.2.4.1 Island-Specific Considerations

Goose Island

Egg removal and daily active hazing would occur simultaneously. It would be initiated in Year 1 for a minimum of 3 years due to the large potential CATE nesting area and type of dissuasion measures.

Crescent Island

Egg removal would occur simultaneously with daily active hazing. It would start as early as Year 2 (e.g., 2015). Daily hazing plus egg removal is recommended as a precautionary measure, although it is anticipated that silt fencing and willow plantings combined with hazing would minimize egg removal frequency within Phase 2. It is expected that vegetation would be established 3 years after the implementation of the Phase 2 habitat modifications, and frequent hazing/egg removal visits to the island could be greatly reduced in frequency or no longer be necessary.

At-Risk Islands (Incipient Colonies)

If action at any of the identified locations is deemed necessary, egg removal in addition to daily active hazing could occur simultaneously for up to 5 years, or until deemed unnecessary.

2.3 Comparison of Alternatives

Alternative D was selected as the preferred alternative as it best meets the projects purpose and need. It provides the most comprehensive set of actions for CATE management with the highest probability of successful CATE dissuasion at Goose and Crescent Islands, which would result in the largest reduction in avian predation losses of ESA-listed salmonids. The habitat modifications, combined with active hazing, would provide a high probability of success, while limited egg take would provide a contingency for unforeseen events. Table 2-5 shows a comparison of the alternatives considered.

Table 2-5. Comparison of Alternatives

ACTIONS TAKEN UNDER EACH ALTERNATIVE

	Alternative A	Alternative B	Alternative C	Alternative D
Action	**No Action**	**Habitat Modifications to Alter CATE Nesting Areas. Phase 1 and Phase 2**	**Alternative B, Habitat Modification, Combined with CATE Hazing**	**Alternative C Habitat Modification and Hazing Combined with Egg Removal**
Temporary Passive Dissuasion (Rope and Flagging)	No	Yes, Phase 1 includes the placement of a network of rope and flagging to deter use of nesting habitat at Goose Island. Dissuasion activities (i.e., rope and flagging) will take place at Crescent Island if necessary to prevent colony expansion. Phase 1 includes the implementation of dissuasion actions (rope and flagging) for at-risk islands (if necessary).	Yes, as described under Alternative B.	Yes, as described under Alternative B.
Habitat Enhancement	No	Habitat enhancement would occur prior to implementation of permanent Phase 2 actions at Goose and Crescent Islands. Additional studies will be required to identify suitable sites and a supplemental/tiered NEPA process will be completed prior to implementation.	Yes, as described under Alternative B.	Yes, as described under Alternative B.
Habitat Modification	No	Yes, Phase 1 includes test willow planting at Crescent Island. Phase 2 actions include additional planting of native vegetation as well as the potential construction of a low berm, installation of a silt fence and the addition of large woody debris to create a visual barrier and deter use of CATE nesting habitat at Crescent Island. As an adaptive management action in Phase 2, cobble/boulder substrate modification may occur if other habitat modification actions are unsuccessful. If warranted, a new substrate of cobble/boulder may be placed on Goose Island in the same area where rope and flagging was earlier deployed.	Yes, as described under Alternative B.	Yes, as described under Alternative B.

	Alternative A	Alternative B	Alternative C	Alternative D
Action	**No Action**	**Habitat Modifications to Alter CATE Nesting Areas. Phase 1 and Phase 2**	**Alternative B, Habitat Modification, Combined with CATE Hazing**	**Alternative C Habitat Modification and Hazing Combined with Egg Removal**
Active Hazing	No	No	Active daily hazing at Goose and Crescent Islands and the at-risk islands would commence with the arrival of nesting birds (e.g., gulls and CATEs) and continue until first CATE or gull eggs are laid or early July if no eggs are laid. Active daily hazing would typically be conducted by two or more observers/hazers on foot to minimize disturbance to other species and to maximize coverage and effectiveness of the operation. To improve success of dissuasion actions, active hazing would be conducted 7 days a week to reduce the chance new nests are initiated. Active hazing would be discontinued if eggs from any birds are discovered in the vicinity of the hazing activity.	Yes, as described under Alternative C. Daily active hazing would occur simultaneously with limited egg removal.
CATE Egg Collection	No	No	No	Yes, up to 200 CATE eggs may be collected under a MBTA permit at Goose, Crescent and the at-risk islands combined. Egg removal would occur simultaneously with daily active hazing.

		Alternative B		Alternative D
Action	**No Action**	**Habitat Modifications to Alter CATE Nesting Areas. Phase 1 and Phase 2**	**Alternative B, Habitat Modification, Combined with CATE Hazing**	**Alternative C Habitat Modification and Hazing Combined with Egg Removal**
Monitoring and Timing	No monitoring of CATE colonies would be performed by the Action Agencies	See Table 2-1 for phased implementation timeline. Rope and flagging will begin in Year 1 at Goose Island while Crescent Island is monitored to ascertain whether CATEs attempt to relocate to Crescent Island. If CATEs attempt to relocate to Crescent Island, rope and flagging will be implemented at Crescent Island to dissuade CATEs and limit the development of incipient satellite colonies. In Year 1, 75 willow whips will be test-planted on Crescent Island and monitored to see if existing conditions will promote successful willow growth suitable for CATE dissuasion activities in Phase 2. During Phase 2, Habitat modifications on Crescent Island will take place on both the CATE nesting area and where CATEs have formed incipient colonies. Plantings and silt fencing would be monitored upon deployment. No additional planting at Crescent Island is anticipated unless substantial (e.g., greater than 50%) plant failure occurs in the first 3 years. If silt fencing becomes damaged, it would be repaired or replaced as needed. All habitat and substrate changes will occur out of season. If monitoring indicates that CATE nesting continues along the fringes of the treated areas, additional habitat-related dissuasion measures would be implemented in future years. In Phase 2, Implementation of the Phase 2 habitat modifications at Crescent and Goose Islands are contingent upon	Hazing would be initiated in Year 1 at Goose Island and at Crescent Island in Year 2. Active hazing actions would occur prior to and during the gull and CATE nesting season. Active hazing would be discontinued if eggs from CATEs, gulls or any other birds are discovered in the vicinity of the hazing activity. Hazing at Goose Island would likely continue for a minimum of 5 years or until deemed unnecessary. For example, permanent substrate modifications could eliminate the need for hazing at Goose Island. At Crescent Island, hazing would be used as a tool to dissuade the formation of incipient colonies away from the primary CATE colony during Phase 1. Active hazing measures would be expanded as necessary at Crescent Island during Phase 2 to dissuade CATE from nesting on the island after implementation of Phase 2 habitat modification. Following the implementation of Phase 2, hazing on Crescent Island would likely take place for 3 years as vegetation is anticipated to	Egg removal and daily active hazing would occur simultaneously at both Goose and Crescent Islands during the CATE nesting season. It would be initiated in Year 1 at Goose Island and Year 2 at Crescent Island. At Goose Island, egg removal and daily active hazing would occur for a minimum of 5 years or until deemed unnecessary. During implementation of Phase 2, hazing and egg take may be implemented for 3 years or as warranted at Crescent Island as it is expected that the combination of passive and active dissuasion measures would minimize the need for egg removal. If action at any of the at-risk islands is deemed necessary, egg removal in addition to daily active hazing could occur simultaneously until deemed unnecessary.

Action	Alternative A No Action	Alternative B Habitat Modifications to Alter CATE Nesting Areas. Phase 1 and Phase 2	Alternative C Alternative B, Habitat Modification, Combined with CATE Hazing	Alternative D Alternative C Habitat Modification and Hazing Combined with Egg Removal
		identifying and implementing suitable new nesting habitat outside the Columbia River Basin. If CATE colonies on at-risk locations grow to a size of 40 nesting pairs or CATE numbers grow to greater than 200 pairs within the inland basin, predation impacts will be further evaluated and, if warranted, efforts to work with the respective landowners to implement dissuasion measures (rope and flagging similar to Goose Island) will be implemented.	establish quickly due to climatic conditions, and CATEs would be persuaded not to nest by the presence of vegetation. After that, the need for hazing would be reevaluated and would only continue if deemed warranted by agency personnel and subject to availability of funds. Daily active hazing would occur at any at-risk island starting in Year 2, if warranted, and continue until deemed unnecessary.	

2.4 Alternative Actions/Measures Considered Including those Eliminated from Further Study

The alternative development process required by NEPA is designed to allow consideration of the widest possible range of solutions and potential management approaches. During the alternative development process, many different actions/measures were considered. Table 2-6 shows the potential alternative actions/measures considered and how they compared against the purpose and need criteria: benefits to ESA-listed salmonids; minimize/avoid impacts to CATEs and other species of concern (i.e., other MBTA birds and other ESA-listed species). While this table includes all actions/measures considered (including those that were developed into the alternatives for this plan), actions/measures that did not meet (at least in part) all the purpose and need criteria were eliminated from further consideration.

Based on this evaluation, habitat modifications, active hazing and egg take for the entire CATE colonies at Goose and Crescent Islands, along with habitat enhancement, were identified as the actions/measures that satisfied (at least in part) the purpose and need criteria. This evaluation of the potential alternative actions/measures was used to develop the alternatives fully evaluated in this EA.

Subsequent paragraphs describe, in more detail, the alternative actions/measures that were eliminated from further consideration.

Table 2-6. Actions Initially Considered for Alternative Development

Potential Alternative Actions	Benefits to ESA-listed Salmonids	Minimize Impacts To CATEs	Minimize Impacts To Other MBTA Birds	Minimal Impacts To Other ESA Species
Goose Island Actions				
Modify habitat to remove entire CATE colony (passive)	+	+	+	+
Modify habitat to remove partial CATE colony (passive)	-	+	+	+
Active management (hazing and egg take) to discourage all CATE nesting	+	+	+	+
Active management to discourage partial CATE nesting	-	+	+	+
Predator introduction (e.g., terrestrial predators)	+	-	-	+
Predator encouragement (avian predator structures)	-	-	-	+
Lethal take (CATE)	+	-	+	+
Alternative food source (e.g., net pen or wetland cell)	-	+	+	+

Potential Alternative Actions	Benefits to ESA-listed Salmonids	Minimize Impacts To CATEs	Minimize Impacts To Other MBTA Birds	Minimal Impacts To Other ESA Species
Crescent Island Actions				
Modify habitat to remove entire CATE colony (passive)	+	+	+	+
Modify habitat to remove partial CATE colony (passive)	-	+	+	+
Active management (hazing and egg take) to discourage all CATE nesting	+	+	+	+
Active management to discourage partial CATE nesting	-	+	+	+
Predator introduction (e.g., terrestrial predators)	+	-	-	+
Predator encouragement (avian predator structures)	-	-	-	+
Lethal take (CATE)	+	-	+	+
Alternative food source (e.g., net pen)	-	+	+	+
Net pens and wetland cells	-	+	+	+
CATE Habitat Enhancement out of basin	+	+	+	+
CATE Habitat Enhancement in the inland basin	-	+	+	+
Maximize juvenile transport	-	+	+	-
Increased hatchery production	-	+	+	+

Notes:

"+" = Meets purpose and need.

"-" = Does not meet purpose and need.

2.4.1 Lethal Take of Adult CATEs

The lethal take of adult CATEs as a sole dissuasion method would likely not meet the purpose and need of the EA, as CATEs would likely continue to colonize the site and prey upon ESA-listed salmonids if nesting habitat is still available. In addition, over time, this could potentially have a significant impact on CATE metapopulations. Lethal take via killing juvenile and adult CATEs was eliminated from consideration under this EA due to the availability of less obtrusive measures. Similarly, predator introduction and predator encouragement were eliminated on the grounds that these methods constituted indiscriminate lethal take that could have negative impacts on other non-targeted species in the area, including other bird species covered under the MBTA.

2.4.2 Partial Colony Reduction at Goose Island

The Benefits Analysis analyzed the reduction of the CATE colony at Goose Island at levels of 33, 67, and 100 percent dissuasion for their respective effects on the average annual growth rate (λ) of selected salmonid ESUs. For all ESA-listed salmonids considered, substantial avian predator reduction benefits (identified in the Benefits Analysis as having a Δλ of 0.5 percent or greater) were only seen in UCR steelhead and UCR spring Chinook at 100 percent dissuasion. With no compensatory mortality, reducing 33 percent of the CATE colony at Goose Island could result in a Δλ of 1.5 percent hatchery population and 1.1 percent wild population of UCR steelhead. A reduction of 67 percent of the same CATE colony could result in a Δλ of 2.9 percent hatchery population and 2.2 percent wild population of UCR steelhead. Reduction of 100 percent of the same CATE colony could accrue a Δλ of 4.2 percent hatchery population and 3.2 percent wild population of UCR steelhead and 0.7 percent for UCR spring Chinook (Lyons et al. 2011a).

All of the actions at Goose Island, with the exception of entire habitat modification and active management to discourage all CATE nesting (with and without lethal take), were eliminated from further consideration. Due to the small area of actual CATE habitat on Goose Island (0.13 acre), habitat modification for partial colony removal was considered to have insufficient biological benefit to salmonids (based on reduction in predation rates and Δλ calculated in the Benefits Analysis). From an economic efficiency perspective, partial habitat management would not be substantially less expensive than full habitat modification. Active management to discourage partial nesting was similarly eliminated due to no substantial biological benefit to salmonids or substantial reduction in cost versus active management to discourage all nesting. Furthermore, reducing the size of small CATE colonies (e.g., < 500 nesting pairs) through directed management actions has not been done to date and may be difficult to successfully implement without unintentionally causing full colony failure.

Finally, alternative food sources (e.g., in net pens or wetland cells) were eliminated from consideration due to having limited known biological effectiveness and potentially high long-term operations and maintenance costs. The following biological concerns have also been raised about the use of net pens (BRNW, personal communication):

- Use of alternative food sources (e.g., net pens or modified wetland cells) by non-target species.
    - Other piscivorous waterbirds (e.g., American white pelicans, cormorants, herons, night-herons, gulls, etc.) would likely also utilize the net pens and could increase in numbers near the pen.
    - Cooperatively foraging waterbirds (e.g., gulls and cormorants) would likely find the net pen before CATEs and would potentially interfere with the foraging of CATEs at the pen. There are far more gulls and cormorants than CATEs in the region, and both readily take advantage of new foraging

opportunities, while CATEs would likely take more time to change their foraging habitat and utilize the pens.

  - Mammals (especially river otters) would also likely be attracted to the pen.

- Questionable effect of alternative food sources (e.g., net pens or modified wetland cells) on CATE foraging behavior. Recent unpublished data (BRNW, unpublished data) indicate CATEs are somewhat site-faithful with regard to foraging areas so the majority of birds in a CATE colony might continue to forage at traditional locations.
- Potential to attract more CATEs to an area. The presence an abundant food source in a net pen, for example, could attract more CATEs to an area and might counterbalance the intended benefits of the pen.

2.4.3 Partial Colony Reduction at Crescent Island

The Benefits Analysis also analyzed the reduction of the CATE colony at Crescent Island at levels of 33, 67, and 100 percent dissuasion for their respective effects on the average annual growth rate (λ) of selected salmonid ESUs. For all salmonids considered, substantial avian predator reduction benefits were only seen in UCR steelhead and SR steelhead only at 100 percent dissuasion. With no compensatory mortality, reducing 33 percent of the CATE colony at Crescent Island could result in a Δλ of 0.2 percent hatchery population and 0.2 percent wild population of UCR steelhead. A reduction of 67 percent of the same CATE colony could result in a Δλ of 0.5 percent hatchery population and 0.4 percent wild population of UCR steelhead. Reduction of 100 percent of the same CATE colony could accrue a Δλ of 0.7 percent hatchery population and 0.6 percent wild population of UCR steelhead and 0.5 percent for SR steelhead (Lyons et al. 2011a).

Elimination of actions for further study at Crescent Island followed similar reasoning as with Goose Island. All of the actions at Crescent Island, with the exception of entire habitat modification and active management to discourage all CATE nesting (with egg take), were eliminated from further consideration. Because of the small area of actual CATE habitat on Crescent Island (0.09 acre), habitat modification for partial colony removal was considered to have insufficient biological benefit to salmonids (based on reduction in predation rates and Δλ calculated in the Benefits Analysis). From a financial perspective, partial habitat management would not be substantially cheaper than full habitat modification. Active management to discourage partial nesting was similarly eliminated due to no substantial biological benefit to salmonids or substantial reduction in cost versus active management to discourage all nesting. Furthermore, reducing the size of small CATE colonies (e.g., < 500 nesting pairs) through directed management actions has not been done to date and may be difficult to successfully implement without unintentionally causing full colony failure. Finally, alternative food sources (i.e., net pens and wetland cells) were eliminated due to having very limited known biological effectiveness, as well as potentially high and long-term operations and maintenance costs.

2.4.4 Additional Juvenile Transport Action

An action initially considered was additional juvenile transport to minimize avian predation-related mortality during downstream migration. The Corps's juvenile salmonid transportation program collects juvenile salmonids from collector projects (Lower Granite Dam, Little Goose Dam, Lower Monumental Dam, McNary Dam) and transports them via barge or truck to release sites below Bonneville Dam. The majority of the predation by CATE's nesting at Goose Island occur within the Columbia River upstream of McNary Dam before juvenile salmonids could be collected for transport. Therefore, changes to the Corps's juvenile transport program would not reduce the impacts of CATEs nesting on Goose Island on Upper Columbia River salmonid ESU's. Due to operational constraints within the FCRPS, such as court mandated spill levels, the abilities to reduce avian predation on outmigrating Snake River and mid-Columbia River ESU's smolts through changes to the juvenile transportation program are currently limited. For example, the current spill regime limits the ability of the Corps to dramatically increase the number of ESA-listed salmonids collected for transport around Crescent Island during the periods of highest avian predation (i.e., May through June). This action was therefore eliminated from further consideration as changes to the juvenile transport program are anticipated to only provide minor improvements to ESA-listed salmonids survival at this time.

2.4.5 Increased Hatchery Production

Increased hatchery production was eliminated from further consideration primarily because it did not meet the purpose and need to reduce avian predation. Increased hatchery production could have the opposite effect, resulting in an increase in predation over time. An increase in fish available for foraging could lead to an increase in avian predators in the inland Columbia River Basin region.

SECTION 3.0 AFFECTED ENVIRONMENT

The following sections provide a description of the affected environment relating to proposed project actions. To simplify the description of the affected environment, several of the resources are grouped into general categories or areas:

- Columbia River – Includes Crescent, Badger, Blalock, Foundation, Miller Rocks, Three-mile Canyon, Richland (Islands 18 and 20), and Cabin Islands all located within the Columbia River between The Dalles Dam and Priest Rapids Dam.
- Potholes Reservoir – Solstice Island and Goose Island are both located within Potholes Reservoir.
- Banks Lake – Goose (Banks) and Twinning Islands are both located within Banks Lake.

3.1 Biological Environment

The following subsections provide a description of the relevant fish, wildlife, and plants that occur within the project area. Fish are presented in two categories: ESA-listed and other fishes. CATEs are presented in their own subsection, with other piscivorous birds presented in a separate subsection.

3.1.1 Federally Endangered and Threatened Fish

Thirteen species of salmonids in the project area are listed as threatened or endangered under the ESA. Anadromous fish species spend most of their lives in the ocean and return to fresh water to spawn. Salmon are semelparous meaning that they spawn once before dying. Steelhead are the anadromous form of rainbow trout and do not necessarily migrate to sea at a specific age. They are also iteroparous, meaning that they may spawn more than once.

Salmonids typically exhibit two types of principal life history cycles: stream-type and ocean-type. Stream-types usually remain in or near their natal stream for at least one year before traveling to saltwater. Ocean-type groups typically migrate to saltwater in their first year.

3.1.1.1 Chinook

Chinook (*Oncorhynchus tshawytscha*) are the largest of the Pacific salmon species and are found in the larger river systems and some smaller coastal river drainages from the Ventura River in California to Point Hope, Alaska (Healey 1991). Chinook can exhibit either stream-type or ocean-type life history cycles. Migration distance, stream flows and temperatures, and the productivity of streams and estuaries appear to be the strongest environmental factors affecting specific emigration timing (Myers et al. 1998).

Peak spawning for Chinook salmon within the project area occurs from August to September, although the timing is highly dependent upon water temperature. The egg incubation/alevin stage goes from August into December, and emergence extends from that point into March. The juveniles typically spend 1 year in freshwater before migrating downstream—primarily in May and June. Most adults return after spending 2 years in the ocean, although 20 to 40 percent return after 3 years at sea.

Four listed Chinook ESUs occur in the project area: Lower Columbia River, Upper Columbia River, SR Spring/summer run, and SR fall run.

Lower Columbia River Chinook ESU

Chinook salmon in the Lower Columbia River generally follow an ocean-type life history cycle. Late, fall-run (ocean-maturing) Chinook enter fresh water at an advanced stage of maturity, move rapidly to their spawning areas in the mainstem Columbia River and lower reaches of tributaries, and spawn within a few days or weeks of freshwater entry. Fall-run Chinook are the most abundant run in this ESU and are dominated by hatchery production.

Fall-run Chinook adults typically enter freshwater in August through October to spawn in large river mainstems and juveniles emigrate from freshwater as subyearlings (ocean-type).

Upper Columbia River Chinook ESU

Spring-run Chinook in this ESU have a stream-type life history, which means that juveniles enter marine waters during their second year and return to fresh water as subadults, maturing during their upriver spawning run. Adults returning to the Wenatchee River enter fresh water from late March through early May, while those returning to the Entiat and Methow Rivers enter fresh water from late March through June. Their arrival times tend to be earlier in low flow years and later in high flow years. Spring-run Chinook generally emigrate from freshwater as yearlings (stream-type).

The complex life cycle of Chinook in this ESU is closely associated with complex habitat needs, particularly during the freshwater phase (Spence et al. 1996).

Snake River Spring/Summer-Run Chinook ESU

Spring/summer-run Chinook from the Snake River Basin exhibit a stream-type life history cycle (Healey 1983). Eggs are deposited in late summer and early fall, incubate over the following winter, and hatch in late winter and early spring of the following year. Juveniles rear through the summer, overwinter, and migrate to sea in the spring of their second year of life. Depending on the tributary and the specific habitat conditions, juveniles may migrate extensively from natal reaches into alternative summer-rearing or overwintering areas (Good et al. 2005). SRS/S Chinook adults return from the ocean to spawn primarily as 4- and 5-year-old fish, after 2 to 3 years in the ocean. A small fraction of the fish return as 3-year-old "jacks," heavily dominated by males. Returning fish hold in deep mainstem and tributary pools until late summer, when they migrate into tributary areas to spawn. In general, spring-run type Chinook tend to spawn in higher-elevation reaches of major Snake River tributaries from mid- through late August; summer-run fish spawn approximately 1 month later than spring-run fish. Summer-run Chinook tend to spawn lower in the Snake River drainages, although their spawning areas often overlap with spring-run spawners (Good et al. 2005).

Snake River Fall-Run Chinook ESU

The SR component of the Chinook fall run migrates past the lower Snake River mainstem dams from August through November.SR fall-run Chinook adults enter the Columbia River in July and August. Chinook in this ESU generally exhibit an ocean-type life history, with juveniles migrating downstream from their natal spawning and rearing areas from June through early fall (Good et al. 2005). Natural spawning is currently limited to the area from the upper end of Lower Granite Reservoir to Hells Canyon Dam, the lower reaches of the Imnaha, Grande Ronde, Clearwater, and Tucannon Rivers, and small mainstem sections in the tailraces of the lower Snake River hydroelectric dams.

3.1.1.2 Steelhead

The present distribution of steelhead (*O. mykiss*) extends from the Kamchatka Peninsula in Asia, east to Alaska, and south to southern California (NMFS 1999, as cited in Good et al. 2005), although their historical range extended at least to the Mexico border (Busby et al. 1996). Steelhead exhibit highly complex life history cycles—more so than other species of Pacific salmonids. Steelhead exhibit both anadromous and freshwater resident life histories and may produce offspring that take on the opposite life history cycle than their parents. The anadromous form may spend up to 7 years in fresh water before entering the smolt life stage, and then may spend up to 3 years in saltwater prior to first spawning (Good et al. 2005).

Non-anadromous (i.e., resident) forms are typically referred to as rainbow trout, or in some inland portions of the Columbia River Basin, as redband trout. Although the anadromous and resident forms are considered to be the same species, the exact relationship between the two forms is not well understood, and little data are available on the interactions between the two forms (Kostow 2003, as cited in Good et al. 2005).

Steelhead inhabiting upper portions of the Columbia River Basin, particularly the Snake River Subbasin, are referred to as either A-run or B-run fish. A-run steelhead are believed to occur throughout the Snake River Basin and the inland Columbia River, while B-run steelhead are thought to occur only in the Clearwater, Middle Fork Salmon, and South Fork Salmon Rivers.

Four listed steelhead DPSs occur in the project area: Lower Columbia River, Middle Columbia River, Upper Columbia River, and SR steelhead.

Lower Columbia River Steelhead DPS

LCR steelhead include both summer- and winter-run steelhead and use the project area for migration, holding, and rearing. Summer steelhead adults return to fresh water from May to October in a sexually immature condition and require several months in fresh water to reach sexual maturity and spawn. Winter-run steelhead adults enter fresh water from November to April as sexually mature individuals that spawn shortly thereafter (NMFS 2005). Rearing winter-run steelhead use the Lower Columbia River year-round (CRC 2009). Rearing habitat is limited in the project area but is present in off-channel areas (e.g., accessible areas of small tributaries, backwater areas, and other low-velocity refugia).

Middle Columbia River Steelhead DPS

MCR steelhead are predominantly summer-run steelhead, but winter-run fish are found in the Klickitat River, Washington, and Fifteenmile Creek, Oregon. MCR steelhead use the Columbia River within the project area for migration and holding. Most fish in this DPS smolt at 2 years and spend 1 to 2 years in salt water before re-entering fresh water, where they may remain for up to a year before spawning. Juvenile life stages (i.e., eggs, alevins, fry, and parr) inhabit freshwater/riverine areas throughout the range of the DPS. Parr usually undergo a smolt transformation as 2-year-olds, at which time they migrate to the ocean. Subadults and adults forage in coastal and offshore waters of the North Pacific Ocean before returning to spawn in their natal streams (NMFS 2005).

Upper Columbia River Steelhead DPS

The UCR steelhead DPS consists entirely of summer-run steelhead. Adults enter fresh water between May and October. During summer and fall before spawning, they hold in cool, deep pools. They migrate inland toward spawning areas, overwinter in the larger rivers, resume migration to natal streams in early spring, and then spawn. Spawning occurs in the late spring of the calendar year following entry into the river (Good et al. 2005). In general, adults in this DPS spawn later than in most downstream populations, often remaining in fresh water for a year before spawning (NMFS 2005). Although the life history of this DPS is similar to that of other inland steelhead, smolt ages are some of the oldest on the west coast (up to 7 years old), probably due to the area’s cold water temperatures (Good et al. 2005, NMFS 2005). UCR steelhead use the Columbia River within the project area for migration and holding (NMFS 2005).

Snake River Steelhead DPS

The SR steelhead DPS includes all anadromous populations that spawn and rear in the mainstem Snake River and its tributaries between Ice Harbor and the Hells Canyon Dam complex. SR steelhead migrate a substantial distance from the ocean (up to 930 miles) and use high elevation tributaries (typically 3,300 to 6,600 feet above sea level) for spawning and juvenile rearing. Steelhead in this DPS occupy habitat that is considerably warmer and drier (on an annual basis) than other steelhead DPSs. Snake River Basin steelhead are generally classified as summer-run, based on their adult run timing patterns. Summer steelhead enter the Columbia River from late June to October, hold over the winter, then spawn during the following spring (March to May) (NMFS 2005). Adults use the Columbia River within the project area for migration and holding, and are present between June and October. Emergence from gravel occurs by early June in low elevation streams and as late as mid-July at higher elevations. SR steelhead usually rear in the natal tributaries for 2 to 3 years before outmigrating (NMFS 2008).

3.1.1.3 Snake River Sockeye ESU

SR sockeye (*O. nerka*) are distinctive in that they spawn at a higher elevation (approximately 6,000 feet) and have a longer freshwater migration (900 miles) than any other sockeye population in the world (Waples et al. 1991). SR sockeye spend 2 to 3 years in the ocean before returning to their natal lake to spawn (Good et al. 2005). Adult SR sockeye are present in the Columbia River during upstream migration between June and September. Sockeye juveniles rear in freshwater lakes for 1 to 3 years prior to migrating to the ocean, and primarily use the Columbia River as a migration corridor (Burgner 1991 and Gustafson et al. 1997, as cited in Carter et al. 2009). Juvenile outmigration occurs from April to mid-September, with the peak outmigration occurring between late April and May (NMFS 2001).

3.1.1.4 Lower Columbia River Coho ESU

Coho do not have the major life-history variation seen in some of the other listed salmonid species occurring in the Lower Columbia River (e.g., steelhead or Chinook) (Good et al. 2005). The Lower Columbia River coho ESU includes two distinct runs: early returning (Type S) and late returning (Type N). Type S coho salmon generally migrate south of the Columbia once they reach the ocean, returning to fresh water in mid-August and to the spawning tributaries in early September. Spawning peaks from mid-October to early November. Type N coho have a northern distribution in the ocean, return to the Columbia River from late September through December, and enter the tributaries from October through January. Most Type N spawning occurs from

November through January, but some spawning occurs in February and as late as March (LCFRB 2004, as cited in Good et al. 2005).

LCR coho use the Columbia River within the project area for migration, holding, and rearing. Upstream migrating adults are present from approximately mid-August to mid-February (NMFS 2005, CRC 2009). Rearing habitat is limited in the project area, but is present in off-channel areas (e.g., accessible areas of small tributaries, backwater areas, and other low-velocity refugia). Coho spawn downstream of the project area in the Lower Columbia River near Ives Island and Hamilton Creek, at river mile 143, 3 miles downstream from Bonneville Dam (FPC 2008). Spawning occurs approximately from December to February (ODFW and WDFW 2008). Rearing juveniles of this ESU are present in the project area year-round (Carter et al. 2009, CRC 2009). Outmigrating juveniles are present in the project area from mid-February to mid-September (CRC 2009), with peak juvenile outmigration occurring between April and June (Carter et al. 2009).

Coho salmon were declared extinct in the Snake River Basin in 1986; however, through reintroduction efforts coho now return in numbers that support a fishery in a number of rivers and streams within the state (CRITFC 2013).Coho salmon are not listed under the federal ESA within the middle and upper portions of the Columbia River or Snake River, and are discussed in more detail in Section 3.1.2.3.

3.1.1.5 Columbia River Bull Trout DPS

Bull trout (*Salvelinus confluentus*) are members of the salmon family known as char. Bull trout exhibit both resident and migratory life history cycles (Rieman and McIntyre 1993). Resident bull trout complete their entire life cycle in the tributary (or nearby) streams in which they spawn and rear. Migratory bull trout spawn in tributary streams where juvenile fish rear 1 to 4 years before migrating to either a lake (adfluvial form) or river (fluvial form) (Fraley and Shepard 1989, Goetz 1989). The size and age of bull trout at maturity depends upon life-history strategy. Resident fish tend to be smaller than migratory fish at maturity and produce fewer eggs (Fraley and Shepard 1989, Goetz 1989). Bull trout normally reach sexual maturity in 4 to 7 years. Spawning typically occurs from August to November. Eggs hatch in late winter or early spring. Fry may remain in the stream gravels for up to 3 weeks before emerging (USFWS 2002).

Habitat components that influence bull trout distribution and abundance include water temperature, cover, channel form and stability, substrate for spawning and rearing, and migratory corridors. Bull trout are found in colder streams and require colder water than most other salmonids for incubation, juvenile rearing, and spawning. Bull trout of all life stages require complex forms of cover, including large woody debris, undercut banks, boulders, and pools. Bull trout require loose, clean gravel relatively free of fine sediments for spawning and rearing. Bull trout use migratory corridors to move from spawning and rearing habitats to foraging and overwintering habitats and back (USFWS 2002).

The habitat within the mainstem Columbia River within the project area is considered essential to conservation of mid-Columbia River populations and for maintaining connectivity and providing for the expression of historic migratory life history forms throughout the lower and mid-Columbia River Basins (USFWS 2009).

Historically, the mainstem Snake and Columbia Rivers were likely used as migration corridors, foraging areas, and overwintering habitat by fluvial bull trout that originated in tributary streams throughout the basins. Presently, mainstem habitat may or may not be used by bull trout depending on the strength of their populations in tributary streams and the availability of migration corridors that connect to the Columbia and Snake Rivers. Bull trout have been observed passing the fish ladders at numerous mainstem Columbia River dams (e.g., Bonneville, Wells, Rocky Reach, and Rock Island Dams) (USFWS 2002), confirming potential presence in the project area. Bull trout in one study of habitat use of the mainstem mid-Columbia River were documented utilizing the mainstem for migration and, in general, entered mainstem tributaries by mid-June (Chelan PUD 2002).

A significant gap of knowledge exists regarding migratory bull trout life history and their use of the mainstem Columbia and Snake Rivers. Few data are available regarding movements within the mainstem, the use of various mainstem habitats, or bull trout presence and passage at mainstem dams (USFWS 2012).

Bull trout are estimated to have occupied about 60 percent of the Columbia River Basin and currently occur in 45 percent of the estimated historical range. The Columbia River bull trout DPS comprises 141 bull trout sub-populations in four geographic areas of the Columbia River Basin. The current distribution of bull trout in the Lower Columbia River Basin is less than the historical range (USFWS 2005a).

3.1.2 Other Fishes

This section addresses those fish species that are not currently listed under the federal ESA. As mentioned in Section 3.0, the affected environment was broken down into three general areas: (1) Potholes Reservoir, (2) Banks Lake, and (3) Columbia River.

3.1.2.1 Potholes Reservoir

Fish species found at the Potholes Reservoir included carp (*Cyprinus carpio*), largemouth (*Micropterus salmoides*) and smallmouth bass (*M. dolomieu*), perch (*Perca flavescens*), bluegill (*Lepomis macrochirus*), long-nose sucker (*Catostomus*

catostomus), black crappie (*Pomoxis nigromaculatus*), pumpkinseed (*Lepomis gibbosus*), sculpin (*Cottus* spp.), rainbow trout, brown bullhead (*Ameiurus nebulosus*) and walleye (*Sander vitreus*) (Reclamation 2002, WDFW 2013).

3.1.2.2 Banks Lake

Within Banks Lake, fish species include smallmouth bass, largemouth bass, carp, yellow perch, rainbow trout, walleye, kokanee (*O. nerka*), black crappie, bullhead, lake whitefish (*Coregonus clupeaformis*), bluegill (Polacek and Shipley 2007) and burbot (*Lota lota*) (WDFW 2006a).

3.1.2.3 Columbia River

Snake River Coho Salmon

Historically, coho salmon were abundant in the lower Snake River Basin and were known to spawn in several Snake River tributaries, including the Clearwater River. Snake River coho are not considered part of the LCR coho ESU, and were never listed under the federal ESA. In 1986, the last wild coho migrated back to the Snake River system, and the run was considered extinct after that time (Harrison 2008). In 1995, the Nez Perce Tribe began coho reintroduction efforts in the Clearwater River Subbasin through the transfer of fish reared at the Eagle Creek National Fish Hatchery. For context, in 2009, 550,000 hatchery-reared smolts are transferred from the Dworshak, Kooskia, and Eagle Creek hatcheries to several streams in the Clearwater River Subbasin (HSRG 2009). Annual adult returns at Lower Granite Dam between 2003 and 2012, have ranged from 1,135 to 5,060 with the 2012 total being 2,433, not including jacks. Several hundred jacks have been observed at Lower Granite Dam annually (FPC 2013). In 2004, 35 redds were observed within the Potlatch River, Lapwai Creek, Lolo Creek, Clear Creek, and the South Fork Clearwater River, indicating wild propagation is occurring (HSRG 2009).

Lamprey

Three species of lamprey have been identified in the Columbia River: Pacific (*Entosphenus tridentatus*), river (*Lampetra ayresi*), and western brook lamprey (*L. richardsoni*). Pacific and river lamprey are anadromous and parasitic. Western brook lamprey are freshwater residents that do not migrate to the ocean and are nonparasitic. Of the three lamprey species in the Columbia River Basin, the Pacific lamprey is currently designated as a federal Species of Concern by USFWS. Pacific lampreys spend 1 to 3 years maturing in the ocean environment before migrating as adults to freshwater systems. Adults enter the mainstem Columbia River between approximately February and June and complete migration into streams by September (Kostow 2002). Adults are thought to overwinter in freshwater habitat for approximately one year before spawning (USFWS 2008a). Spawning occurs between March and July in gravel-bottomed streams, at the upstream end of riffle habitat, and often near habitat suitable for ammocoetes (e.g., silty pools and banks) (Kostow 2002, Moyle 2002). After the eggs are deposited and fertilized, the adults usually die within 3 to 36 days (Kostow 2002).

Ammocoetes (larvae) drift downstream to areas of low velocity and silt or sand substrate, where they burrow and remain for 3 to 7 years. After reaching approximately 6 inches (15 cm) in length, ammocoetes metamorphose into macropthalmia (Moyle 2002). Downstream migrating macropthalmia have weak swimming ability (USFWS 2008a) and tend to move at night (USFWS 2010). Metamorphism is reported to occur between July and November, followed by outmigration to the ocean from November through June (peaking in the spring) (Kostow 2002).

Pacific lampreys migrate primarily at night, possibly in response to temperature cues or an aversion to light (Kostow 2002, USFWS 2008, USFWS 2010). Unlike most fishes, lampreys do not have swim bladders and are therefore not able to maintain neutral buoyancy; they must swim constantly or attach to objects to maintain their position in the water column (USFWS 2008a). Lampreys may travel deeper in the water column compared to salmonids (USFWS 2008a) (however, some dam passage studies have found juvenile lamprey much higher in the water column [CRITFC 2008]).

No population estimates are available for Pacific lamprey in the Columbia River Basin. Dam counts are unreliable for absolute abundance for several reasons, including lampreys migrate at night and pass counting windows when no counts are being taken; lampreys also pass via routes that bypass the counting stations; and there are large gaps in the years counts have been taken (Moser and Close 2003). However, dam passage counts can be a useful metric to describe changes in relative abundance over time, and are a clear indication of the decline of this species from historical conditions (Moser and Close 2003). For example, lamprey counts at Bonneville Dam prior to 1970 were regularly at least 50,000 adults; only about 25,000 adults have passed Bonneville Dam in recent annual counts (Kostow 2002). Passage counts show an even sharper decline at the furthest upstream dams: two hundred lampreys have been observed annually at the upper Snake River dams (Kostow 2002).

Primary factors for decline appear to be passage issues due to dams, loss of spawning and rearing habitat, poor water quality, and impacts of climate change. The USFWS currently has a strategy, “The Pacific Lamprey Conservation Initiative,” which seeks to improve the status of Pacific lamprey throughout its ranges via research and conservation actions (USFWS 2011). Besides their ecological value, lamprey historically played a very important role in the cultural traditions of Northwest Indian tribes, where they were used for subsistence, ceremonial, and medicinal purposes (NPCC 2010b).

Predation on juvenile Pacific lamprey by avian predators is well documented at Columbia River hydroelectric dams and other structures that concentrate and disorient out-migrants (Zorich et al. 2012). Gull consumption of lamprey macropthalmia had been reported as early as 1959, but this impact has not been quantified.

White Sturgeon

White sturgeon (*Acipenser transmontanus*) are known to utilize both shallow- and deep-water habitat in the Columbia River. In the Columbia River, adult white sturgeon have been observed at a mean water depth of 36 feet (Counihan et al. 1999), although they are also known to utilize habitat in the Columbia River of less than 23 feet in depth (Parsley et al. 1993). Adult white sturgeon have been observed in waters approximately 7 to 98 feet in depth (Counihan et al. 1999) and are likely to use deep-water habitat for foraging, resting, breeding, and spawning (Moyle 2002). Juvenile white sturgeon prefer deep-water habitat (median water depths of 52 to 62 feet [Parsley et al. 1993]) and are often observed in the deepest part of the channel; however, they have been observed in water as shallow as 6 feet (Parsley et al. 1993). White sturgeon often congregate in deep holes in the Columbia River (Brannon and Sutter 1992). Adult and subadult white sturgeon are primarily benthic feeders and are likely to use shallow water for foraging (Moyle 2002).

Other Columbia River Fish

Other native fish that occur in Columbia River in the project area include the kokanee salmon (*Oncorhynchus nerka* – a land-locked sockeye salmon that is not an ESA-listed fish), northern pikeminnow (*Ptychocheilus oregonensis*), redband rainbow trout (*O. mykiss*), westlope cutthroat trout (*O. clarki lewisi*), mountain whitefish *(Prosopioum williamsoni*), largescale sucker (*Catastomus macrocheilus*), bridgelip sucker (*C. columbianus*), longnose dace (*Rhinichthys cataractae*), speckled dace (*R. osculus*), redside shiner (*Richardsonius balteatus*), and sculpin spp. (*Cottus* spp.) (USFWS 2010).

3.1.3 Caspian Terns

3.1.3.1 Species Range

CATEs are widely distributed around the world, occurring on five of seven continents, but areas of occurrence are localized within their range (Figure 3-1). They breed locally across Eurasia, Africa, Australia and New Zealand (Cuthbert and Wires 1999). The global CATE population is estimated to be between 240,000 and 420,000 individuals. Their population trend is increasing and is currently classified as “Least Concern” by the International Union for Conservation of Nature (IUCN) Red List (BirdLife International 2012a) as the species does not meet the criteria for “Vulnerable” under the population trend or population size criteria. The increasing population trend appears to be especially pronounced in North American breeding areas where Breeding Bird Surveys have shown increases between 55 and 85 percent over the last several decades (Cuthbert and Wires 1999) with estimates ranging from approximately 33,000 to 35,000 breeding pairs (Cuthbert and Wires 1999) to 66,000 to 70,000 “breeders” (Kushlan et al. 2002). The CATE western metapopulation has increased since the 1960s, likely driven by anthropogenic nesting sites along with abundant fish forage (USFWS 2005b).

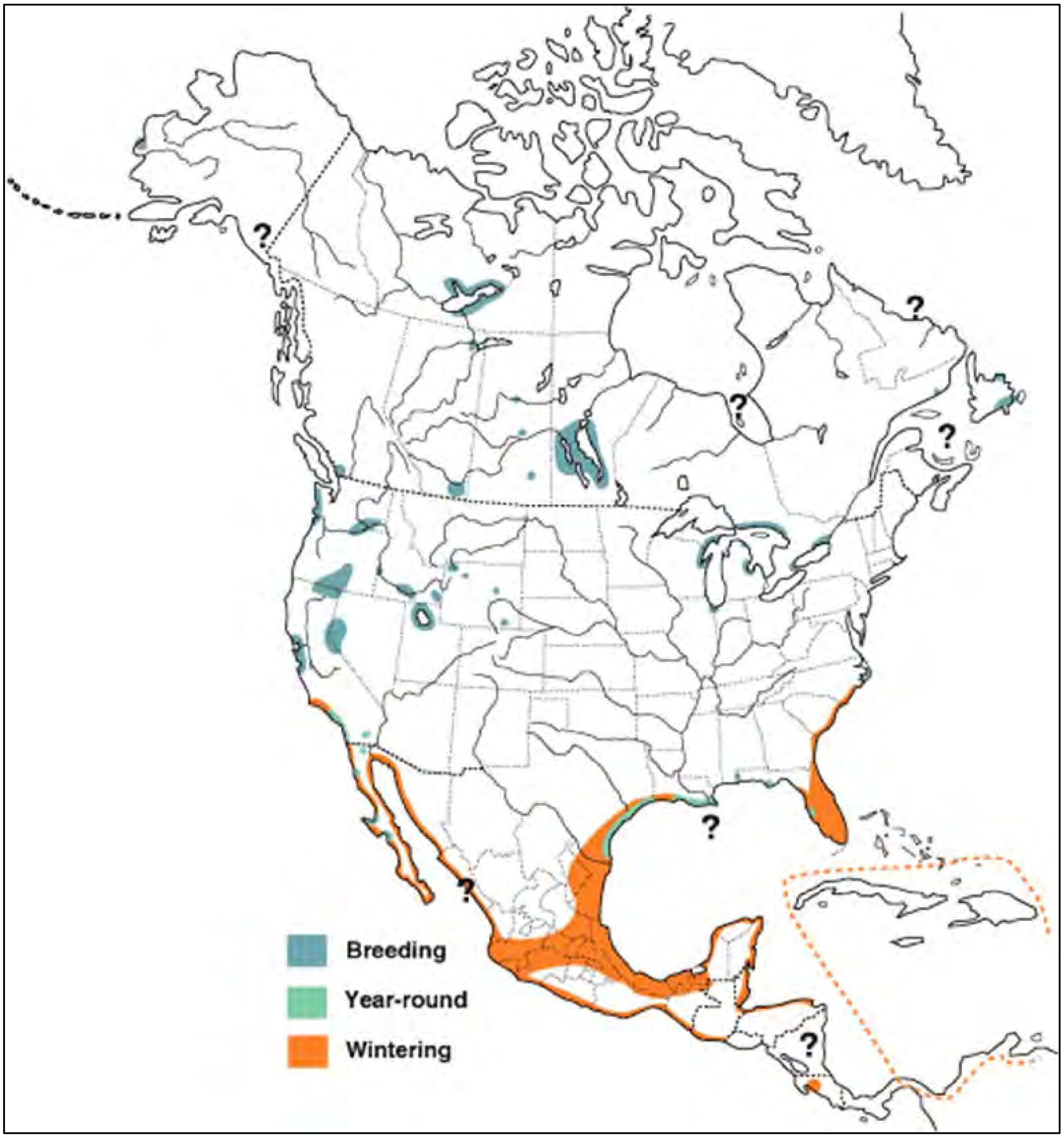
The decline in use of chemicals such as polychlorinated biphenyls (PCBs) may have contributed to the increase in nesting CATEs in North America. Buck (2004) noted that CATE eggs contained traces of several chemicals known to be harmful to nesting birds that prey on fish. As use of these chemicals has declined, several bird species (e.g., bald eagles) have experienced population increases.

Table 3-1. Estimated Number of CATE nests or breeding pairs in western metapopulation, 1996 to 2011[a]

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
AK	3	3	N/A	N/A	4	N/A	N/A	N/A	N/A	N/A	130	39	209	443	498	491
BC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	5	0	1
CA	1790	3602	2558	1607	2740	2438	2309	2394	2365	2132	2047	3655	4111	5154	2577	2366
ID	0	0	0	0	1	2	84	40	0	28	105	128	151	90	0	0
MT	32	5	0	2	7	60	68	11	12	0	6	2	N/A	13	112	67
MX	82	30	34	N/A	0	0	143	151	216	160	7	183	N/A	N/A	N/A	107
NV	12	1	5	685	0	0	0	5	30	9	20	42	0	4	2	16
OR	8346	7570	8981	9181	9785	8949	9938	8428	9502	8825	9201	9900	11096	10559	8382	7159
UT	0	0	240	0	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	0
WA	239	908	542	1310	1354	1417	1043	922	1025	1643	2159	1947	1706	2605	2914	1453
WY	6	4	5	4	0	3	5	6	4	3	0	0	0	0	0	0
Total	**10510**	**12123**	**12365**	**12789**	**13891**	**12869**	**13590**	**11957**	**13154**	**12800**	**13675**	**15896**	**17274**	**18873**	**14486**	**11660**

Source: USFWS 2013a personal communication.

a Numbers used in USFWS 2013a personal communication may reflect more recently compiled information than in Collis et al. 2012.

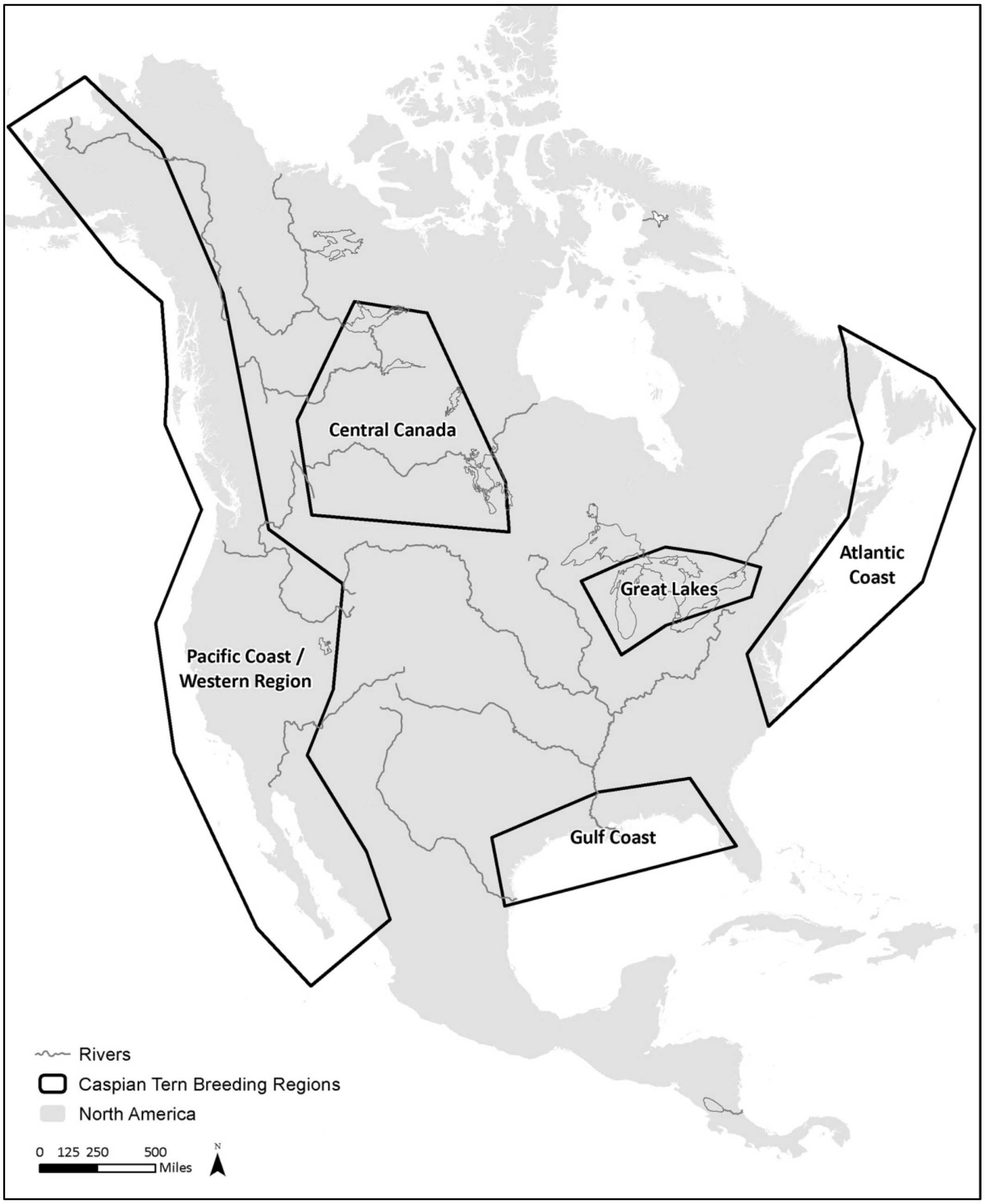


Source: Cuthbert and Wires 1999.

Figure 3-1. Location of CATE range in North American including breeding, wintering, and year-round areas. The western breeding range stretches from central California through the Pacific Northwest/Intermountain West to Alaska. Wintering range is central and coastal Mexico and Florida.

In North America, the CATE breeding range can be separated into five distinct breeding regions (Wires and Cuthbert 2000), by far the largest of these being the Pacific Coast/Western Region (Figure 3-2). The Pacific Coast/Western Region stretches from western Alaska through Baja California and Sinaloa, Mexico. The Pacific Coast/Western

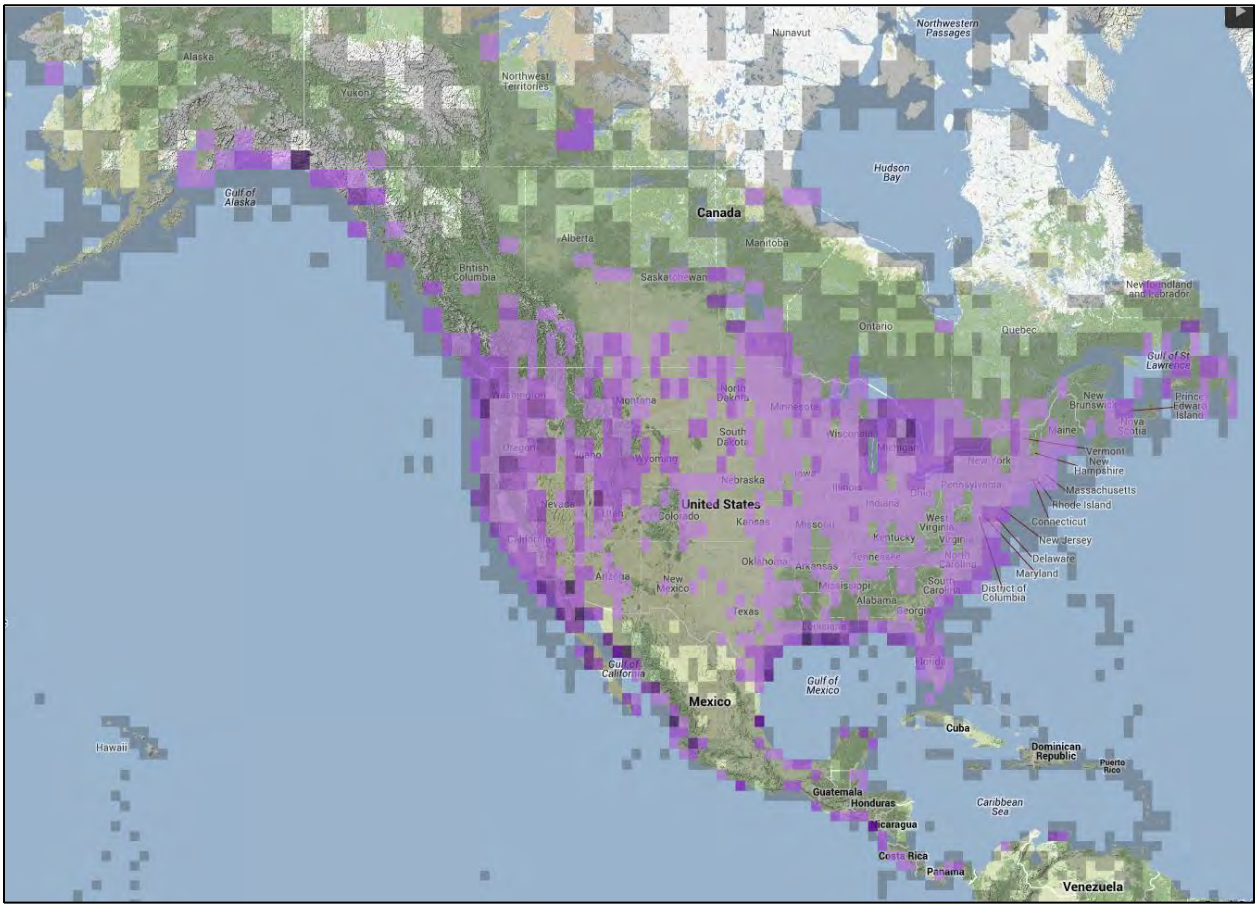
Region also encompasses non-coastal sites from southern Idaho to northern Utah including the inland Columbia River Basin.



Source: Wires and Cuthbert 2000.

Figure 3-2. Location of CATE breeding regions in North America: Pacific Coast/Western Region, Central Canada, Gulf Coast, Great Lakes, and Atlantic Coast.

In addition to these five regions, there are isolated instances of CATEs breeding in parts of the Midwest and East Coast (Cuthbert and Wires 1999). Analysis of eBird, an online database repository of citizen science bird reporting from North America and around the world, implies that some CATEs are also found during the CATE breeding season from May to June (Figure 3-3) outside of the five regions referred to above, though the presence of these birds at this time does not equate breeding (Cornell 2013).



Source: eBird 2013.

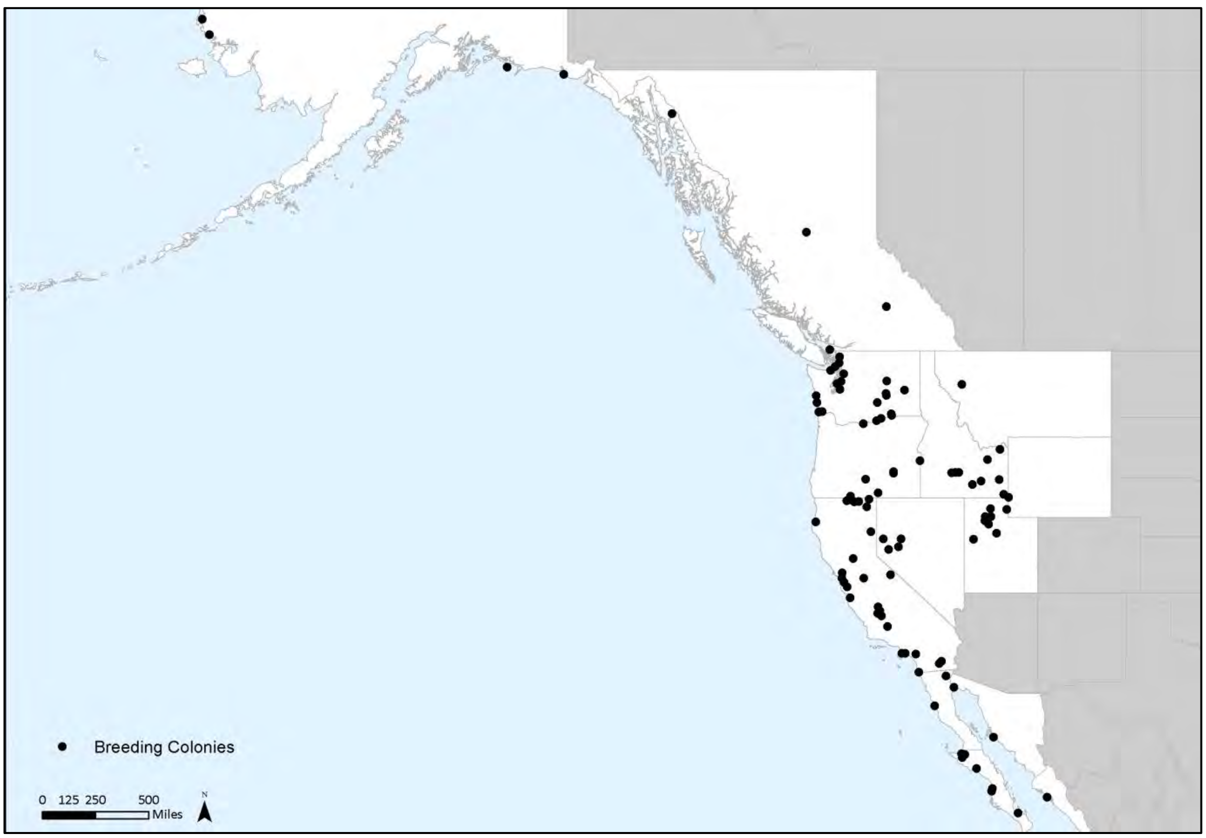
Figure 3-3. Frequency of eBird reports containing CATEs in North and Central America from May to June over multiple years. Darker shades represent more frequent reports. Areas with no shading (e.g., central Mexico) have no eBird reports for these months. Many of these reports are of only an individual CATE, not multiple birds.

CATEs breeding in North America winter primarily along the coasts, from southern California to Central American on the Pacific, and from North Carolina to Nicaragua on the Atlantic and Gulf coasts, but also in non-coastal Mexico and Florida and sparsely throughout the Caribbean (Cuthbert and Wires 1999).

Outside North America, the range of the CATE has decreased, including in parts of Europe where it formerly bred. In areas of Tunisia, Romania, Denmark, and Germany, where the species bred regularly, the species is either rare or extirpated (Cramp 1985). Despite these declines, the species still breeds on the coasts of Sweden, Finland, Estonia within Europe. The Asian breeding range includes the Caspian and Aral Seas, northern Mongolia, south Siberia, and coastal eastern China. The species also breeds in coastal Australia and New Zealand and scattered locations in coastal Africa (Cuthbert and Wires 1999).

3.1.3.2 Western Metapopulation Overview

The Pacific Coast/Western Region, including non-coastal sites, is also known as the western North America metapopulation (Figure 3-4). CATEs from this region have separate breeding and wintering areas from CATE populations east of the Continental Divide (Gill and Mewaldt 1983). Since the 1970s the western (Pacific Coast) North America CATE metapopulation has been the largest in the United States (Table 3-2). Knowledge of CATE populations and efforts to estimate numbers have improved over time and current CATE population estimates are likely much better than previous estimates.

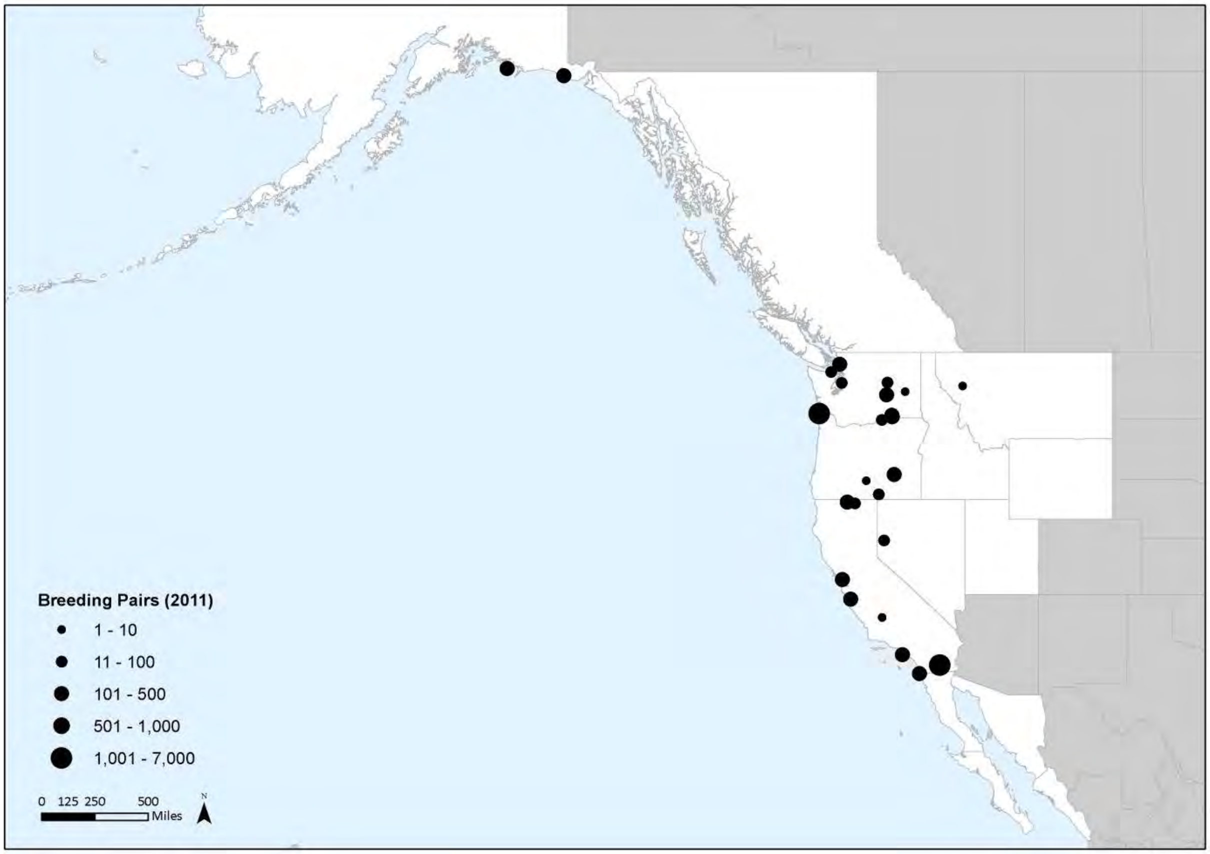


Source: Collis et al. 2012.

Figure 3-4. Distribution of current and historical CATE breeding colonies in western metapopulation.

While the western metapopulation does not extend east of the Continental Divide, it is possible that even during the breeding season from May to July CATEs could wander outside the metapopulation as indicated in Figure 3-3. At least one CATE from the western metapopulation has been observed to the east of the divide - a single individual CATE was observed in Pierre, South Dakota (latitude 44.36804, longitude -100.36405) on May 2, 2013. This individual CATE was banded as a chick at East Sand Island in 2003. Before this South Dakota sighting, the furthest east a CATE from the western metapopulation had been sighted was in Montana (Suzuki 2013 personal communication).

Nesting habitat limits CATE colony location while prey abundance can influence colony size. CATE nesting locations are rarely permanent but instead come and go with storms, droughts and other factors (e.g., predation) that improve or diminish the quality of nesting sites. Due principally to the unstable nature of their nesting habitat, CATEs have developed a rather nomadic approach to locating suitable nest sites (Cuthbert 1985, Roby et al. 2002). By 1930, CATEs in the western metapopulation had shifted their population from primarily smaller non-coastal colonies to larger coastal colonies at human-created sites with abundant food sources (Gill and Mewaldt 1983). On the Pacific Coast specifically, this shift from non-coastal colonies to coastal has been occurring since the 1970s, with new colonies forming in British Columbia and Alaska in the 1980s (Cuthbert and Wires 1999), and spreading as far north as western Alaska by 1996 (McCaffery et al. 1997). By 2011, many of the largest CATE colonies in the western North American metapopulation were located in coastal areas (Figure 3-5). This dynamic nature of their nesting sites adds to the uncertainty of predictions of where dissuaded CATEs will go and the value of nest habitat enhancement.



Source: Collis et al. 2012.

Figure 3-5. Distribution and relative size of CATE breeding colonies in western metapopulation surveyed in 2011.

Table 3-2. Estimates of the U.S. CATE breeding population by region (does not include estimate of Mexico and Canada CATE breeding population and may include "floaters" – non-breeding CATEs that commonly occur in suitable foraging areas)

	1976-1982[a]		1997-1998[b]		2011[c]
	Estimated Pairs	**% U.S. Population**	**Estimated Pairs**	**% U.S. Population**	**Estimated Pairs**
Pacific Coast	6,218	66.4	14,534	69.4	11,660
Great Lakes	1,682	18.0	3,979	19.0	--
Gulf Coast	1,456	15.5	2,303	11.0	--
Atlantic Coast	10	0.12	122	0.6	--
Total	**9,366**	**100.00**	**20,938**	**100.00**	**--**

Notes:

a Spendelow and Patton 1988. Numbers of adults are divided by two to estimate nesting pairs. Likely an underestimate due to frequent absence of one member of breeding pair.

b Shuford and Craig 2002.

c USFWS 2013a personal communication.

Colonies within the western metapopulation are linked with each other such that CATEs breeding at one colony may disperse to any other colony within the metapopulation. Analysis of band re-sighting data shows that there is connectivity between Goose and Crescent Islands (birds from one island were resighted at the other), at East Sand Island, and in Interior Oregon and California, including at Crump Lake in Warner Valley, Oregon, and Lower Klamath and Tule Lake National Wildlife Refuges (NWRs) (Collis et al. 2012) (Figure 3-8). Colony sites often vary in habitat quality over time so that in years with poor nesting conditions at one colony CATEs will often shift to attempt to nest at another colony. Coastal sites tend to have more s food resources (Seto et al. 2003). Interior sites in Washington State have less stable food availability and often higher per capita levels of predation on ESA-listed salmonids.

Of 134 known historical and active CATE colonies in the western metapopulation, approximately 100 received some degree of monitoring in 2011 (Collis et al. 2012). Of the 100 colonies monitored in 2011, 33 had at least one confirmed CATE breeding pair (Table 3-3). Of the 14 colonies with more than 100 CATE pairs, nine sites were coastal and five (Goose and Crescent Islands, Salton Sea, Malheur and Sheepy Lake) were non-coastal. In addition to Goose Island, Crescent Island, and Salton Sea, only two other CATE colonies had more than 400 pairs: Padilla Bay's Unnamed Island (424 pairs) in Coastal Washington and, by far the largest colony in the metapopulation, Coastal Oregon's East Sand Island with almost 7,000 CATE pairs.

Table 3-3. Monitored CATE colonies with at least one confirmed breeding pair in 2011

State/Region/Site	2011 Colony Size (Breeding Pairs)
ALASKA	
Copper River Delta - Kokinhenik Bar	241
Icy Bay - Gull Island	250
WASHINGTON	
Coastal Washington	
Padilla Bay - Unnamed Island	424
Strait of Juan de Fuca - Smith and Minor islands	5
Strait of Juan de Fuca - Dungeness Spit	42
Puget Sound - Seattle Waterfront (Pier 90)	60
Interior Washington	
Banks Lake - Twinning Island	19
Sprague Lake - Harper Island	4
Potholes Reservoir - Goose Island	422
Columbia River - Blalock Islands ("Anvil" Island)	20
Columbia River - Crescent Island	419
Columbia River - Badger Island	31
Columbia River - Foundation Island	5

State/Region/Site	2011 Colony Size (Breeding Pairs)
OREGON	
Coastal Oregon	
Columbia River estuary - East Sand Island	6,969
Columbia River estuary - Rice Island	3
Interior Oregon	
Malheur Lake - Singhus Ranch	150
Summer Lake Wildlife Area, East Link Impoundment (tern island)	2
Warner Valley, Crump Lake (tern island)	35
NEVADA	
Pyramid Lake - Anaho Island	16
MONTANA	
Ninepipe Reservoir	3
CALIFORNIA	
Coastal California (North)	
San Francisco Bay - Brooks Island	306
San Francisco Bay - San Francisco Waterfront (Agua Vista Park)	8
Monterey Bay - Elkhorn Slough ("Boomerang" Island)	4
Monterey Bay - Salinas River mouth (NWR)	261
Coastal California (South)	
Los Angeles Harbor - Terminal Island (Pier 400)	112
Huntington Beach - Bolsa Chica Ecological Reserve (North Tern Island)	65
San Diego Bay - San Diego Bay NWR (Salt works)	260
Interior California (North)	
Lower Klamath NWR, Sheepy Lake (tern island)	188
Lower Klamath NWR, Orems Unit (tern island)	2
Tule Lake NWR, Tule Lake (tern island)	34
Clear Lake - Clear Lake NWR	12
Interior California (South)	
Salton Sea - Headquarters Unit “D”	1,114
MEXICO	
Baja California	
Cerro Prieto	107
Total for all sites	**11,593**[a]

Source: Collis et al. 2012.

a Numbers used in USFWS, unpublished data may reflect more recent information than in Collis et al. 2012.

3.1.3.3 Western Metapopulation Population Trends

In the early twentieth century, CATE in the western metapopulation nested almost exclusively at non-coastal lakes and marshes (Wetmore 1919, Willett 1919). Coastal habitats were not used for nesting until the late 1920s and 1930s. By the 1950s, there was a major range expansion northward in coastal Washington which continued through 1980 (Suryan et al. 2004). Between the early 1960s and early 1980s the number of CATEs in the western metapopulation has increased by more than 70 percent but numbers have stabilized since 1997 (Gill and Mewaldt 1983) (Table 3-1). In 1983, 77 percent of CATEs were found in three areas: Grays Harbor, Washington, and San Francisco and San Diego Bays, California (Gill and Mewaldt 1983). Since the mid-1990s, the number of CATEs in the western metapopulation has remained relatively stable, with population shifts between states especially evident in some regions such as Alaska, California, and Washington (Table 3-4).

Abandonment of breeding sites in natural conditions is often a result of natural changes in conditions such as drought, erosion, flooding, vegetation encroachment, colony disturbance, nest predation, and changes in prey abundance (Suryan et al. 2004). Anthropogenic causes in habitat modification have been one of the most influential sources of changes in CATE breeding distribution (Shuford and Craig 2002). Artificial sites (e.g., dredge disposal areas) that are maintained either through vegetation management or through controlled water levels during droughts or floods are often well suited to CATE breeding. Prey abundance at artificial sites on the Columbia River is often more stable than at other sites due to the release of fish from nearby hatcheries (Suryan et al. 2004).

From the early 1980 population estimate of approximately 6,000 CATE pairs (Gill and Mewaldt 1983), the metapopulation has doubled to 11,593 pairs at monitored sites (Collis et al. 2012). The western metapopulation peaked in 2009 at almost 19,000 pairs and has declined since (Table 3-1). This western metapopulation decline corresponds to a decrease in the East Sand Island colony from more than 10,500 pairs in 2008 to fewer than 7,000 pairs in 2011 (USFWS 2013a personal communication). Despite the decline in the last several years, the western metapopulation shows an overall increase since the 1970s and early 1980s (Table 3-2). The large population increase can be primarily attributed to the increase in CATEs within the Columbia River estuary between 1984 and 2002 (USFWS 2005b).

During this time many breeding CATE shifted from traditional nesting in small non-coastal colonies and natural sites to large coastal colonies at anthropogenic sites (Suryan et al. 2004). In Washington, large coastal colonies in Grays Harbor and Willapa Bay were abandoned in 1989 while new colonies were established in the Columbia River estuary and collectively grew to over 9,000 pairs by 2000 (Suryan et al. 2004). These colonies moved to Rice Island and nested there until they were pushed off the island by the Corps and its partners to East Sand Island.

Table 3-4. Number of CATEs nesting at select islands in Washington and Oregon, 1996 to 2011

Years	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Interior Washington																
Goose Island (Banks Lake)					10	19		21	41	4	0	0	0	0	0	0
Twinning Island[a]					0	0				12	24	30	27	61	34	19
Badger Island																33
Anvil Island										0	0	0	0	0	135	20
Rock Island[b]										6	110	16	104	80	0	0
Crescent Island	205	614	357	552	571	720	578	510	530	476	448	355	388	349	375	419
Foundation Island																5
Miller Rocks	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Goose Island (Potholes)					0	0			87	325	273	282	293	487	416	422
Solstice Island (Potholes)					130	250			0	0	0	0	0	0	0	0
Harper Island		20	20	50	23	20				10	7	0	11	4	4	4
Coastal Oregon																
East Sand Island	0	0	0	547	8513	8896	9933	8352	9502	8822	9201	9900	10668	9854	8283	6969
Miller Sands Island (Spit)		0	17	0	0	0	0	0	0	0	0	0	0	0	0	0
Rice Island	8149	7151	8691	8328	588	0	0	0	0	0	0	0	0	0	0	3

Source: Adkins et al. 2011; USFWS, unpublished data.

3.1.3.4 Habitat Requirements

CATEs typically prefer open, sparsely vegetated areas but accommodate a variety of substrates. For example, nests are known on islands with sand-gravel or limestone substrate, on soft, spongy, marshy soil and on hard soil (Ludwig 1965, Degroot 1931, Miller 1943). CATEs have also been known to nest on non-natural substrate such as rooftops and barges (USFWS 2005a). Within the Columbia River, CATEs have nested on spoil-dredge islands and other islands with a bare sand substrate free of vegetative cover. A key aspects of CATE nest sites are that the substrate has an open vista and be vegetation-free, or nearly so.

Typically, a CATE nest is a depression large enough to hold two to three eggs, usually elevated more than 2 to 3 meters above the water and is occasionally lined with dried vegetation, small pebbles or bits of broken clam shells, and debris (Bent 1921, Penland 1976). Sometimes the nest is built up elaborately like a gull nest, others are piled masses of wood and stick debris while others appear primitive, with eggs merely lying on shells or in slight hollows that are already present or built by other birds (Bent 1921, Hayward 1935, Miller 1943; Quinn 1990).

Within the Columbia River, CATEs sometimes dig nest scrapes near the high water line. Because of this habit, nests occasionally fail during periods of high water events when they are prone to flooding (Roby et al. 2011a).

3.1.3.5 Diet

CATEs are piscivorous in nature (Harrison 1984), primarily or exclusively feeding on fish, but occasionally taking crayfish and insects (Cuthbert and Wires 1999). They require about 220 grams (roughly one-third of their body weight) of fish per day during the nesting season (Harrison 1984). A more in-depth analysis of the diet of CATEs shows that the total metabolized energy requirement for breeding adult CATEs is roughly 1040 kJ/day, and chick energy requirement from hatching to fledging averaging 450 kJ/day, translating to an approximate average of 215.32 grams of mixed fish diet a day for an adult, and an approximate average 93.2 grams of mixed fish diet a day for a growing chick (Roby et al. 2003). CATEs catch a diverse array of species with shallow plunge dives, usually managing to completely submerge themselves underwater, but rarely feeding any deeper (Cuthbert and Wires 1999). The sizes of fish caught and species composition of the diet are largely determined by geography and annual and seasonal prey availability, but most fish consumed are between 5 and 25 cm in length, and occur near the surface of the water (Collis et al. 2001, Roby et al. 2011b, Ryan et al. 2003,USFWS 2005a). The timing of courtship, nesting and chick rearing usually corresponds with prey availability.

Within the Columbia River, CATE diet studies have been carried out with the primary focus of systematically evaluating predation on salmonids by colonial nesting birds in the Columbia Basin in 1997 and 1998 (Collis et al. 2002a). Diet variation between colonies and seasonal changes in the proportion of salmonids that occur in CATE diet in the Columbia River probably reflects differences in availability of prey (Roby et al. 2011b). Bill load identifications (Collis et al. 2002a, Roby et al. 2002), bio-energetics modeling (Roby et al. 2003, Antolos et al. 2005, Maranto et al. 2010), and smolt PIT-tag recovery (Ryan et al. 2001a, Collis et al. 2001, Ryan et al. 2003, Evans et al. 2012) have all been used to assess CATE diet composition and smolt impacts in the Columbia River Basin. From 1999 to 2003, the tern diet on East Sand Island, close to the mouth of the Columbia River, was primarily marine forage fish (non-salmonids) including northern anchovy, herring, shiner perch, sand lance, smelt, and flatfish, while only 33 (17 to 47) percent was juvenile salmonids (Roby et al. 2002, Collis et al. 2002c, 2003a). Further from the ocean, but still within the Columbia River estuary, diet studies between 1999 and 2000 of the tern colony on Rice Island documented an average of 83 (77 to 90) percent juvenile salmonids in their diet (Roby et al. 2002). This variation reinforces the opportunistic nature of the prey selection of CATEs.

In the UCR, juvenile salmonids are a significant part of CATE diet during salmonid out-migration to the Pacific Ocean, with up to 71 percent of prey items at some colonies consisting of salmonid smolts (steelhead, Chinook, sockeye, rainbow trout [*O. mykiss*] and bull trout [*Salvelinus confluentus*]) (Lyons et al. 2011a, Roby et al. 2011b). The remainder of the diet consists partially of centrarchids (bass and sunfish, 15 percent) and cyprinids (carp and minnows, 9 percent) (Roby et al. 2011b). A more detailed discussion of salmonid consumption estimates and predation rates by CATE located at Goose and Crescent Islands is presented below in Section 3.1.3.8.

3.1.3.6 Migration

In general, the CATE is a partial, medium-distance migrant, though large numbers of CATEs do migrate to wintering ground in Mexico (Cuthbert and Wires 1999). During the winter the majority of the CATEs from the western metapopulation winter from California to Mexico. In the western metapopulation, band re-sighting data have shown that CATE range from 1,000 to almost 1,600 miles (n = 118 band recoveries from CATEs banded in San Diego and San Francisco, California, and Grays Harbor, Washington). However, they may travel much farther distances (Gill and Mewaldt 1983). CATEs from the inland Columbia River Basin likely follow the Columbia River to the Pacific Coast, then follow the coast south (Cuthbert and Wires 1999).

Migrant CATE generally arrive at breeding colony sites in the inland Columbia Basin in early April and depart colonies in early to mid-July (Figure 3-6). This trend is similar for both Goose Island and Crescent Island. Starting in early April number of adult birds on colonies increases dramatically and peaks around mid-May. Numbers begin to decline in late-May and this trend continues until the end of June. Few birds occur on the colonies in July though fall movements continue between mid-July and mid-September along the Pacific Coast (Shuford and Craig 2002). Fall departure of CATEs from breeding grounds is typically preceded by a gathering of adults and juveniles at staging areas by breeding areas (Cuthbert and Wires 1999).

Trends in seasonal adult colony attendance can vary in other locations from what occurs in the inland Columbia River Basin. For example, at East Sand Island, CATEs start arriving on colonies in early April and peak in mid-May, but abundance declines more gradually to the point where birds can still be observed on colonies in mid-August (Roby et al. 2013). At Tern Island at Crump Lake, birds arrive in late-April, peak in late-June and can still be found on the colonies as late as early-September. At smaller colonies such as on East Link Impoundment, Gold Dike Impoundment, and Dutchy Lake, abundance is fairly consistent throughout the breeding season with no distinct peaks (Roby et al. 2013). Abundance trends from Tule Lake in California were inconsistent between 2011 and 2012 during the time when they were monitored. In 2011, CATEs began arriving on colonies at Tule Lake in early-April and increases stopped in mid-May. From mid-May to early-September, abundance was fairly consistent throughout this time. In contrast, during 2012 on Tule Lake, birds did not begin arriving on colonies until late-April increase sharply until mid-June when abundance peaked. Abundance declined sharply afterward, and by mid-July no adult CATEs were observed on colonies (Roby et al. 2013).

3.1.3.7 Colony Sizes and Growth Rates at Sites in the Inland Columbia River Basin

Beginning in 2009 and continuing through 2012 (year of latest data), the CATE colony located on Goose Island was the largest CATE colony in the inland Columbia River Basin region with a population of 459 CATE breeding pairs in 2012 (Roby et al. 2013) (Table 3-5).

Until 2009 the CATE colony on Crescent Island was the largest of its kind within the inland Columbia River Basin. Overall, the CATE colony size at Crescent Island trended downward from 2001 to 2007 but has remained relatively stable since 2007 with a population of 422 breeding pairs in 2012 (Roby et al. 2011a) (Table 3-5).

Table 3-5. Numbers of CATE breeding pairs on Goose and Crescent Islands

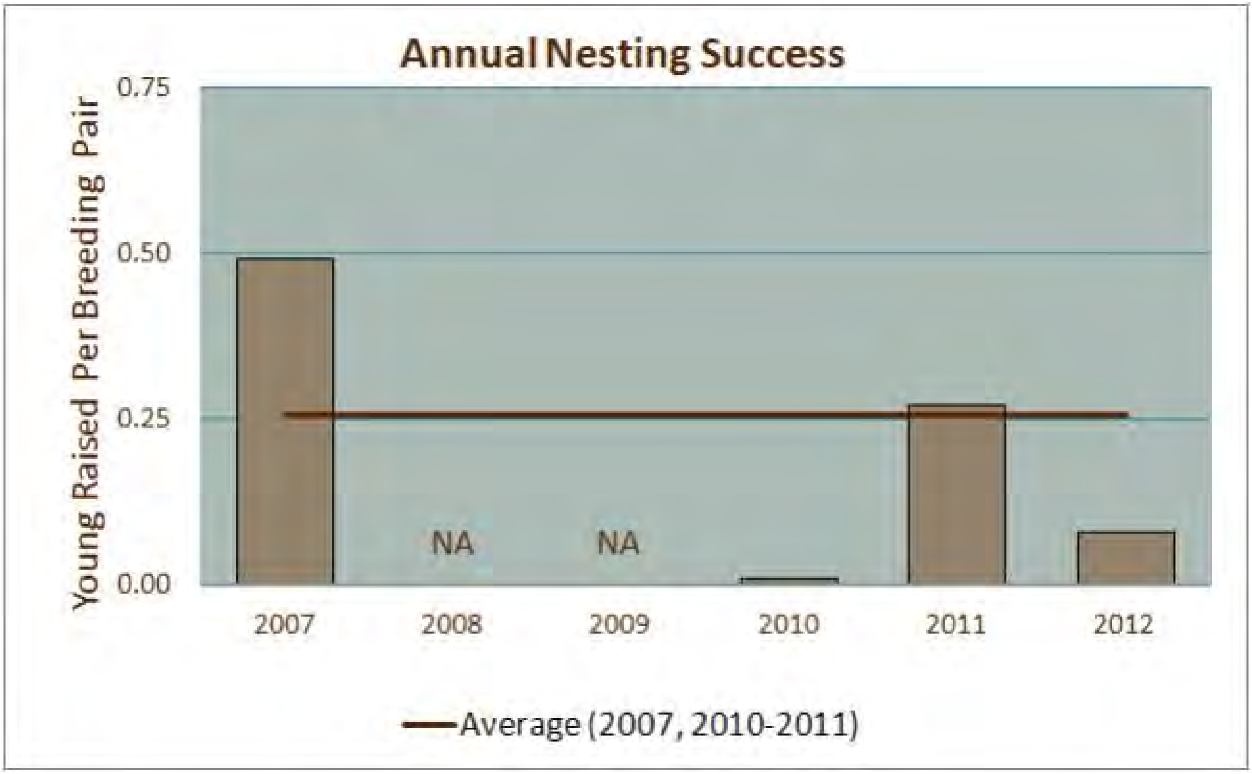
Island	2004	2005	2006	2007	2008	2009	2010	2011	2012
Crescent Island	530	476	448	355	388	349	375	419	422
Goose Island (Potholes)	87	325	273	282	293	487	416	422	459

Sources: Adkins et al. 2011, Roby et al. 2011a, Roby et al. 2013.

Within the Columbia River at-risk islands the first documentation of CATEs on the Blalock Islands was in 2005 when six breeding pairs attempted to nest on Rock Island. The breeding pairs grew from six in 2005 to 110 pairs in 2006 and 80 breeding pairs in 2009, however no CATE have nested on the Rock Island colony since 2009 (USFWS 2013a personal communication). In 2005, CATEs began nesting on Twinning Island within Banks Lake and continue to in all years through 2011 (USFWS 2013a personal communication). The colony at Twinning Island has grown from 12 breeding pairs in 2005 to 61 breeding pairs in 2008, but fell back to 19 pairs in 2011 (USFWS 2013a personal communication) (Table 3-5). CATEs have intermittently attempted to nest on Miller Rocks, and in 2001, 20 breeding pairs of CATEs nested on the island (USFWS 2013). The first documentation of CATEs nesting on Three-mile Canyon Island was in 1977 (184 breeding pairs), and the colony grew to 260 breeding pairs by 2000 (USFWS 2013a personal communication). In 2000, and again in 2001, no chicks were fledged from the island potentially due to mink (*Neovison vison*) predation. The site was abandoned by nesting CATEs in 2002, and they have not nested there since, presumably because of the disturbance associated with mink activities on the island (BRNW 2012).

Populations of CATEs in the inland Columbia River Basin have historically been dynamic in nature. CATEs were first recorded nesting in this region in 1929 at a single nest at Moses Lake (Kitchen 1930, as cited in Antolos et al. 2004). Three years later a colony of approximately 50 pairs nested on an unnamed island in the Columbia River in Benton County (Decker and Bowles 1932). Johnsgard (1954) regarded CATEs as rare summer residents at Potholes Reservoir with no successful nesting in 1953 or 1954. Populations increased during the 1980s but increases began to slow in the 1990s (Table 3-4). From 1996 to 2001, Antolos et al. (2004) did not find significant population trends within the area for six CATE colonies in the inland Columbia River Basin. The same number of colonies was reported by Roby et al. (2013) which included approximately 1000 breeding pairs and no population trends were apparent from 2008 to 2012, but the total number of birds is slightly higher compared to what was recorded from 2005 to 2008 (Table 3-5).

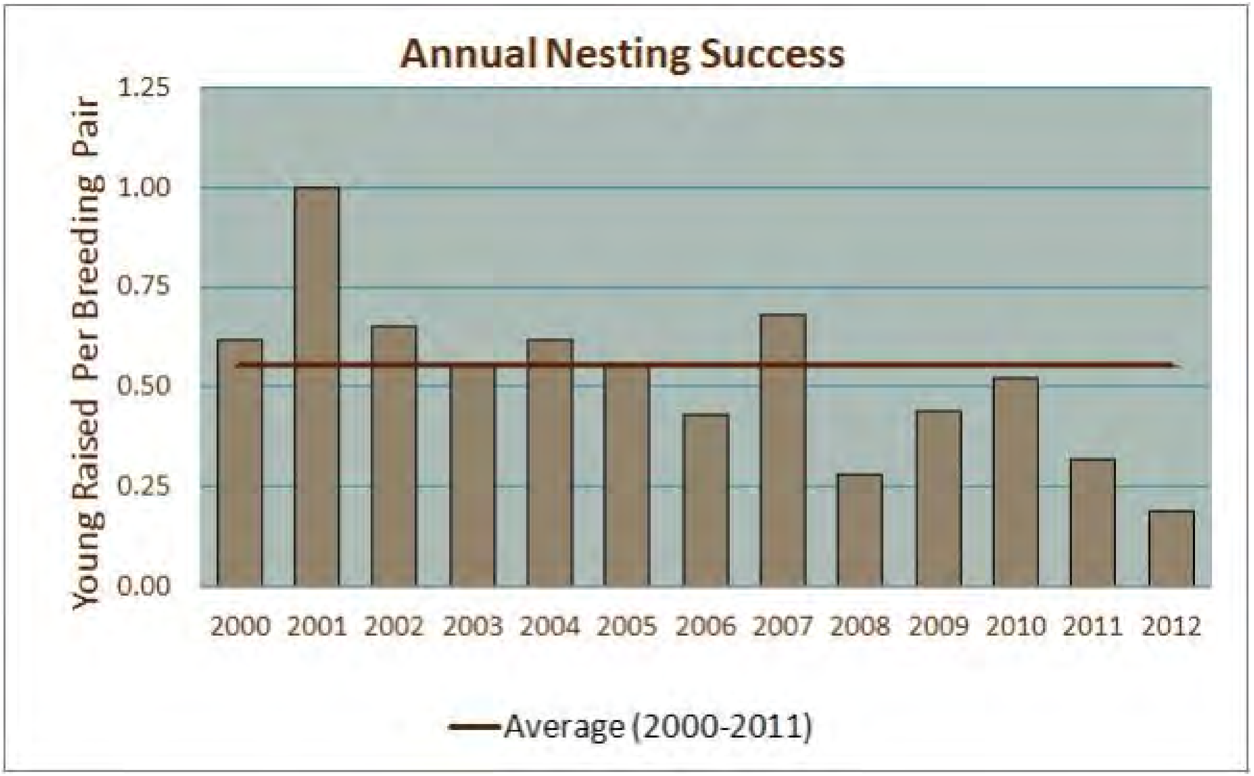
In general, fledging success rates on Goose and Crescent Islands vary greatly from year to year. On Goose Island, nesting success rates were not measured in 2008 and 2009, but in general were low (Figure 3-6). The number of young raised per breeding pair dropped from an average of 0.5 in 2007 to almost no young fledged in 2010. Nesting success rose to about 0.25 young per pair in 2011, but dropped to less than half of that in 2012 (BRNW 2013).



Source: BRNW 2013.

Figure 3-6. Annual nesting success of Goose Island CATEs, 2007, 2010 to 2012.

In general, Crescent Island had much better fledgling success rates than Goose Island (Figure 3-7). The number of young raised per breeding pair between 2000 and 2012 varied from a high of one chick per pair in 2001 to a low of approximately 0.2 chicks per pair in 2012 (BRNW 2013). Crescent Island CATEs averaged slightly more than-0.5 chicks per pair from 2000 to 2012 (BRNW 2013).

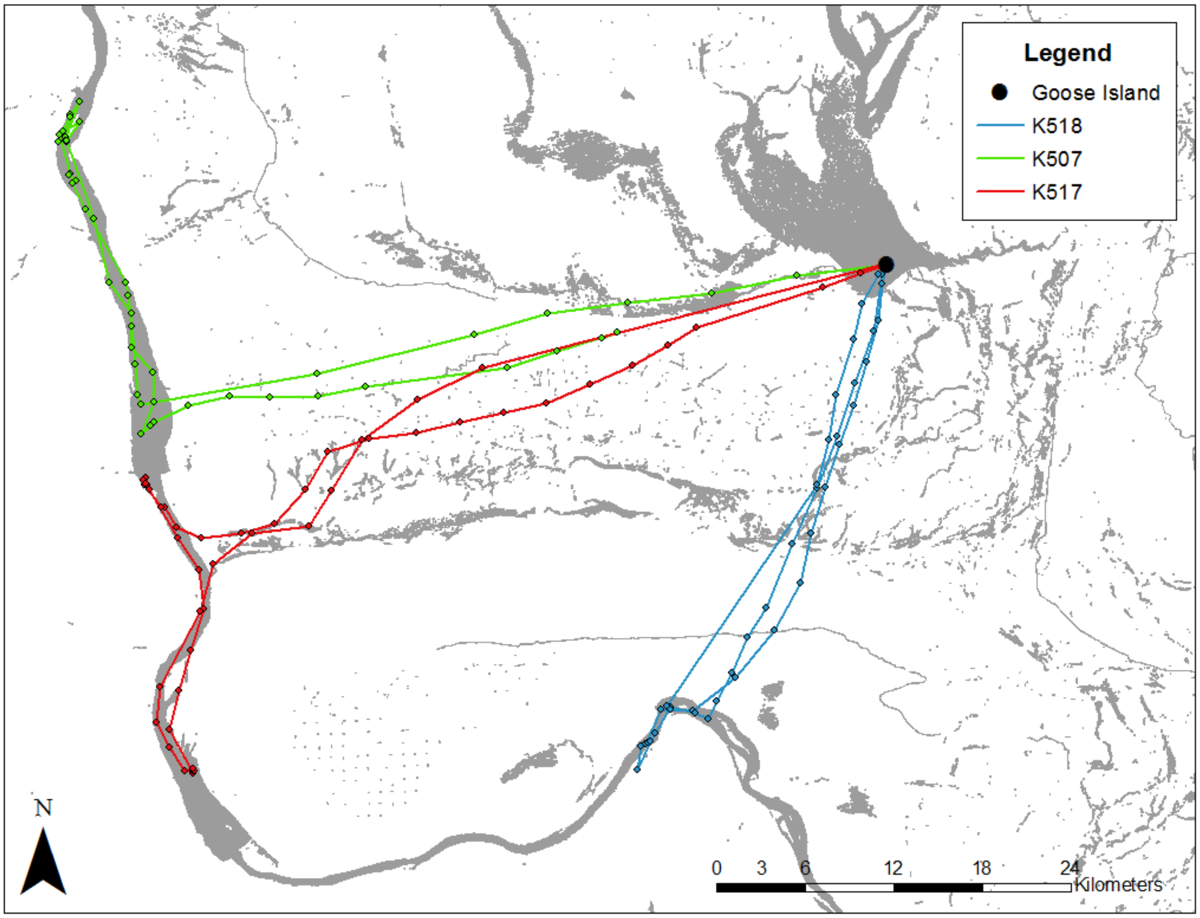


Source: BRNW 2013.

Figure 3-7. Annual nesting success of Crescent Island CATEs, 2000 to 2012.

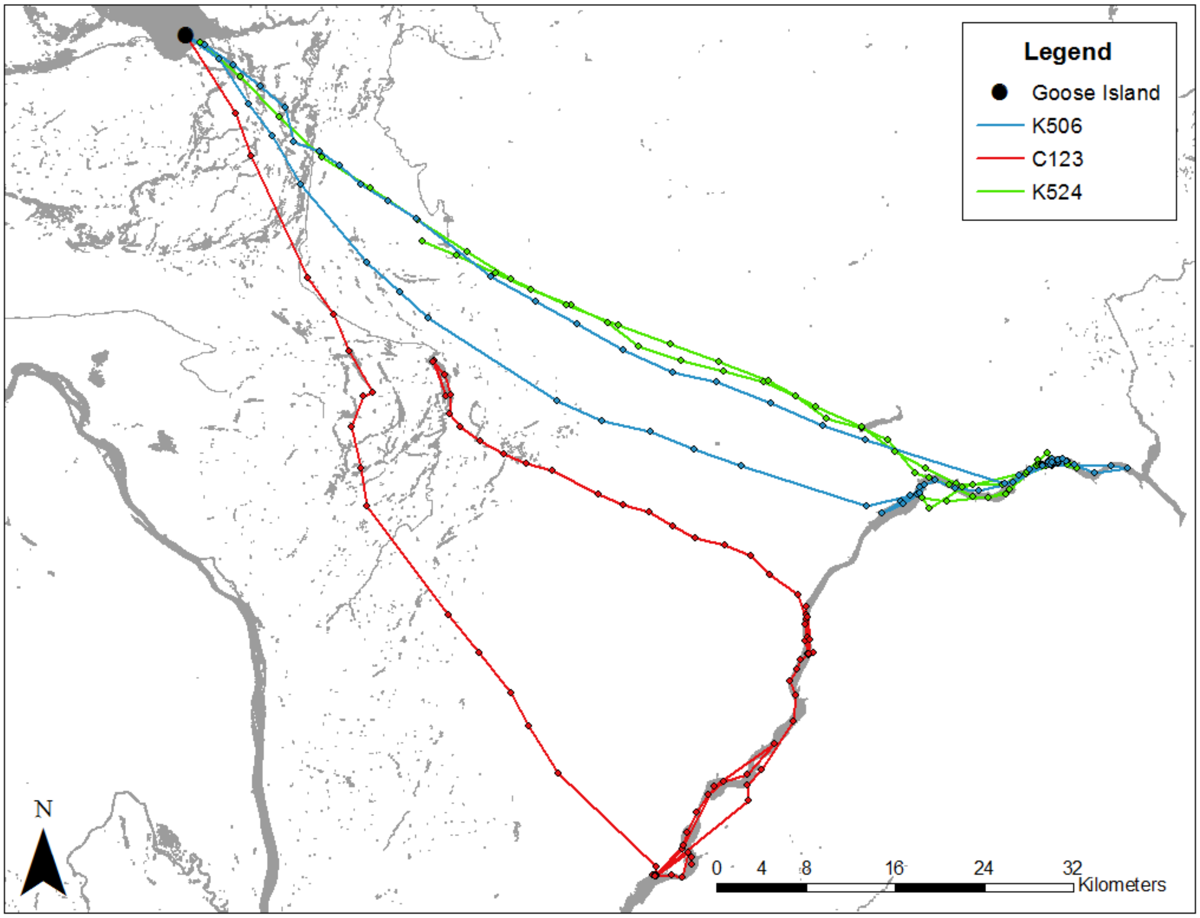
Limitations on colony size usually relate to habitat and food. Antolos et al. (2004) postulated that colonies at Crescent Island and Three-mile Canyon Islands were limited by mammalian disturbance and predation (mink), but that the Solstice Island Colony was limited by food availability. Limitations on nesting success and concomitant population growth are often affected by nest predators.

Suitable CATE nesting areas free from predators may not be located close to foraging areas. For example, GPS transmitters were placed on CATEs nesting on Goose Island in 2013 (BRNW 2013, unpublished data). Preliminary data show movement of CATEs as far as 93 km away from a nesting site. Figures 3-8 and 3-9 show examples of CATE foraging trips from Goose Island to sites on the Columbia and Snake Rivers (BRNW 2013, unpublished data).



Source: BRNW 2013, unpublished data.

Figure 3-8. Foraging trip of three GPS-tagged CATEs from Goose Island to the Columbia River.



Source: BRNW 2013, unpublished data.

Figure 3-9. Foraging trip of three GPS-tagged CATEs from Goose Island to the Snake River.

3.1.3.8 Colony Connectivity

The inland Columbia River Basin includes areas around the Columbia River above the Bonneville Dam and along the Snake River. The two largest colonies of CATEs present in the inland Columbia River Basin are Goose Island, and Crescent Island. CATEs breeding on Goose and Crescent Islands are part of the western metapopulation and have been observed from as far away as British Columbia and Mexico (Collis et al. 2012) (Table 3-6). Data indicate colony connectivity between Goose and Crescent Islands and roosts in southeast Alaska, Utah, and Idaho (Collis et al. 2012).

Table 3-6. Connectivity of monitored CATE colonies and other sites in the western metapopulation in 2005 to 2011 based on re-sightings of CATEs banded with alphanumeric leg bands on Goose and Crescent Islands. Re-sighting efforts varied between sites

Region/Colony or Roost	Crescent Island	Goose Island	Total
British Columbia			
Fraser River Delta (roost)	>10	>10	>20
Total			>20
Coastal Washington			
Bellingham Bay-Port of Bellingham	5	6	11
Strait of Juan de Fuca - Dungeness Spit	1	0	1
Padilla Bay - Unnamed Island	0	1	1
Total			13
Interior Washington			
Potholes Reservoir - Goose Island	25	--	25
Columbia River - Crescent Island	--	16	16
Total			41
Coastal Oregon			
Columbia River estuary - East Sand Island	19	12	31
Joaquin Miller State Park (roost near Florence)	0	1	1
Total			32
Interior Oregon			
Malheur Lake - Singhus Ranch	3	5	8
Summer Lake Wildlife Area - Dutchy Lake	0	1	1
Summer Lake Wildlife Area - East Link Impoundment	5	3	8
Warner Valley - Crump Lake	18	13	31
Total			48
Idaho			
American Falls Reservoir - Gull Island	0	1	1
Total			1
Coastal California (North)			
San Francisco Bay - Brooks Island	1	0	1
Total			1
Coastal California (South)			
Huntington Beach - Bolsa Chica Ecol. Reserve	0	1	1
Mouth of Sand Diego River (roost)	0	1	1
Oceano (roost)	1	0	
Total			3
Interior California (North)			
Lower Klamath NWR - Sheepy Lake	8	12	20
Lower Klamath NWR - Orems Unit	5	1	6

Region/Colony or Roost	Crescent Island	Goose Island	Total
Tule Lake NWR - Tule Lake	15	9	24
Total			50
Interior California (South)			
Salton Sea - Headquarters Unit “D”	3	3	6
Total			6
Mexico			
Shrimp Farm near Mazatlan (roost)	1	1	2
Total			2

Source: Collis et al. 2012 (site assessment report).

Salmonid Consumption Estimates

Salmonid consumption estimates in this section focus on Goose and Crescent Islands in accordance with the results of the Benefits Analysis, which indicates that CATE colonies at these two islands have the highest salmonid consumption measurements of any other CATE colony locations in the inland Columbia River Basin.

For the Goose Island CATE colony in 2010, it was estimated that between 110,000 to 134,000 juvenile salmonids were consumed. On average, approximately 21 percent of colony diet was composed of juvenile salmonids (bass and sunfish comprised approximately 63 percent). At least 73 percent of the salmonids consumed at the colony were determined to be anadromous fish (steelhead or salmon) from the Columbia River based on morphological characteristics, with the rest being resident fish (rainbow trout) from the Potholes Reservoir or nearby lakes and reservoirs (Roby et al. 2011a). At Crescent Island the percentage of juvenile salmonids as prey items was much higher, averaging around 68 percent. Interannual variation in the percentage of juvenile salmonids as prey items was fairly consistent between 2000 and 2010, ranging from 60-70 percent. In 2011 and 2012, the percentage of juvenile salmonids as prey items increased to around 85 percent which was the highest amounts observed during the 12-year timeframe of the study (Roby et al. 2013).

Based on bioenergetic modeling, salmonid estimated consumption rates by CATEs on Crescent Island were relatively stable between 2009 and 2010. CATEs nesting there consumed approximately 360,000 juvenile salmonids in 2009 and an additional estimated 420,000 juvenile salmonids in 2010 from the Columbia and Snake Rivers. The average percentage of juvenile salmonids in the Crescent Island CATE diet was approximately 68 percent from 2000 to 2012 (bass and sunfish comprised the majority of the dietary remainder), although the percentage was higher (approximately 85 percent) in 2011 and 2012. In comparison, this is substantially higher than the East Sand Island CATE colony in the Columbia River estuary, which was estimated to derive

35 percent of colony diet from juvenile salmonids in 2012 and approximately 30 percent of colony diet from juvenile salmonids in the 2000 to 2012 period (Roby et al. 2013).

ESU Specific Predation Rates

Predation rates in this section focus on Goose and Crescent Islands in accordance with the results of the Benefits Analysis, which indicates that CATE colonies at both Goose Island and Crescent Island have an overall higher impact on salmonids than other islands located within the inland Columbia River Basin.

Steelhead

In-river migrating Columbia and Snake River steelhead are particularly vulnerable to CATE predation, especially during low flow years and periods outside the peak migration period (Roby et al. 2006). Based on PIT tag recovery data collected between 2004 and 2010, CATEs at Goose Island had an average predation rate of approximately 14.6 percent and 11.4 percent on the in-river migrating hatchery and wild UCR steelhead, respectively, based on steelhead smolts last detected at Rock Island Dam.

In comparison, CATEs at Crescent Island during the same time period had a predation rate of approximately 2.7 percent and 2.3 percent on the in-river migration populations of hatchery and wild UCR steelhead, respectively. Similarly, the predation rate on non-transported SR steelhead by CATEs at Crescent Island was approximately 5.1 percent of the in-river migrating population during this time period based on smolts interrogated at Lower Monumental Dam (Lyons et al. 2011a).

Salmon

Between 2004 and 2010, Goose Island CATEs had a predation rate of approximately 3 percent on the UCR Sp Chinook based on smolts tagged at and above Rock Island Dam. At Crescent Island, CATEs had a predation rate of approximately 1.2 percent on the non-transported SR Fall Chinook, less than 1.0 percent on non-transported SRS/S Chinook runs, and approximately 1.3 percent on non-transported SR sockeye based on smolts interrogated at Lower Monumental Dam (Lyons et al. 2011a).

3.1.4 Other Piscivorous Colonial Waterbirds

3.1.4.1 Double-Crested Cormorants

DCCO is a widespread common cormorant across both coasts and the interior of the U.S. Breeding occurs in the north central U.S. and south central Canada and along both the Atlantic and Pacific coasts. Its nonbreeding range is along both coasts of the U.S. and Mexico, and in the southeastern U.S. (Figure 3-10).

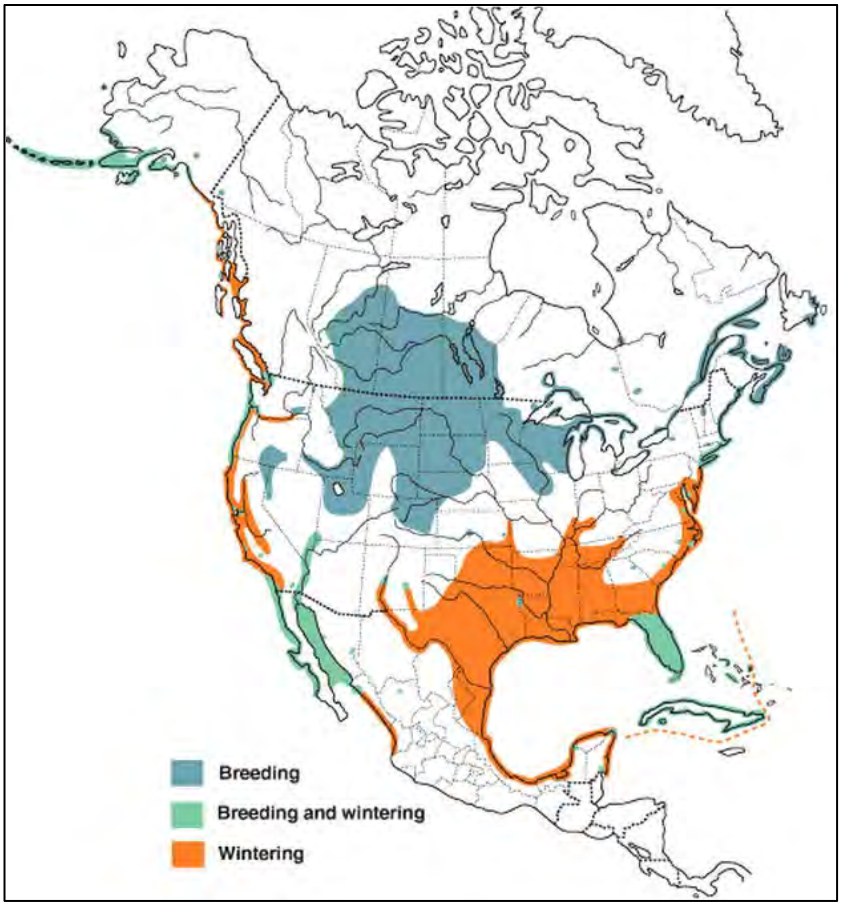


Figure 3-10. DCCO range map.

The DCCO colony on Foundation Island is the largest colony of its kind on the mid-Columbia River. The colony is located below the confluence of the Snake and Columbia Rivers near Crescent Island in the McNary Reservoir. In 2010, the colony consisted of a minimum of 308 breeding pairs. During 2003 to 2006, the number of breeding pairs at Foundation Island grew from approximately 250 breeding pairs to around 360 breeding pairs. This number declined to about 310 breeding pairs in 2009 to 2010 (Roby et al. 2011a).

The largest breeding colony of DCCOs within the inland Columbia River Basin in 2010 was located at the north end of the Potholes Reservoir in the North Potholes Reserve. The colony has gradually diminished in size from approximately 1,150 breeding pairs in 2006 to just over 800 breeding pairs in 2009 to 2010. DCCOs here nest in trees that remain flooded for much of the nesting season. Based on scarcity of salmonid PIT tags near the colony, there is little evidence that these birds forage on juvenile salmonids in the Columbia River (Roby et al. 2011b).

Additional colonies of DCCOs are present at the Okanogan Colony on the Upper Columbia River and on Harper Island in Sprague Lake. In 2010, it was estimated that there was a minimum of 26 breeding pairs of DCCOs at the Okanogan Colony, smaller than the 2009 estimate of 36 breeding pairs. At Harper Island, 86 breeding pairs of DCCOs were estimated in 2010, more than doubling the 2009 estimate of 42 breeding pairs (Roby et al. 2011a).

Overall, these four active DCCO colonies within the inland Columbia River Basin totaled approximately 1,250 nesting breeding pairs. This estimate seems to indicate that the number of total breeding pairs of DCCOs in the Columbia River Basin has remained relatively stable since 2005, when an estimate of 1,150 breeding pairs was counted (Roby et al. 2011b).

In recent years, an increase in the abundance of overwintering DCCOs on the lower Snake River has been reported. In 2007, a pilot study was initiated to determine whether overwintering DCCOs prey primarily on holdover Snake River fall (SR) Chinook salmon, which are known to substantially contribute to adult returns. Data collected between 2007 and 2010 suggest that some predation by DCCOs on overwintering SR fall Chinook salmon is occurring in the Snake River, but the numbers of overwintering DCCOs are small (fewer than 400 individuals) as is the proportion of fall Chinook in the diet of overwintering DCCOs (Cramer et al. 2011). Locations of DCCO colonies within the inland Columbia River Basin are shown in Figure 1-2.

Salmonid Consumption Estimates

Salmonid consumption estimates in this section focus on Foundation Island in accordance with the results of the Benefits Analysis, which indicates that the DCCO colony at this island has the highest salmonid consumption measurement of any other DCCO colony location in the inland Columbia River Basin.

Based on pooled data collected between 2005 and 2009, it is estimated that DCCOs at Foundation Island consumed from 470,000 to 880,000 smolts annually (Lyons et al. 2011a). Between 2005 and 2010, juvenile salmonids comprised 21.9 percent of the diet of the Foundation Island DCCO colony (Roby et al. 2011b). Evidence suggests smolts from the Upper Columbia ESU are not a targeted prey of Foundation Island DCCOs.

PIT tags from bull trout were found on the Foundation Island DCCO colony grounds following the 2011 nesting season, the fourth consecutive year bull trout PIT tags have been found on the Foundation Island DCCO colony grounds. From 2008 to 2011, a total of 32 PIT tags from bull trout (most originating from the Walla Walla River Basin) have been recovered on the Foundation Island DCCO colony grounds (Roby et al. 2011b).

ESU Specific Predation Rates

Predation rate estimates in this section focus on Foundation Island in accordance with the results of the Benefits Analysis, which indicates that the DCCO colony at this island has the highest predation rates of any other DCCO colony location in the inland Columbia River Basin.

Steelhead

Based on PIT tag recovery data collected between 2004 and 2010, the average annual predation rate on non-transported hatchery and wild SR steelhead by DCCOs nesting on Foundation Island was estimated at 2.9 percent and 2.5 percent, respectively, of the available in-river migrating population. In contrast, during the same time period, DCCOs nesting on Foundation Island had an estimated average annual predation rate of approximately 0.1 percent (wild and hatchery combined) of the available in-river migrating population of wild UCR steelhead (Lyons et al. 2011a).

Salmon

With regard to salmon species, DCCOs at Foundation Island had predation rates of approximately 1.2 percent on SRS/S Chinook, approximately 2.3 percent of SR sockeye, less than 1 percent of SRF Chinook, and less than 0.1 percent of the of UCRSp Chinook based on smolts interrogated at the Lower Monumental Dam on the Snake River and the upper Hanford Reach on the Columbia River, respectively (Lyons et al. 2011a).

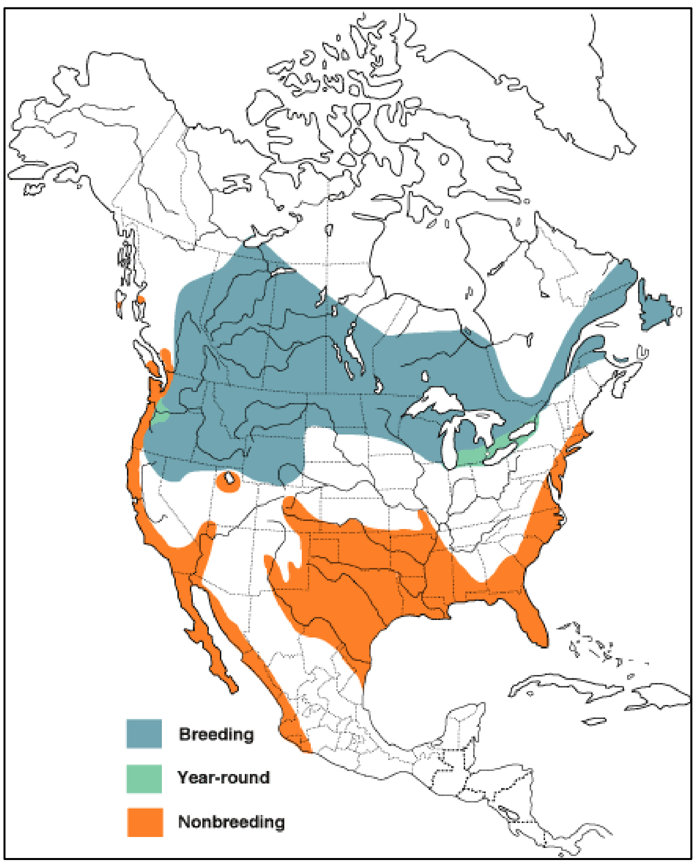
3.1.4.2 California and Ring-Billed Gulls

CAGU (*L. californicus*) and RBGU (*L. delawarensis*) gulls are known to nest throughout the inland Columbia River Basin at multiple sites. Confirmed nesting sites on the Columbia River between Bonneville Dam and Rock Island Dam have typically included Miller Rocks, Three-mile Canyon Island, Anvil Island (one of the Blalock islands), Crescent Island, and Island 20. As of 2009 when the last comprehensive survey of nesting gull colonies was conducted on the inland Columbia Basin (i.e., Middle and Upper Columbia River) it was estimated that approximately 41,700 adult CAGU and RBGU were present in colonies on the Columbia River between Bonneville and Rock Island Dams (Roby et al. 2011b). This represents a 22 percent decrease in overall gull numbers since the previous comprehensive survey was completed in 1998, with an estimate of 53,200 gulls present in the same area. In 2010, gulls were also confirmed to be nesting on Goose Island in the Potholes Reservoir, on Harper Island in Sprague Lake, and on Twinning Island in Banks Lake. Although 2010 estimates of these gull colonies' sizes are not available, 2009 data estimated these off-river colonies to total approximately 21,500. Locations of gull colonies within the inland Columbia River Basin are shown in Figure 1-2.

Although the overall numbers of gulls in this area appear to have decreased, three colonies have increased in size between 1998 to 2009 including Miller Rocks (approximately 2,200 gulls and 6,000 gulls, in 1998 and 2009, respectively), Blalock Islands (approximately 0 and 1,600 gulls, in 1998 and 2009, respectively) and Crescent Island (approximately 4,600 and 8,600, in 1998 and 2009, respectively). The gull colonies' populations in the Middle Columbia River were almost evenly divided in number between CAGU and RBGU. No gull colonies or breeding has been observed on the lower Snake River since 1997 when regular monitoring of piscivorous waterbirds on the inland Columbia River Basin began (Roby et al. 2011b, Roby et al. 2013).

Ring-Billed Gull

RBGU is a widespread common gull. It breeds across the northern United States and Canada and winters on the Pacific coast from British Columbia south to central, Mexico and in the southeastern United States (Figure 3-11).



Source: Pollet et al. 2012.

Figure 3-11. RBGU range map.

This species is currently increasing in population and listed as of “Least Concern” by the IUCN Red List as the species does not meet the criteria for “Vulnerable” under the population trend or population size criteria (BirdLife International 2012b). The current world population is estimated at 2.55 million birds (Pollet et al. 2012). RBGUs are increasing in many areas, though this trend is not consistent throughout their range. The North American Breeding Bird Survey between 1999 and 2009 showed a 3.3 percent annual increase across the range, but there were decreases in population during certain periods in that time frame in the Great Lakes region (Pollet et al. 2012). Despite these increases, populations of western RBGUs may have leveled out starting in the early 2000s because of changes in dumping practices which affects food accessibility (USFWS 2005b).

Approximately 10,500 RBGUs were found nesting across the Potholes Reservoir during 2009 and none on Crescent Island (Roby et al. 2010). This number is approximately 19 percent of the total number (56,462) of RBGUs across five western states (Washington, Oregon, California, Idaho, and Nevada) in 2009 but does not include population numbers from other states or Canada (USFWS 2013b personal communication) (Table 3-7).

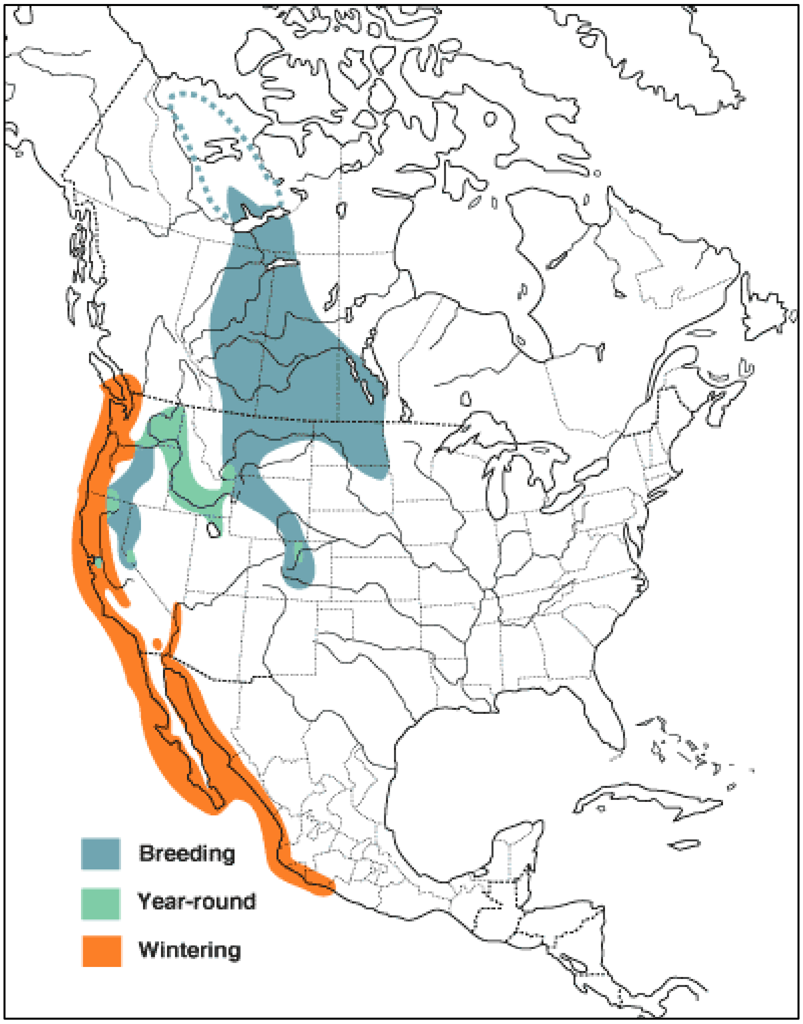
Table 3-7. RBGU population survey results in select western states, 2002 to 2009

RBGU	2002	2003	2004	2005	2006	2007	2008	2009
WA	2500	N/A	N/A	5000	N/A	N/A	N/A	28062
OR	2600	11346	3664	694	1889	530	N/A	2905
CA	N/A	1476	1528	N/A	N/A	N/A	N/A	13800
ID	N/A	N/A	N/A	N/A	5336	12442	N/A	11378
NV	N/A	N/A	N/A	N/A	N/A	N/A	N/A	317
Total	**5100**	**12822**	**5192**	**5694**	**7225**	**12972**	**0**	**56462**

Source: USFWS 2013b personal communication.

California Gull

CAGU occurs in western North America from Canada south into southwest Mexico (Figure 3-12). The westernmost breeding and year-round ranges stretch along the east side of the Cascade Mountains and Snake and mid-Columbia Rivers, respectively. The wintering range is along the Pacific coast from central Mexico to southwest Canada.



Source: Winkler 1996.

Figure 3-12. CAGU range map.

The population trend of the CAGU appears to be decreasing but the declines are not rapid enough to warrant listing as vulnerable in the IUCN Red List (BirdLife International 2012c) (Table 3-8). In addition, the population size is very large and therefore the CAGU is classified as Least Concern (BirdLife International 2012c). Population sizes of CAGUs are estimated to be between 500,000 and 1 million individuals (Winkler 1996). Despite the current decreasing trend, current populations are likely larger than they were at the beginning of the twentieth century due to increasing farm area, more island nesting sites, decreased harvesting, and increase food availability from landfills (Conover 1983; Winkler 1996).

Approximately 11,000 CAGUs were found nesting across the Potholes Reservoir and Crescent Island during 2009 (Roby et al. 2012). This number is approximately 8 percent of the total number (136,928) of CAGUs across five western states (Washington, Oregon, California, Idaho, and Nevada) in 2009 but does not include population numbers from Canada or other western states (USFWS 2013b personal communication).

Table 3-8. CAGU population survey results in select western states, 2002 to 2009

CAGU	2002	2003	2004	2005	2006	2007	2008	2009
WA	13500	N/A	N/A	5000	5000	5000	21000	31811
OR	9000	N/A	N/A	N/A	N/A	N/A	N/A	6548
CA	45716	42194	53310	43882	42480	43398	N/A	64382
ID	N/A	N/A	N/A	N/A	29906	N/A	N/A	26080
NV	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8107
Total	**68216**	**42194**	**53310**	**48882**	**77386**	**48398**	**21000**	**136928**

Source: USFWS 2013b personal communication.

Salmonid Consumption Estimates

Research has indicated that, in general, the diet of gulls typically consists of limited numbers of salmonids, except for specific colonies within the Columbia River Basin (Roby et al. 2011b) and at specific foraging areas such as at certain hydroelectric dams (Zorich et al. 2011). From data collected in the late 1990s, the diet of CAGUs at Miller Rocks was composed of juvenile salmonids as 3 percent of total biomass from stomach contents (Roby et al. 2011b). Estimates of per-capita consumption of smolt PIT tags were twice as high for gulls nesting on Miller Rocks compared to gulls nesting on Crescent Island (Evans et al. 2011b). For gulls nesting at locations away from the Columbia River, estimated salmonid consumptions rates are very low. For example, gulls nesting at Goose Island (Potholes Reservoir) appear to consume very limited numbers of salmonids and of those consumed, some are kleptoparasitized from other species such as CATEs.

In 2012, kleptoparasitism rates by gulls on CATEs averaged 19 percent at Goose Island. A total of 164 kleptoparasitized PIT-tagged smolts (Chinook, coho, sockeye, and steelhead, combined) were recovered on the gull colony at Goose Island, a colony that consists of both ring-billed and CAGU. Control tags sown on the colony prior to and after the nesting season (n = 100) indicated that detection efficiency ranged from 16 percent to 64 percent for tags deposited between 1 April and 31 July (Roby et al. 2013).

Predation rates by gulls nesting at Goose Island were < 0.1 percent for all salmonid ESUs, except Upper Columbia River steelhead. Estimated predation rate by gulls nesting at Goose Island on Upper Columbia River steelhead were 2.8 percent (95 percent c.i. = 1.1 – 5.6 percent). The much higher predation rates on steelhead smolts, compared to smolts of other salmonid ESUs, by gulls nesting at Goose Island were similar to results from the Crescent Island gull colony. At both of these gull colonies, higher predation rates on steelhead ESUs compared to salmon ESUs could be related to gulls disproportionately kleptoparasitizing steelhead smolts compared to salmon smolts (Roby et al. 2013).

Salmonid ESU-Specific Predation Rates

In general, reducing predation by gulls and other piscivorous waterbirds would have a much lower benefit rate to ESU-listed salmonids (Lyons et al. 2011a). Predation rates in this section focus on Miller Rocks in accordance with the results of the Benefits Analysis, which indicates that the gull colony at this island has the highest predation rates of any gull colony location in the inland Columbia River Basin.

Predation rate estimates indicate that approximately 4 percent of available Snake River steelhead and approximately 6 percent of available Upper Columbia River steelhead were consumed by gulls nesting on Miller Rocks in 2012. Predation rates on most populations of salmon by gulls nesting at the Miller Rocks colonies were, however, generally less than 1.0 percent, with the exception of the predation rate on Snake River sockeye salmon by gulls nesting on Miller Rocks (approximately 5 percent).

Steelhead

Based on PIT tag recovery data collected between 2004 and 2010, the predation rate on non-transported wild SR steelhead by gulls at Miller Rocks was approximately 2.0 percent of the in-river migrating population based on smolts interrogated at McNary Dam. Similarly, these gulls during the same time period had a predation rate of approximately 1.6 percent on the in-river migration population of wild UCR steelhead (Lyons et al. 2011a).

Salmon

Gulls at Miller Rocks had predation rates of less than 1.0 percent on all runs of SR Chinook, less than 1.0 percent of the UCRSp Chinook, and approximately 1.4 percent of SR sockeye based on smolts tagged at McNary Dam (Lyons et al. 2011a).

3.1.4.3 American White Pelicans

A breeding colony of American White Pelicans is present at Badger Island. This colony relocated to Badger Island from Crescent Island in 1997 and is the only known nesting colony of American White Pelicans in the State of Washington. It is estimated that an average of 2,083 adult pelicans were present at Badger Island in 2012, down from 2,177 counted in 2011 (Roby et al. 2013). Little information exists on smolt consumption at dams in the Columbia River Basin by American White Pelicans. Based on PIT tag recovery at Badger Island, smolt predation rates by pelicans between 2004 and 2009 were found to be much lower than those of other piscivorous waterbirds (e.g., CATEs), at less than 0.1 percent of PIT-tagged salmonid smolts passing through Lake Wallulla (McNary Pool) (Roby et al. 2011). The location of the Badger Island pelican colony is shown in Figure 1-2.

Three PIT tags from bull trout tagged in the Walla Walla River Basin were detected on the Badger Island pelican colony grounds in 2010, providing for a total of six bull trout PIT tags recovered on the colony through 2010 since scanning began in 2005 (Roby et al. 2011b).

3.1.4.4 Other Bird Species Present

For this section, the affected environment was broken down into two general areas: (1) Potholes Reservoir/Banks Lake and (2) Columbia River.

Potholes Reservoir/Banks Lake

Around the Potholes Reservoir area and Banks Lake upland, game birds include ring-neck pheasant (*Phasianus colchicus*), California quail, mourning dove (*Zenaida macroura*) and gray partridge (*Perdix perdix*). Waterfowl in the reservoir area include Canada goose and various duck species. Colonial waterbird species include black-crowned night heron, Forster's tern (*Sterna forsteri*), American white pelican, great blue heron, great egret (*Ardea alba*) and DCCO. Other non-colonial species include peregrine falcon, sandhill crane (*Grus canadensis*), bald eagle (*Haliaeetus leucocephalus*), ferruginous hawk, common loon (*Gavia immer*), western burrowing owl (*Athene cunicularia hypugaea*), prairie falcon (*Falco mexicanus*), grasshopper sparrow, western grebe, Clark's grebe (*Aechmophorus clarkii*), sora (*Porzana carolina*), Virginia rail (*Rallus limicola*), American coot (*Fulica americana*), killdeer (*Charadrius vociferus*), long-billed curlew (*Numenius americanus*), Wilson's snipe (*Gallinago delicata*), and spotted sandpiper (*Actitis macularius*) (Reclamation 2002).

Columbia and Snake Rivers

Other bird species that may be present in the project area include great blue heron, western grebe, black-crowned night heron (*Nycticorax nycticorax*), Canada goose (*Branta canadensis*), wood duck (*Aix sponsa*), mallard (*Anas platyrhynchos*), northern pintail (*A. acuta*), blue-winged teal (*A. discors*), common merganser (*Mergus merganser*), turkey vulture (*Cathartes aura*), bald eagle, red-tailed hawk (*Buteo jamaicensis*), ferruginous hawk (*B. regalis*), golden eagle (*Aquila chrysaetos*), American kestrel (*Falco sparverius*), peregrine falcon (*F. peregrinus*), California quail (*Callipepla californica*), great horned owl (*Bubo virginianus*), common nighthawk (*Chordeiles minor*), cliff swallow (*Petrochelidon pyrrhonota*), common raven (*Corvus corax*), red-winged blackbird (*Agelaius phoeniceus*), American goldfinch (*Carduelis tristis*) (Csuti et al. 1997), greater sage-grouse (*Centrocercus urophasianus*), sage thrasher

(*Oreoscoptes montanus*), Brewer's sparrow (*Spizella breweri*), savannah sparrow (*Passerculus sandwichensis*), horned larks (*Eremophila alpestris*), grasshopper sparrow (*Ammodramus savannarum*), vesper sparrow (*Pooecetes gramineus*), and western meadowlark (*Sturnella neglecta*) (WDFW 2006b).

3.1.5 Mammals

Based on general similarities in habitat, prey source and mammals generally present, this section was broken down into two general areas: (1) Potholes Reservoir/Banks Lake and (2) Columbia River.

3.1.5.1 Potholes Reservoir/Banks Lake

Mink have been documented at Goose Island and are known to prey primarily on gulls with some limited depredation of CATEs as well (Hostetter 2012 personal communication). Several other mammal species are located around the Potholes Reservoir area. Species include mule/black-tailed deer, North American beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), coyote (*Canis latrans*), long-tailed weasel (*Mustela frenata*), badger (*Taxidea taxus*), striped skunk (*Mephitis mephitis*), black-tailed jackrabbit (*Lepus californicus*), and Nuttall's cottontail rabbit (*Silvilagus nuttallii*).

Mammals within the vicinity of Banks Lake are anticipated to be similar to those of Potholes Reservoir.

At the potential habitat enhancement sites, mammal species may include potential CATE predators such as coyote, gray fox (*Urocyon cinereoargenteus*), western spotted skunk (*Spilogale gracilis*), striped skunk, opossum (*Didelphis virginiana*), badger, raccoon, nonnative rats (e.g., black rat, *Rattus rattus*), and domestic dogs and cats. Non-CATE-predators may include beaver and muskrat, and at coastal sites, harbor seals (*Phoca vitulina*).

3.1.5.2 Columbia River

North American beaver were documented to be feeding on vegetation at Crescent Island in August of 2012 (Parametrix staff field observation, August 15, 2012). Other mammals that may be present in the project area include mink, California myotis (bat) (*Myotis californicus*), Yuma myotis (bat) (*M. yumanensis*), little brown myotis (bat) (*M. lucifugus*), big brown bat (*Eptesicus fuscus*), white-tailed jackrabbit (*Lepus townsendii*), Townsend's ground squirrel (*Spermophilus townsendii*), deer mouse (*Peromyscus maniculatus*), bushy-tailed woodrat (*Neotoma cinerea*), common porcupine (*Erethizon dorsatum*), coyote, common raccoon, long-tailed weasel, badger, western spotted skunk, striped skunk, northern river otter (*Lutra canadensis*), bobcat (*Lynx rufus*), and mule/black-tailed deer (Csuti et al. 1997).

3.1.6 Federally Endangered and Threatened Plants and Wildlife

For this section, information on federally endangered and threatened plants and wildlife was obtained for the following counties: Benton, Klickitat, Grant, Franklin, Walla Walla, and Morrow (Oregon).

Two federally listed threatened plant species may occur within the project area (including the at-risk islands): the Ute ladies'-tresses (*Spiranthes diluvialis*) and Spalding's catchfly (*Silene spaldingii*). Two candidate species occur within the project area, Wormskiold's northern wormwood (*Artemisia borealis* var. *wormskioldii*) and whitebark pine (*Pinus albicaulis*) (WDNR 2012). According to WDFW, these species are not present at, or within 1 mile of, Goose Island (WDFW 2012b). Several state-listed species occur within the project area. However, records do not indicate that any of these plant species are present at or adjacent to Goose or Crescent islands (WDFW 2012b). In field visits to both Goose and Crescent Islands in August 2012 as part of developing this EA, none of these plant species was observed at either location.

With regard to federally listed threatened and endangered wildlife, three candidate species are listed as potentially occurring within the project area including the greater sage-grouse *(Centrocercus urophasianus)*, the yellow-billed cuckoo (*Coccyzus americanus*), and the Washington ground squirrel *(Spermophilus washingtoni)*. Two endangered species, the pygmy rabbit (*Brachylagus idahoensis*) and the gray wolf (*Canis lupus)*, are listed as potentially occurring within the project area. In addition, three federally listed threatened species may occur within the project area, and bull trout.

Regular concentrations of Washington ground squirrel occur landward of Potholes Reservoirs and within Morrow County; there have been no observations of this species on Goose Island. No records or observations indicate that any of these other species occur at or adjacent to Goose or Crescent islands (WDFW 2012b).

Listed wildlife species are not anticipated to be present on the at-risk islands. Suitable habitat does not occur on the islands, and/or given the current range of the species and lack of documented detections, it is extremely unlikely that the species would be present.

The streaked horned lark (*Eremophila alpestris strigata*) is a subspecies of horned lark proposed for listing as threatened under the ESA. These larks may be found in areas where habitat enhancement may be conducted as part of this project. This lark occurs mainly on open, sandy islands in the Lower Columbia River, the southern Washington coast, south of Tacoma, and south of Portland (Pearson and Altman 2005). Actions separate from but similar to those in this EA are currently being undertaken by other agencies in areas where these larks could occur (e.g., Lower Columbia River and estuary).

3.1.7 Vegetation

3.1.7.1 Goose Island

Goose Island is approximately 4.9 acres and is largely open ground with sparse shrub cover. Goose Island is comprised of a larger western island and a smaller eastern island. Shrub cover on both island consists primarily of sagebrush (*Artemisia* spp.), although some Russian thistle (*Salsola tragus*) is present and some broadheaded buckwheat (*Eriogonum sphaerocephalum*) was noted on the east island. During a field visit in August 2012, in the area between the west and east islands that is underwater for the majority of the year, willow (*Salix* spp.) was present as well. A detailed list of vegetation present at Goose Island is listed in Table 3-9.

3.1.7.2 Crescent Island

Crescent Island is approximately 7.5 acres in area with a mix of dense upland shrub habitat, some trees, and bare ground. The island is covered by a variety of species, including many nonnative and noxious ones. Predominant groundcover species include lamb's quarters (*Chenopodium album*), Russian thistle, and perennial pepperweed (*Lepidium latifolium*). Dominant tree species located on the island include Russian olive, Chinese elm (*Ulmus parvifolia*), willow (*Salix* spp.), and locust (*Robinia* spp.). Russian olive is largely located in the interior portion of the island while locust, willow, and Chinese elm are both in the interior and adjacent to water. Several dead trees and "girdled" trees were noted in a field visit to the site in August 2012 (Parametrix field visit observations). These dead and damaged trees appear to be due largely to beaver. A detailed list of vegetation present at Crescent Island is listed in Table 3-9.

Table 3-9. Vegetation Presence at Project Sites

Common Name	Scientific Name	Potholes Reservoir (Goose Island) Goose West	Potholes Reservoir (Goose Island) Goose East	Crescent Island
Russian olive	*Elaeagnus angustifolia*			X
Chinese Elm	*Ulmus parvifolia*			X
Cottonwood	*Populus trichocarpa*			X
Locust	*Robinia pseudoacacia*			X
Willow	*Salix* spp.	X		X
Alder	*Alnus* spp.			X
Lamb's quarters	*Chenopodium album*	X		X

Common Name	Scientific Name	Potholes Reservoir (Goose Island) Goose West	Goose East	Crescent Island
Diffuse knapweed	*Centaurea diffusa*			X
Goldenrod	*Solidago* spp.			X
Hogwort	*Croton capitatus*			X
Kochia	*Kochia scoparia*			X
Sagebrush	*Artemisia* spp.	X	X	X
Perennial pepperweed	*Lepidium latifolium*	X		X
Common cocklebur	*Xanthium strumarium*	X		
Bull thistle	*Cirsium vulgare*			X
Puncture vine	*Tribulus terrestris*	X	X	
Russian thistle	*Salsola tragus*	X	X	X
Broadheaded buckwheat	*Eriogonum sphaerocephalum*		X	
Salt heliotrope	*Heliotropium curassavicum*	X		X
Purple loosestrife	*Lythrum salicaria*	X		X

3.1.7.3 At-Risk Islands

Because of the geographic range and close proximity of the at-risk islands with the dissuasion islands, it is anticipated that the vegetation regime for the at-risk islands would be similar to either Goose or Crescent Island, whichever is nearest.

3.2 Physical Environment

This section of the EA discusses the physical environment of the sites being analyzed.

3.2.1 Geology and Soils

The colony sites and at-risk islands are within an area geologically known as the Columbia Plateau, which is typified by the presence of Columbia River basalts stemming from lava flows that occurred between 6 million and 17 million years ago. These lava flows eventually resulted in a subsidence of the crust in the area creating a slightly depressed lava plain that is now called the Columbia Plateau. During the last ice age, glaciation dammed rivers and created lakes in Washington, Idaho, and Montana. Glacial Lake Missoula a very large lake that formed in Montana, and over a course of thousands of years, its ice dam failed repeatedly and released catastrophic floods through the Columbia River drainage that stripped away soils and cut deep canyons, “coulees,” into the underlying bedrock creating the channeled scablands that are characteristic of eastern Washington (USGS 2011). Most of the at-risk islands including Miller Rocks, Three-mile Canyon Island, Blalock Islands, Badger Island, Foundation Island, Richland Islands, and Cabin Island are located within the Columbia River and have geology and soil types derived from Columbia River basalts.

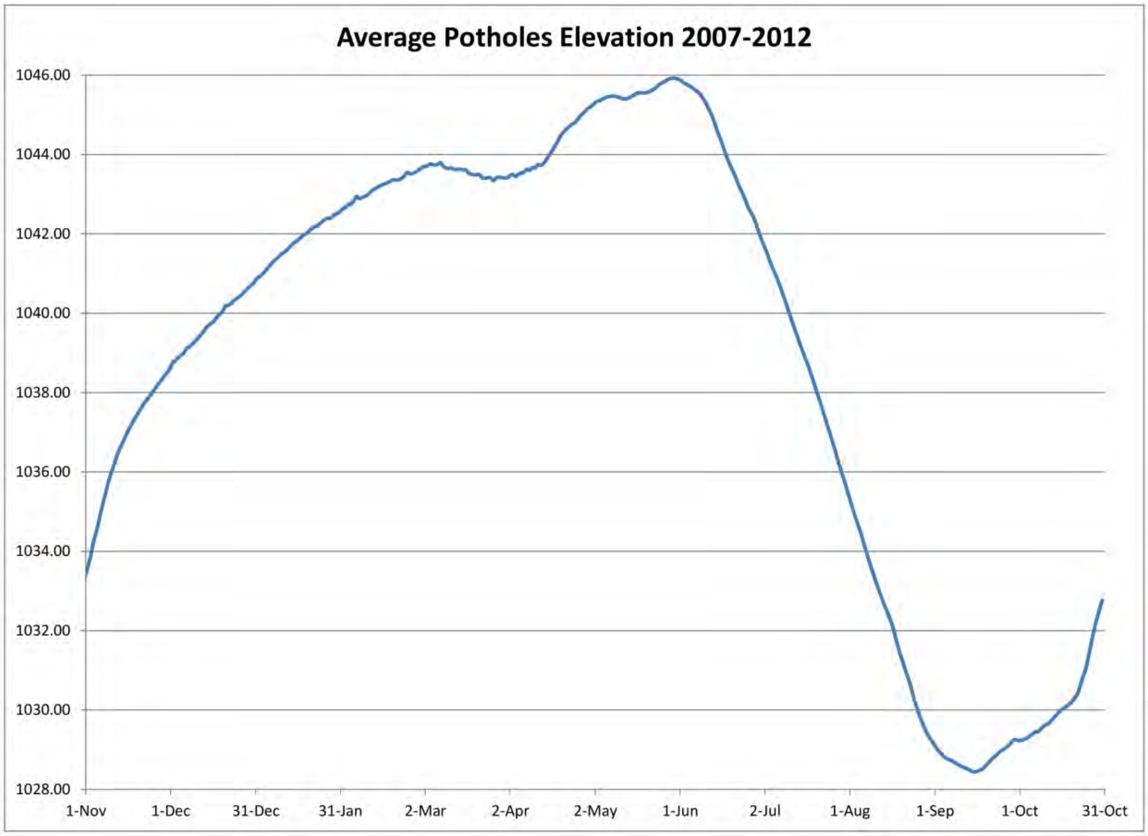
Goose Island and Solstice Island are located within the Potholes Reservoir near Moses Lake, Washington. Goose Island is approximately 4.9 acres, rocky and steep-sided. The reservoir receives a continuous inflow of suspended sediment from contributing waterways. As with the majority of soils on the Columbia Plateau and in the Columbia drainage basin, the soils in this area have formed under grassland or shrub-grassland vegetation. These soils derive from parent material including basalt, volcanic ash, sedimentary deposits, glacial outwash, and alluvial, fluvial, and colluvial deposits (Reclamation 2002). Soils on Goose Island are mapped as Schawana complex. These soils are developed in eolian (wind-formed) deposits derived from weathered basalt parent material. Structurally, the soil consists of approximately 0 to 12 inches of sand and sandy loam overlaying unweathered bedrock (NRCS 2012).

Crescent Island was created in 1985 with materials dredged from the approach to the Boise paper mill. Soils are primarily sandy in nature and covered by a mix of vegetation as described in Section 3.1.6. At the existing CATE nesting site, soils are largely devoid of vegetation due to bird presence and are covered with a hardpan. Environmental sampling of CATE eggs at Crescent Island in the 1990s revealed the presence of polychlorinated biphenyls (PCBs) and organic pesticides above detection limits (Buck 2004). Although PCBs and organic pesticides were banned in the 1970s, the chemicals persist in the sediments of the Columbia River. Because Crescent Island was created from dredge spoils, there is a possibility that these types of contaminants may be present in soils on the islands.

Twinning Island is located in Banks Lake. Banks Lake contains basalt cliffs and talus slopes with shallow soils and rocky outcrops (WDFW 2013b).

3.2.2 Floodplain/Water Elevation

Goose Island and Solstice Island are located within the Potholes Reservoir. The Potholes Reservoir has a full pool elevation of 1,046 feet, which covers an estimated 27,800 acres with a total storage capacity of 511,700 acre-feet. During September to October, when water levels are lowest, the reservoir elevation is approximately 18 feet below full pool (Figure 3-13). The main objective of the operation of Potholes Reservoir is to supply irrigation water. Reclamation operates the reservoir within established constraints for surface water elevation to meet contractual obligations, to assure public safety, and to protect property; other resource needs are viewed as secondary within existing operational constraints. The 25-year management agreement and the Potholes Resource Management Plan support this key purpose of the Columbia Basin Project (Reclamation 2001). During this period, many of the dunes and sand islands in the northern half of the reservoir become exposed and difficult to access due to reduced water levels.



Source: Lesky 2013 personal communication.

Figure 3-13. Potholes Reservoir average water elevation chart. Maximum water elevations occur in early summer with minimums in September after irrigation demand ends.

Crescent, Badger, Richland and Foundation Islands are located upstream of McNary Dam in Lake Wallula on the Columbia River. The reservoir's water surface elevation is typically held between 335 feet above mean sea level (fmsl) and 338 fmsl, however the maximum pool elevation is 357.0 fmsl, and minimum pool elevation is 335.5 fmsl.

Miller Rocks Island is located upstream from The Dalles Dam within Lake Celilo on the Columbia River. The capacity for Lake Celilo is 330,000 acre-feet. The lake elevation at maximum pool is 182.3 fmsl, full pool elevation is 160.0 feet, and at minimum the pool elevation is 155.0 feet.

Blalock and Three-mile Canyon Islands are located upstream from the John Day Dam, within Lake Umatilla on the Columbia River. The capacity for Lake Umatilla is 2,530,000 acre-feet. The lake elevation at maximum pool is 276.5 feet, full pool elevation is 268.0 feet, and at minimum the pool elevation is 257.0 feet.

Cabin Island is located upstream from the Priest Rapids Dam within Priest Rapids Lake on the Columbia River. The capacity for Priest Rapids Lake is 237,100 acre-feet. The normal full pool elevation is 486.0 feet and the normal low pool elevation is 481.5 feet.

Banks Lake is a human-made impoundment for irrigation water in the Columbia Basin Irrigation Project. The lake is formed by the North Dam near Grand Coulee and the Dry Falls Dam near Coulee City and is filled with water from Franklin D. Roosevelt Reservoir (Lake Roosevelt) (WDFW 2013b).

3.2.3 Water Quality

3.2.3.1 Potholes Reservoir

Created by O'Sullivan Dam, Potholes Reservoir lies immediately downstream of Moses Lake in the Lower Crab Creek Basin. Built as part of the Columbia Basin Project (CBP), which provides irrigation water to land of the Columbia Plateau, the reservoir's main water supply is operational waste and irrigation return flow from northern CBP lands irrigated from the East Low and West Canals. This water supply is supplemented by natural flows in Crab Creek, Rocky Coulee, Weber Coulee, and Lind Coulee. Reservoir inflows originate from Moses Lake through the Crab Creek channel on the north side, from the Lind Coulee Wasteway on the east side, and from the Winchester and Frenchman Hills Wasteways on the west side. Shallow groundwater seepage is also a water source entering Potholes Reservoir. Irrigation water for the southern part of the CBP is distributed via the Potholes East Canal, which begins at O'Sullivan Dam (Reclamation 2002).

The Potholes Reservoir is listed under Section 303(d) for presence of dieldrin, a chlorinated pesticide. During 2007 and 2008, dieldrin was only detected during the non-irrigation season where groundwater dominates as the major water source contributing to the reservoir. Because no major current sources of Dieldrin were identified in the study, it is suggested that Dieldrin is recycling internally in the Potholes Reservoir fish food chain and accumulating in the larger, fattier and longer-lived species. Additionally, sediment samples at the reservoir detected 4,4'-DDE, a breakdown product of the now-banned pesticide, DDT. These samples, however, did not exceed state sediment quality guidelines (Ecology 2011).

3.2.3.2 Banks Lake

Banks Lake is currently not listed under Section 303(d) (water medium) nor are any maximum contaminant levels exceeded from the Drinking Water Regulations. However, Banks Lake is listed under Section 303(d) for multiple toxins, such as mercury, PCB, etc., based on tissue samples (Ecology 2011).

3.2.3.3 Columbia River

The Columbia River mainstem and Snake River are listed under Section 303(d) of the federal Clean Water Act (CWA). Section 303(d) identifies surface waters that are impaired as defined by accepting water quality standards for criteria pollutants. Impaired water bodies require the creation of a total maximum daily load (TMDL). A TMDL is a cleanup plan that identifies the amount of a pollutant that a water body can receive and still meet water quality standards (EPA 2011). TMDLs for the Columbia River mainstem and Snake River that are currently in place include:

- TMDL for total dissolved gas in the Middle Columbia River and Lake Roosevelt, EPA approved 7/21/04
- Columbia River dioxin TMDL (Idaho, Oregon, and Washington), Issued by EPA 2/25/91
- Lower Snake River total dissolved gas TMDL (Washington State Department of Ecology)

3.3 Greenhouse Gas Emissions

While greenhouse gases (GHGs) are produced locally where people live, work, and recreate, the impacts are global in nature. Energy consumption and associated GHG emissions adversely affect the environment by contributing to climate change. In turn, climate change results in environmental impacts such as changes in precipitation and water quantity. These changes can impact the built environment as well as impact natural resources.

While impacts will vary by location, the Washington Climate Change Impacts Assessment (UW 2013) and other published works provide useful information about the region’s climate trends. Washington State is likely to experience:

- Higher temperatures
    - Increases in average annual temperature of 2.0°F (range: 1.1°F to 3.4°F) by the 2020s, 3.2°F (range: 1.6°F to 5.2°F) by the 2040s, and 5.3°F (range: +2.8°F to +9.7°F) by the 2080s (compared to 1970–1999) are projected. There is an increasing likelihood of extreme heat events (heat waves) that can stress energy, water, and transportation infrastructure.
- Enhanced seasonal precipitation patterns
    - Wetter autumns and winters, drier summers, and small overall increases in annual precipitation in Washington (+1 to +2 percent by the 2040s) are projected. Increases in extreme high precipitation in western Washington are also possible.
- Declining snowpack
    - Spring snowpack is projected to decline, on average, by approximately 28 percent by the 2020s, 40 percent by the 2040s, and 59 percent by the 2080s (relative to 1916–2006).

- Seasonal changes in streamflow
  - Increases in winter streamflow, shifts in the timing of peak streamflow in snow-dominant and rain/snow mix basins, and decreases in summer streamflow are expected. In addition, the risk of extreme high and low flows is expected to increase.
- Sea level rise
  - Medium projections of sea level rise for the 2100s are 2 to 13 inches (depending on location) in Washington State. Higher increases (up to 50 inches depending on location) are possible depending on trends in ice loss from the Greenland ice sheet, among other factors.

3.4 Cultural Resources

The following sections provide precontact, historic, and ethnographic context for cultural resources within the area of potential effect, and a summary of the general character and condition of cultural resources. Cultural resource laws require the Action Agencies, in consultation with the public, Tribal governments, and other interested parties to take into account the effects of the project on cultural resources. The prehistoric, historic, and ethnographic context and information on the general character and condition of known resources provide a basis for assessing the potential for proposed actions to affect cultural resources.

3.4.1 Cultural Resources Property Types

Cultural resources within the area of potential effect are composed of precontact (i.e., pre-EuroAmerican contact and settlement) and historical period archaeological sites, elements of the historical built environment (historic buildings and structures), cultural landscapes, and traditional cultural properties. These can be individual sites, districts, landscapes, buildings, structures or objects. Archaeological resources, historic buildings and structures, and traditional cultural properties that have been evaluated on the basis of specific criteria and found eligible for the National Register of Historic Places are all included under the heading cultural resources.

3.4.1.1 Archaeology

Archaeological resources are the locations of the tangible, physical remains of human activity. The age of these resources within the area of potential effect ranges from thousands of years to recent time. Precontact resources date from the post-glacial arrival of humans in the area approximately 12,000 years ago, up until the *protohistoric* period when the first European explorers documented their forays into the region, and into the historic period characterized by intensive immigration and settlement by Europeans.

Precontact archaeological sites include occupation sites (pit house villages, caves, rock shelters, and open campsites). Storage activities may be represented at these sites or in areas related to specific resource procurement locations. Sites related to resource procurement activities include hunting stations, fishing stations, butchering sites, rock alignments, quarry sites, and resource-specific task areas such as *camas* (edible plant) fields and nut-gathering camps. Site types related to resource processing include *lithic*/tool scatters, fire pits and hearths, and shell *middens*.

Historical archaeological resources are related to a number of different historic themes during and following post-contact settlement and development of the area, such as exploration, industry (mining and logging), settlement and community development, commerce, transportation, agriculture and stock-raising, public lands management, and recreation.

3.4.1.2 Traditional Cultural Properties

A traditional cultural property (TCP) is a type of cultural resource that is associated with cultural practices or beliefs of a living community that are rooted in that community's history, and plays an important role in maintaining the continuing cultural identity of the community. A TCP may be an archaeological site but may also be represented by non-archaeological features such as distinctive shapes in the natural landscape, named features in local geography, natural habitat for significant faunal and floral resources, traditional fisheries and sacred religious sites. Although most TCPs in the project area are associated with Native American groups, they can also be related to other ethnic communities, e.g., African American, Chinese, or Japanese groups. Other types of TCPs include those of importance to maintaining the cultural identity of rural communities. Because a TCP is defined in relation to a specific group, the intangible qualities associated with such resources may be known only to that group or a subset of their members. This property type may also be referred to as a historic property of cultural or religious significance to an Indian tribe.

3.4.1.3 Built Environment

Historic buildings and structures refer to elements of the aboveground built environment typically related to historical themes identified in the area of potential effect: exploration, missions and settlement, industry (mining and logging), transportation (trail systems, railway systems, road systems), agriculture and stock raising, and modern land use (dam projects, irrigation projects and federal land management).

3.4.1.4 Islands as Cultural Resources

Much of the work would take place on islands, and some discussion of the significance of Islands as cultural resources is warranted here. During pre-contact times the

Columbia and Snake rivers were major travel routes connecting bands and villages in the southern Plateau (Shawley 1984) creating extensive socio-economic interaction networks (Anastasio 1972). Certain islands were used for crossing rivers, and some of these crossings were associated with pre-contact overland trails (Ray 1975). As noted by the Lewis and Clark Expedition (Moulton 1983), islands were useful occupation and harvest platforms, and may also have served as natural buffers against hostile parties. The expedition noted homes, fishing scaffolds and drying racks, sweat houses and cemeteries on islands. Many islands are also recognized as traditional cultural properties.

3.4.2 Cultural Resources in the Area of Potential Effect

The proposed project involves modifying approximately 4 acres of habitat on two islands within the Columbia River Basin in eastern Washington, Goose Island (up to 2.5 acres) and Crescent Island (up to 2 acres). The IAPMP also contains an expanded adaptive management component that may extend well outside this area to other areas within the interior Columbia Basin. Currently 10 additional islands of interest have been identified for monitoring, and future adaptive management activities. Specific information is provided for both Goose Island and Crescent Island while general information about the character and condition of cultural resources within the larger area of potential effect is summarized.

3.4.2.1 Goose Island

Reclamation (2007) provides a succinct summary of the cultural context around Goose Island:

> “Aboriginal groups known to have occupied or utilized the project area include a variety of Plateau groups: the San Poil, Nespelem, Middle Columbia Salish, Wanapum, Yakama, Lower Spokane, as well as others who frequented the Columbia and Snake River confluence…..However, the Columbia people were indigenous to the area, with settlements on and surrounding Moses Lake. The general area, including Moses lake, provided excellent resource gathering opportunities including root corps, fish, turtles, and waterfowl, among other resources….Euro American exploration prior to 1870 included fur traders, road and railroad surveyors, miners, freighters, and stockmen. Early settlers attempted raising livestock including cattle and horses; however, the lack of water and overgrazing caused the industry to decline. Dryland farming proved equally short-lived and unsuccessful…”

The area is closely linked to Chief Moses, an important member and leader of the Sinkiuse-Columbia tribe during the turbulent years between the 1850’s and 1880’s. Hurley (personal communication 2012) reports that this fact, as well as substantial archaeological and oral history data from recently ongoing cultural resources work in the Lake Moses and Crab Creek basins, strongly suggests that the general area within and near Goose Island has a high probability of containing archaeological and/or TCP historic properties. The resources discovered in the area range from semi-permanent habitation sites, temporary camp-sites and limited resource capture/processing sites to TCP features such as rock cairns (Bruce et al. 2001).

To date archaeological surveys in the vicinity of Goose Island and Potholes Reservoir have been limited. Prior to the construction of O'Sullivan Dam, Goose Island would have been an upland rise located approximately one mile to the west of Crab Creek. The island was part of a fairly high ridge that overlooked a tributary of crab creek and parts of the series of ponds known as "The Potholes". No sites have been recorded on the island, but sites within an approximate one mile radius of the island consist of one pre-contact lithic scatter and three sites associated with late 19th to early 20th century agrarian activities.

3.4.2.2 Crescent Island

Crescent Island exists because of the hydroelectric dam and modern maritime commerce along the Columbia River. The island was created in 1985 from dredge spoils. The material used to construct Crescent Island is derived from dredging within the Boise-Cascade paper plant barge channel. For a number of years the plant maintained a barge approach that ran from the Federal navigation channel to the plant. The channel ran southwest to northeast toward the plant and passed right by the island.

Crescent Island is within the area of the Columbia River known as the Pasco Basin, which is the topographic low point within the Columbia River Basalt Plateau. Within a few miles of each other the Snake, Yakima, and Walla Walla rivers all drain into the Columbia River (Hall 2012). The confluence of so many significant drainages has attracted people to the region since the beginning, and continues to attract them today. When Lewis and Clark passed through the area in 1805 the Palouse, Umatilla, Walla Walla, Wanapum and Yakama were the primary residents, but the Nez Perce and Cayuse also made use of the area (Hicks 2000). This pattern of interaction characterizes much of the interior Columbia Basin where inter-group contact commonly occurred between bands that shared common language, religion, and culture.

Just to the south of Crescent Island the Northwest Company established Fort Walla Walla in 1811 near the mouth of the Walla Walla River. The discovery of gold to the north and east of the area began a steady increase of immigration into the area. In 1855 tribes in the region including the Yakama, Nez Perce and Umatilla signed treaties that established reservations but also reserved rights to fish, hunt, and graze stock on open and unclaimed ceded lands. The initial influx of gold seekers was followed by farmers and ranchers who established many of the modern towns and cities in the region. The arrival of railroads and the expansion of irrigation networks allowed for more farms, and more development of the area.

In contrast to Goose Island a number of surveys have occurred, and a number of sites have been recorded, near Crescent Island. However, Crescent Island is not a natural island. The potential for artifacts to be present within the dredge fill that composes the island exists, but this material would not be in a primary context and would not be considered a cultural resource requiring consideration under Federal cultural resources laws.

3.4.2.3 Larger Area of Potential Effect

The EA provides for specific actions at Goose and Crescent Island. It also provides for future expansion of predation management activities outside of these two locations. Specifically, ten additional islands are discussed in the plan as at-risk islands. These islands stretch from the Miller Rocks located just above where the Deschutes River flows into the Columbia River, northward to Twinning Island in Banks Lake, and eastward to Harper Island in the privately owned Sprague Lake. More generally, the EA recognizes that predation management activities may need to be expanded to additional at-risk islands within the Columbia River Basin that have not yet been identified through monitoring and adaptive management measures. Some of these islands are known to have cultural resources representing a diverse range of ages and types, some of which have been found eligible for listing on both National and State site registers. Some of these islands also represent historic properties of cultural and religious significance to an Indian tribe. Some of the islands also occur within known National Register of Historic Places listed archaeological districts, and some have never been surveyed to identify the presence or absence of cultural resources.

The EA also identifies a habitat enhancement site (or sites) that would be developed outside the Columbia River Basin as part of Phase 2 actions. Any additional areas, once identified, also have the potential of containing any number of cultural resources types and will require further research.

3.5 Built Environment and Socioeconomics

3.5.1 Built Environment

Goose and Crescent Islands, as well as the at-risk islands, are undeveloped. Other than structures used seasonally for bird observation, no human-made structures are present on the islands. No human-made structures are present within 0.5 mile of the vicinity of either Goose or Crescent islands. For Goose Island, the closest human-made structure is O’Sullivan Dam, which is over 0.6 mile to the southeast. Other built environment features in the area include resort areas (Mar Don Resort, Perch Point Resort) and limited residential and agricultural buildings. All of these are over 1 mile from Goose Island.

With regard to Crescent Island, the nearest built structure is the Boise Cascade mill in Wallula, Washington, which is over 0.6 mile to the northeast. Residential and commercial buildings are present in Wallula, over 1 mile from the island. Various agricultural facilities are present in the area over 1 mile from the island, as well.

Badger Island is closed to both the public and researchers in order to avoid human disturbance to nesting pelicans that may cause abandonment of the colony. Blalock and Foundation islands are both closed to recreational activities, in part due to the Blalock Islands containing significant cultural resources.

Three-mile Canyon Island is near the town of Boardman, Oregon, and is owned and managed by the Corps. Three-mile Canyon Island is a 17-acre island that was created by the John Day Dam impoundment. A dike-like barrier built from dredged material along its length protects an adjacent bay and boat launch.

Twinning Island is located near Coulee City, Washington, and is situated directly across from a popular boat launch, thus human use and disturbance is evident.

3.5.2 Socioeconomic

3.5.2.1 Commercial and Recreational Fisheries

Commercial salmon fishing by European settlers began in the late 1830s and peaked during the 1860s with the advent of canning technology, and again during World War I with annual catches of more than 40 million pounds. Annual catches declined over time with catches in the 1990s of less than 3 million pounds (World Wildlife 2012). Commercial fishing on the Columbia River is managed by the Columbia River Compact (compact), which has congressional and statutory authority to adopt seasons and rules. The compact consists of agency directors, or their delegates, acting on behalf of the Oregon Fish and Wildlife Commission and the Washington Fish and Wildlife Commission. The Columbia River Treaty tribes also have authority to regulate treaty Indian fisheries. The compact is required to consider the effect of commercial fishery on the escapement, treaty rights, and recreational fisheries, as well as impact to species listed under ESA, when addressing commercial fishing seasons for salmonids and sturgeon (WDFW 2012a). A discussion of policies related to fisheries in the Columbia River Basin is in Section 6.3.

Five commercial zones are open downstream of the Bonneville Dam to drift gill net fishery. Above the Bonneville Dam, extending to McNary Dam, commercial fishing is only open to Treaty Indian set net fishery (WDFW 2012a). Tribal fisheries are described in more detail below in Section 4.4.3. Besides anadromous fish species, white sturgeon, shad, and smelt are other species that contribute to the commercial fish industry in the Columbia River Basin. However, comprehensive data on these other resident fish do not exist in abundance as they do for anadromous fish species (IEAB 2005).

Recreational fishing exists throughout the Columbia River Basin, including Banks Lake and Potholes Reservoir. Recreational fishing in concurrent waters is managed under joint state action between Oregon and Washington. Fisheries that occur within individual state waters (tributaries) are regulated by the home state (ODFW 2012). Aside from anadromous fish species, other principal species that are of importance in recreational fishing in the Columbia River Basin include white sturgeon, bass, shad (*Alosa sapidissima*), smelt (*Thaleichthys pacificus*), walleye, northern pikeminnow, and rainbow trout (IEAB 2005).

In the last century, several factors have contributed to more stringent policies regarding commercial and recreational fisheries in the Columbia River Basin, including listings of various salmonids under ESA; human environmental impacts; and changing policies on hatchery fish-rearing (NPCC 2010a). However, fishing remains an important economic and cultural fixture in the lower-Columbia and Indian communities. In a study conducted by the Independent Economic Analysis Board (IEAB) at the request of the Northwest Power and Conservation Council (NPCC), the economic value of commercial, tribal, and recreational fisheries of salmon and steelhead in the Columbia River Basin based on early 2000s conditions, was estimated to range up to $142 million. This translates to up to 3,633 jobs related to the industry spread over Washington, Oregon, and Idaho (IEAB 2005).

3.5.2.2 Tribal Fisheries

Native Americans have been fishing on the Columbia River since before the arrival of Europeans in the Pacific Northwest. After settlement of the area by non-Native Americans, many of the historic Native American fishing sites along the Columbia River were lost due to encroachment by settlers. Additionally, with the construction of the Columbia River dams, traditional tribal fishing sites were flooded. In order to replace these lost tribal fishing sites, “in lieu” or treaty fishing access sites (TFAS) were set aside. These TFAS are exclusively for the use of Columbia River Treaty tribes, which include Yakama, Umatilla, Warm Springs, and Nez Perce tribal members. Between the Bonneville Dam and McNary Dam, 18 in-lieu TFAS or shared-use (treaty fishing and public access) fishing sites are present. Above Priest Rapids Dam, non-treaty tribal fishing occurs for Wanapum and Colville Tribes.

Tribal Management Authority

Each of the four Columbia River treaty tribes manages their fisheries, including ceremonial and subsistence (C&S) fisheries, individually. Each tribe has retained its authority to regulate its fisheries and issues fishery regulations upon its approval, through its respective governing bodies. Tribal fishery regulations authorize tribal fisheries and describe lawful gear, fishing area, notice restrictions, and other miscellaneous regulations for tribal fisheries enforcement purposes (WDFW 2012a).

All fisheries are monitored by tribal fishery programs to provide accurate in-season accounting of harvest. Commercial fisheries and portions of the C&S fisheries are sampled for biological and stock composition purposes. The tribes are represented by their staff on the Columbia River Compact's Technical Advisory Committee for fishery management coordination and participate in data sharing with the other parties.

Importance of Fisheries

Treaty fisheries serve an important role in the religious, cultural, and economic lives of tribal members. An economic value cannot be put on the religious and cultural use of the fishery resource. Fish harvested for subsistence use have both a cultural and economic component as the fish provide food that would otherwise have to be purchased. Tribal commercial fisheries are of critical economic importance for tribal communities that often suffer from chronic unemployment and under-employment. Many tribal members earn a substantial portion of their annual income through participation in tribal commercial fisheries. Tribal commercial fisheries also provide economic benefits to communities both on Indian reservations and communities along the Columbia River where tribal members purchase supplies and equipment, sell fish, and spend the income they earn. According to the 2005 IEAB report, tribal commercial fisheries based on early 2000s numbers could provide as much as $32.6 million to the local economy.

SECTION 4.0 IMPACT ASSESSMENT

This section of the EA analyzes the impacts associated with each of the four alternatives presented in Section 2 upon the affected environment. The effects of each of the four alternatives follow the same order presented in Section 3. The general effects of CATE habitat enhancement sites, and dissuasion at potential inland basin CATE nesting sites as part of adaptive management (other than the identified at-risk sites) are described in this section, as appropriate and based on available information. Once the specific sites are identified and potential site specific effects can be more fully defined, the effects of these actions will covered in a subsequent supplemental/tiered NEPA analysis (as appropriate) prior to implementation of Phase 2.

4.1 Biological Environment

4.1.1 Federally Endangered and Threatened Fish

4.1.1.1 Alternative A

Under Alternative A, impacts to threatened and endangered salmonids by CATE predation in the inland Columbia River Basin are anticipated to continue in similar trends to those currently present.

As determined by Roby et al. (2011), it is estimated CATEs at Goose Island consumed between 110,000 to 134,000 anadromous juvenile salmonids from the Columbia River in 2010. Of this, an estimated 9 percent to 26 percent were steelhead. Lyons et al, (2011a) determined that CATEs at Goose Island had the following predation rates on salmonids in the Columbia River Basin: 14.6 percent and 11.4 percent of in-river migrating populations of hatchery and wild UCR steelhead, respectively, and 3 percent of the spring run of UCR Chinook (Lyons et al. 2011a).

The 2012 estimated predation rate by CATEs nesting at Goose Island (17.0 percent) was higher than the 2011 estimate (12.7 percent), and was the second highest estimate since this study began in 2008.

CATEs at Crescent Island consumed approximately 420,000 juvenile salmonids in 2010. Of this, an estimated 13 percent were steelhead. Based on the Lyons et al. (2011a) Benefits Analysis, the Crescent Island CATE colony had the following predation rates on salmonids in the Columbia River Basin: 5.1 percent of in-river non-transported SR steelhead; 2.7 percent and 2.3 percent on the in-river migration populations of hatchery and wild UCR steelhead, respectively; 1.2 percent of the non-transported SRF Chinook; less than 1 percent on non-transported SRS/S Chinook runs; and 1.3 percent of non-transported SR sockeye.

From 2008 to 2011, a total of 32 PIT tags from bull trout (most originating from the Walla Walla River Basin) have been recovered on the Foundation Island DCCO colony grounds (Roby et al. 2011b). Three PIT tags from bull trout tagged in the Walla Walla River Basin were detected on the Badger Island pelican colony grounds in 2010, providing for a total of six bull trout PIT tags recovered on colony grounds through 2010 since scanning began in 2005 (Roby et al. 2011b). Although PIT tags from bull trout have been recovered within DCCO and pelican colonies, specific predation rates on bull trout by CATEs is unknown (Evans 2013 personal communication).[3]

4.1.1.2 Alternative B

Using the consumption estimates discussed in Section 3 and in Alternative A above as rough indicators, if 100 percent dissuasion of CATEs nesting at Goose and Crescent Islands was achieved due to actions under Alternative B, approximately 530,000 - 554,000 juvenile salmonids annually would no longer be consumed (Roby et al. 2011b).

At 100 percent dissuasion, relocation of the Goose Island CATE colony could result in an approximate increase of 14.6 percent and 11.4 percent of in-river migrating populations of hatchery and wild UCR steelhead, respectively, and 3 percent of UCRSp Chinook (Lyons et al. 2011a). With regard to effects on annual average growth rate (λ), of selected salmonid ESUs, 100 percent dissuasion could result in a $\Delta\lambda$ of 4.2 percent hatchery population/3.2 percent wild population of UCR steelhead and 0.7 percent UCRSp Chinook.

At 100 percent dissuasion, relocation of the Crescent Island CATE colony could realize an increase of up to 5.1 percent of in-river non-transported SR steelhead; 2.7 percent and 2.3 percent on the in-river migration populations of hatchery and wild UCR steelhead, respectively; 1.2 percent of non-transported SRF Chinook; less than 1 percent on non-transported SRS/S Chinook runs; and 1.3 percent of non-transported SR sockeye (Lyons et al. 2011a). With regard to λ, 100 percent dissuasion could result in a $\Delta\lambda$ of 0.7 percent hatchery population/0.6 percent wild population of UCR steelhead and 0.5 percent for SR steelhead (Lyons et al. 2011a).

As stated above, specific predation rates on bull trout by CATEs is unknown. In addition, a significant gap of knowledge exists regarding migratory bull trout life history and their use of the mainstem Columbia and Snake Rivers. However, if dissuasion of CATEs nesting at Goose and Crescent Islands was achieved due to actions under

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[3] To date, there has been only one confirmed PIT-tagged bull trout consumed by an inland nesting CATE.

Alternative B, it is anticipated that the potential for the consumption of juvenile salmonids would decrease, including bull trout. The Corps has consulted with USFWS to address potential impacts to bull trout as described in Section 6.0 below.

Alternative B would have positive impacts to threatened and endangered salmonids in the Columbia River Basin.

4.1.1.3 Alternative C

With the addition of hazing for CATE dissuasion, Alternative C is anticipated to have higher potential for success with regards to increasing positive impacts to threatened and endangered salmonids in the Columbia River Basin than Alternative B with the use of habitat modification alone (i.e., predation related losses of salmonids would be reduced). The addition of hazing in Alternative C would further ensure that CATEs are effectively dissuaded at Goose and Crescent Islands so that greater reduction in predation rates and potential increases in the annual average growth rates of ESA-listed salmonids in the Columbia River Basin can be achieved. The incremental impacts of hazing in addition to habitat modifications are assumed to be negligible and temporary. Hazing would be employed as a method of reinforcing the anticipated effects of habitat modifications (dissuasion of nesting birds). No additional negative effects to hazed birds are anticipated.

4.1.1.4 Alternative D

With the ability to conduct egg take, Alternative D would have the highest potential for success with regards to increasing positive biological effect to threatened and endangered salmonids in the Columbia River Basin of all the alternatives considered in this EA. Moreover, this alternative is similar to CATE dissuasion efforts conducted in the Lower Columbia River estuary where limited egg take has found to be necessary to most effectively dissuade CATEs.

4.1.2 Other Fishes

4.1.2.1 Alternative A

Current effects to non-ESA-listed salmonids and other fish from CATEs are not expected to change from current conditions under this alternative. At Goose Island in 2010, Roby et al. (2011) determined that juvenile salmonids (ESA- and non-ESA-listed) made up an average of 21 percent of the CATE diet, centrarchids (bass and sunfish) comprised 63 percent, and other fish, such as yellow perch, carp and minnows, made up the remaining 16 percent. Roby et al. (2011) determined that salmonids (ESA- and non-ESA-listed) comprised 71 percent of the CATE diet at Crescent Island in 2010, followed by centrarchids (bass and sunfish, 15 percent) and cyprinids (carps and minnows, 9 percent).

4.1.2.2 Alternative B

Negative effects to non-ESA-listed salmonids and other fish would likely increase with dissuasion of CATEs from Goose and Crescent Islands. It is anticipated that CATE fish consumption would shift to that of non-ESA-listed salmonids and other fish that are locally available at CATE nesting sites. This is supported by data from the relocation of CATEs from Rice Island to East Sand Island (approximately 26 km [16 miles] closer to the ocean than Rice Island) in the Lower Columbia River estuary where it was found that the diet of CATEs relocated to East Sand Island averaged between 31 percent and 47 percent salmonids during the years 1999 to 2002, compared to the diet of Rice Island CATEs which consisted of 77 percent and 90 percent salmonids in 1999 and 2000, respectively (Collis et al. 2002a).

It is anticipated that negative impacts to non-ESA-listed salmonids and other fish species would not be significant under Alternative B. Within the context of a such a wide geographical area, the relatively small quantity of CATEs relocated from Goose and Crescent Islands would not be anticipated to have measurable effects to these fish species. Some CATEs would likely disperse to various locations outside of the inland Columbia River Basin along the western portion of North America or to an enhancement site(s) which would be selected based on availability of an adequate, sustainable food supply.

Impacts to non-ESA-listed salmonids and other fish species at incipient colony dissuasion sites identified during adaptive management (non-at- risk islands) are anticipated to be very similar to those relocated from Goose and Crescent Islands and the at-risk islands. At habitat enhancement sites, CATEs could have increased predation upon non-ESA-listed salmonids and other fish similar to that detailed above for Rice Island. Site-specific evaluations of potential impacts at these dissuasion and enhancement sites on non-ESA-listed salmonids and other fish will be performed during supplemental/tiered NEPA analysis.

4.1.2.3 Alternative C

Effects to non-ESA-listed salmonids and other fish for Alternative C are anticipated to be similar to those of Alternative B. Alternative C would have no significant impacts to non-ESA-listed salmonids and other fish species.

4.1.2.4 Alternative D

Effects to non-ESA-listed salmonids and other fish for Alternative D are anticipated to be similar to those of Alternatives B and C. Alternative D would have no significant impacts to non-ESA-listed salmonids and other fish species.

4.1.3 Caspian Terns

4.1.3.1 Alternative A

Under Alternative A, no significant negative effect would be expected to be seen on CATEs from Goose and Crescent Islands. The CATE colonies at Goose and Crescent Islands would likely continue at their current population numbers (Table 3-6). No habitat management or other dissuasion methods would be enacted on CATEs within the inland basin by the Action Agencies, and, therefore, no direct impacts would occur due to management actions directed at CATEs. Nesting habitat would likely continue to be present for CATEs at these locations similar to what currently exists. It is likely that these CATE colonies would continue to consume salmonids present in the Columbia River Basin following trends similar to those presented in Section 3. Additionally, the potential for members of extant CATE colonies at Goose and Crescent Islands, as well as other locations such as East Sand Island, to relocate to other locations, including those designated in this EA as at-risk islands, would not be hindered by Action Agency management actions directed at CATEs in the inland Columbia River Basin.

CATE colonies at Goose and Crescent Islands under Alternative A would continue to be impacted by causes such as predation, disease, changes in interspecies competition and climate change. Climate change could indirectly affect CATEs via causes such as changes in prey base, predation pressure, disease and interspecies competition. The occurrence and magnitude of the potential direct and indirect effects upon CATEs due to these types of causes are unknown and are not part of this analysis.

4.1.3.2 Alternative B

Under this alternative, existing CATE nesting sites and potential relocation sites at Goose and Crescent Islands would be modified to discourage CATE nesting in Phases 1 and 2. In Phase 1 the approximately 459 CATE pairs nesting on Goose Island would be dissuaded using ropes and flagging. Dissuasion of CATEs from Crescent Island in Phase 2 would affect approximately an additional 422 CATE pairs. If CATEs relocate to other inland Columbia River Basin sites as a result of Alternative B actions, dissuasion actions would be implemented at these at-risk sites to encourage CATEs to nest at locations outside of the basin. The collective dissuasion activities on Goose and Crescent Islands and at at-risk sites if warranted would have the potential to dissuade approximately 900 CATE pairs from nesting within the inland Columbia River Basin, approximately 7.5 percent of the western North America metapopulation, an estimated 11,660 pairs in 2012 (USFWS 2013a personal communication), and roughly 0.4 to 0.7 percent of the worldwide population of between 240,000 to 420,000 individuals (Birdlife International 2012a).

CATEs are long-lived migratory birds with nesting locations that are rarely permanent. Consequently, they have developed nomadic tendencies for movement to new areas for nesting (Cuthbert 1985, Roby et al. 2002). In Alternative B, it is likely there would be a lag between the time the CATEs are dissuaded from Goose and Crescent Islands and when they find new nesting areas, but it is expected to be temporary and of short duration. During the time that dissuaded CATEs are searching for new nesting sites, there could be a temporary reduction in the regional population of CATEs due to loss of productivity at the dissuasion colonies. Based on the most recent estimates of productivity from the two islands given in the Affected Environment section, minimal loss of overall metapopulation productivity is anticipated due to dissuasion of birds from Crescent and Goose Islands. Losses in productivity are expected to be temporary in nature. It should be noted that the western North America metapopulation has experienced significant growth since the 1960s (Table 3-2), and that the potential temporary loss of productivity in the population is not expected to result in a decline in the overall metapopulation.

It is likely that dissuaded CATEs would find other suitable nesting areas in the western metapopulation including at sites identified in Table 2-1 and Figure 3-4. CATE's nomadic approach to locating suitable nest sites has led birds from the western metapopulation, including those from Goose and Crescent Islands, to be re-sighted at nesting sites from Mexico and Alaska and east into Utah and Idaho (Collis et al. 2012, Roby et al. 2002). CATEs tend to be attracted to existing colonies when searching for new nesting areas (Kildaw et al. 2005) such that existing CATE colonies would likely provide nesting space for CATEs dissuaded from Goose and Crescent Island colonies. This includes habitat enhancement sites created by the Corps Portland District outside the Columbia River estuary for the purposes of attracting CATE to alternative nesting sites. Furthermore, CATE are known to nest with similar colonial waterbirds such as gulls, and, as such, extant gull colonies may attract new nesting CATEs at higher numbers than sites without any nesting seabirds. Currently unoccupied sites with ideal nesting CATE habitat conditions, i.e., open sandy ground with few trees, may also attract dissuaded CATEs prospecting for new nest sites. Ultimately, CATEs dissuaded from the inland Columbia Basin, as part of this alternative, would be able to select from a wide range of currently available (whether natural or managed) as well underutilized existing habitat throughout the region of the western metapopulation.

Overall, many known CATE nesting sites vary in suitability on an annual basis, due to fluctuation water levels, exposure of nesting islands, prey resources, and predators, contributing to changes in colony locations and sizes throughout the region on an annual basis. As suitable nesting sites may at times be a limiting factor for the western North America metapopulation (Roby et al. 2013), the identification and development of new nesting areas (enhancement sites) outside the basin would benefit CATEs dissuaded from Goose and Crescent Islands as well as the overall metapopulation. As part of Phase 1 of this alternative, potential habitat enhancement sites identified in 2012 (Collis et al. 2012) as well as other areas meeting the criteria identified in Section 2.1, would be evaluated for implementation. Supplemental/tiered NEPA analysis as described in Section 2.2 would occur for these sites. As part of Phase 2 of this Alternative, habitat enhancement efforts would be implemented in accordance with Phase 1 planning efforts and prior to dissuasion of the primary CATE colony at Crescent Island.

Alternative B actions would be expected to reduce habitat for CATEs nesting in the inland Columbia River Basin, as well as significantly reduce predation on ESA-listed salmonids. CATEs displaced from Goose and Crescent Islands have a high potential to find new nesting areas outside the inland basin, including possible use of one or more habitat enhancement sites that would be implemented as part of this proposal, based on their propensity to travel over large distances to find nesting sites. The dissuasion of CATEs from Goose and Crescent Islands associated with Alternative B actions would not be expected to have a significant negative impact on CATEs populations. CATEs that would be dissuaded from Goose and Crescent Islands represent approximately 7.5 percent of the estimated western metapopulation, 2.5 percent of the estimated North American population, and 0.4 to 0.7 percent of the estimated global population.

4.1.3.3 Alternative C

Effects to CATEs under this alternative would be similar to those under Alternative B for habitat modification actions. Hazing at the CATE colonies at Goose and Crescent Islands would provide an additional means of dissuading CATEs from nesting at these sites. Hazing would supplement habitat modification efforts to dissuade CATEs from nesting at Crescent and Goose Islands by providing a means of deterring CATEs attempting to nest at these sites despite the habitat modifications. This would support the intended effects of Alternative B by further dissuading CATEs attempting to nest at these sites. This alternative is anticipated to have similar long-term results regarding the number of CATEs dissuaded, relocation of displaced CATEs, and positive benefits to salmonid consumption rates as Alternative B because in the long-term most CATE habitat on dissuasion islands would be modified resulting in a similar effect as if the birds had been hazed from the area. Hazing is expected to have non-lethal effects on CATEs (USFWS 2005a). Based on the above discussion, Alternative C would have no significant negative impacts on CATE populations.

Effects to CATEs under this alternative would be similar to those in Alternative B for habitat modification actions. Hazing at the CATE colonies at Goose and Crescent Islands would provide an additional means of dissuading CATEs from nesting at these sites and ultimately may be expected to result in the dissuasion of approximately 900 breeding pairs of CATEs at the two sites collectively. Hazing would augment habitat modification to dissuade CATEs from nesting at Crescent and Goose Islands by initially providing a means of deterring CATE nesting at these locations until habitat modifications are in place. This alternative is anticipated to have similar long-term results regarding the number of CATEs dissuaded, relocation of displaced CATEs, and positive benefits to salmonid consumption rates as Alternative B because in the long-term most CATE habitat on dissuasion islands would be modified resulting in a similar effect as if the birds had been hazed from the area. Hazing is expected to have non-lethal effects on CATEs (USFWS 2005a). Based on the above discussion, Alternative C would have no significant negative impacts on CATE populations.

4.1.3.4 Alternative D

Alternative D differs from Alternative C only in that Alternative D includes the removal of up to 200 CATE eggs per year at Goose and Crescent Islands and the at-risk islands combined. This alternative includes a modified version of lethal take (egg removal). However, the goal of this alternative is not to manage or affect the overall CATE population in the Columbia River Basin, but rather to serve as an additional means of dissuasion to the specific CATE colonies at Goose and Crescent Islands if non-lethal measures are found to be ineffective. As discussed in Section 2, any egg take would be conducted in accordance with a MBTA depredation permit requested from USFWS. As with Alternatives B and C, Alternative D is anticipated to have similar results regarding the number of CATEs dissuaded, relocation of displaced CATEs, and positive benefits to salmonid consumption rates. Moreover, Alternative D represents the most effective potential for dissuading CATEs from Goose and Crescent Islands. While it is anticipated that habitat modification and hazing would be effective methods for dissuading CATEs at Goose and Crescent and the at-risk islands, limited egg take provides an additional level of dissuasion. Action Agencies anticipate that passive and active hazing efforts at Goose and Crescent Islands would result in very few to no CATE breeding pairs remaining on the islands, thus it is expected that far fewer than 100 eggs per year per island (200 eggs total per year) would be laid. Due to the extent of the passive hazing actions, frequency of active hazing actions, and adaptive management options, it is anticipated that only a limited number of CATE eggs would need to be taken from Goose, Crescent, and the at-risk islands (no more than 200 per year on all islands combined). It is in line with recent Corps CATE management actions in the Columbia River estuary where limited egg take has been necessary for effective CATE dissuasion at targeted nesting locations. The Portland District Corps has an active hazing and non-lethal deterrent program in the Columbia River estuary for Rice Island, Miller Sand Spit, and Pillar Rock Sands Island. In support of the non-lethal dissuasion program, USFWS has issued depredation permits annually from 2009 to 2012 for the collection of up to 100 CATE eggs to prevent CATE colonies from reestablishing on sites with documented salmonid consumption rates higher than those for East Sand Island (USFWS 2005). These permits are valid for 1 year and must be renewed each year. Through the breeding season of 2012, fewer than nine eggs per year have been collected in support of hazing actions associated with implementation of estuary CATE management efforts (Roby et al. 2013). Despite the potential temporary loss of productivity resulting from limited egg take, the dissuaded CATEs are anticipated to find new nesting sites as they are long-lived, nomadic birds with a propensity to travel long distances to find nesting areas (see discussion in Section 3.1.1). Based on the above discussion, Alternative D would have no significant negative impacts on CATE populations.

4.1.4 Other Birds

Goose Island lies within the Potholes Reservoir Important Bird Area (IBA) as designated by the Audubon Washington report *Important Bird Areas of Washington* (Audubon 2001). The description of Birds and Habitat for this IBA is as follows, "the shallow open water and wetlands provide a rich foraging area for fish-eating birds, and the small islands provide ideal nesting sites for colonial nesting birds, grebes, ducks, and geese. The reservoir is also important as a migration staging area for waterfowl, and as a wintering area for bald eagles." Potholes Reservoir was designated based on the following the IBA criteria (Audubon 2001):

- CATEGORY 1: Site for endangered or threatened species, or species of special concern in Washington.
- CATEGORY 5: Site where birds regularly concentrate in significant numbers.
    - 5a. Over a short period of time during any season: at least 2,000 waterfowl in fresh water habitats; or 5,000 waterfowl in marine/estuarine habitats.
    - 5b. Over a short period of time during any season: at least 50 seabirds, in either marine or terrestrial nesting areas; or 1,000 gulls at inland sites or 5,000 gulls at coastal sites; or 50 terns.
    - 5d. At least 50 great blue heron nests; or any nesting pelicans, egrets, or black-crowned night herons during breeding season; or 30 brown pelicans at any time of the year.

Based on these criteria, dissuasion of nesting CATEs or gulls from Goose Island has the most potential to affect Category 5b. While CATEs may still occupy Potholes Reservoir following implementation, there is the potential that less than 50 pairs of CATEs may remain within this IBA. However, it is likely that well over 1,000 gulls will continue to nest within Potholes Reservoir following implementation. Therefore, the criteria for which this IBA was designated should not be violated due to the proposed action, and no significant effect to the IBA is anticipated.

4.1.4.1 Alternative A

Alternative A represents no change in existing management activities for non-CATE bird species in the inland Columbia River Basin. No avian predation management or habitat modification actions under the proposed IAPMP, which could affect non-CATE bird species. Nesting habitat would likely continue to be present for non-CATE bird species at these locations similar to what currently exists. It is likely that colonies of non-CATE birds would continue to consume salmonids in the Columbia River Basin following trends similar to those presented in Section 3.

4.1.4.2 Alternative B

In this alternative, habitat modification in Phases 1 and 2 would have a direct impact on gull species at Goose and Crescent Islands. The species most likely to be impacted by actions described herein are RBGU and CAGU. These two gull species are widespread in the western United States, and are highly adaptable to a variety of food sources. Hazing of gulls would occur to avoid potential gull egg take during CATE hazing. The negative effects of dissuading these gulls would be temporary in nature and gulls would be allowed to return to both islands once CATE hazing activities are concluded. For more information on the biology of these two gull species, see Section 3.1.4.1.

RBGUs are widely distributed across the United States and Canada with a total estimated population of 2.55 million gulls in North America (Pollet et al. 2012). In 2009, RBGUs were restricted to Goose Island and did not nest on Crescent Island. If 100 percent dissuasion were to occur on both Goose Island, with an estimated RBGU population of 10,541 in 2009, (Roby et al. 2010) and all the RBGUs were unable to locate to alternate nesting sites, this would potentially result in a 0.4 percent decrease in the number of breeding RBGUs range-wide. Moreover, due to RBGUs high adaptability to habitat and prey sources, the likelihood of 100 percent of the gulls being unable to relocate to suitable nesting sites is highly unlikely.

CAGUs nest in many western states as well as the potholes region of Canada with an estimated population of 500,000 birds in North America (Winkler 1996). CAGUs nested on both dissuasion islands, with 8,575 CATEs on Crescent Island and 2,481 in Potholes Reservoir in 2009 (Roby et al. 2010). If 100 percent dissuasion were to occur on both Goose and Crescent Islands (with an estimated combined population of 11,056 CAGUs) (Roby et al. 2010) and all of the birds were unable to locate to alternate nesting sites, this would potentially result in an approximately 2.2 percent decrease in the number of breeding CAGUs range-wide.

The actions to dissuade CATE at both islands would modify some or most portions of the islands where gulls nest on the periphery of CATE nesting sites. Based on gull survey numbers from 2009, it is anticipated that this could displace as many as 21,597 total adult gulls (not pairs) at both dissuasion islands (Roby et al. 2010, also see Section 3.1.4.2 for more gull population numbers). Additionally, potential modification of habitat at at-risk islands with extant gull populations, such as Miller Rocks, may also displace gulls. However, these individual colony displacements are not anticipated to impact regional population levels of gulls, because adequate habitat is present throughout the Columbia River Basin and gulls are more flexible in their habitat requirements than are CATEs.

Live Russian olive or other nonnative trees on Crescent Island may be cut to be used for coarse woody debris as a visual barrier for CATEs. This may have some small impact on nesting locations for Black-crowned Night Herons and Great Blue Heron, which nest in trees in the interior of the island. However, the potential cutting of Russian olive or other trees is likely to be minimal, and several other trees are present on the island that would provide similar habitat. Additionally, prior to any field activities, survey of existing trees would be performed to ascertain if any nesting is occurring. Any trees discovered to support active nesting would not be cut.

Habitat modification at Crescent Island may also include the use of dead woody debris on site as a visual barrier for CATEs. The majority of the dead trees on the island would be left standing because they may provide perches for Bald Eagles and Ospreys or other raptors in the winter. As with live trees, any dead trees observed to support active nesting or favored raptor perching would not be cut down.

Potential habitat modification (rope and flagging) at at-risk islands with DCCO populations, such as Foundation Island, are not anticipated to have direct negative effects on DCCOs due to their ability to use different habitat from CATEs (e.g., nesting in trees and bushes versus only using ground habitat). Any habitat modification at these islands would be done outside of the nesting season and in a manner approved by USFWS.

No actions would be taken on Badger Island that could disturb American white pelicans, due to their status as a state endangered species (WDFW 2012c). If CATEs attempt to nest on Badger Island before pelicans arrive, these CATEs would be dissuaded and their nest scrapes flattened. If CATEs attempt to nest on Badger Island after pelicans have arrived, no actions would be taken until the following early spring when temporary dissuasion material (ropes and flagging) would be placed over the areas where the CATEs nested in the previous year. All CATE dissuasion actions on Badger Island would be coordinated with McNary National Wildlife Refuge staff.

No actions as part of the IAPMP are anticipated to occur in areas designated as critical habitat or areas with other potential conflicts with ESA-listed birds such as the western snowy plover and the California least tern. Actions Agencies (Corps and Reclamation) will coordinate with USFWS to ensure that these species and others (e.g., streaked horned lark) are not subject to adverse effects (e.g., disruption of nesting activities) as part of habitat enhancement actions. As appropriate, the Action Agencies will further coordinate actions with other federal agencies including other districts such as Portland District, Seattle District, and San Francisco District as well as BPA. Actions as part of this plan (primarily enhancement site efforts) may occur within the habitat range of the western snowy plover and California least tern. If the Action Agencies propose to develop habitat enhancement sites within these areas, coordination would occur with the appropriate agencies (USFWS, CENWP, BPA, and other local or regional agencies) and appropriate consideration to these species would be given under NEPA, the ESA, and other applicable laws as the situation dictates.

Impacts to other birds at incipient colony dissuasion sites identified during adaptive management (non-at-risk islands) are anticipated to be very similar to those at Goose and Crescent Islands and the at-risk islands. At habitat enhancement sites, the creation of CATE habitat could result in potential impacts to other birds including competition for prey and habitat displacement. Site-specific examination of potential impacts to other birds at these dissuasion and enhancement sites will be performed during supplemental/tiered NEPA analysis.

Based on the above discussion, Alternative B would have no significant negative impacts to non-CATE bird species.

4.1.4.3 Alternative C

Alternative C would have the same potential impacts as Alternative B with regard to habitat modification for non-CATE bird species. The addition of hazing under Alternative C would also disturb other birds, especially gulls at Goose and Crescent Islands. Due to the colocation of CATE and gulls on these islands, it is possible that all gulls would have to be dissuaded from both islands to successfully accomplish CATE dissuasion without incurring any gull take (i.e., preventing gulls from nesting and laying eggs and later disrupting gull nesting during CATE hazing which would be a form of a gull take). Hazing would be conducted on foot, and hazers would pass through areas with CATEs to scare them away while dissuading gulls and potentially other waterbird species. It should be noted that American White Pelicans, a Washington state protected species, are not located on Goose or Crescent islands and hazing activities would therefore not impact these birds. Other bird species such as small songbirds or Canada goose may be temporarily disturbed or flushed when field staff is on the islands as they walk by nests or foraging areas but impacts would be negligible because hazing actions would be conducted away from areas where these birds nest (e.g., thicker brushy areas). Alternative C would have no significant negative impacts to non-CATE bird species.

4.1.4.4 Alternative D

Alternative D has the same potential impacts as Alternatives B and C. CATE egg removal would occur during the hazing activities described in Alternative C. As with Alternative C, CATE hazers would also haze gulls. It is not anticipated that CATE egg removal activities would disturb non-CATE bird species any more than hazing by itself. No non-CATE bird eggs would be disturbed or taken as a result of this alternative. Alternative D would have no significant negative impacts to non-CATE bird species.

4.1.5 Mammals

4.1.5.1 Alternative A

Under Alternative A, mammal use of Goose and Crescent Islands, as well as of potential habitat restoration areas, would likely continue at their current levels and fluctuate naturally with annual year-to-year variation. No habitat management or other dissuasion methods would be enacted by the Action Agencies, and, therefore, no direct or indirect impacts would occur due to Action Agency management actions.

4.1.5.2 Alternative B

The passive dissuasion activities would have no or negligible impacts to mammals on Goose and Crescent Islands or the at-risk islands. Although CATEs would be dissuaded from these areas (reducing their availability as prey), gulls would still be at these sites in abundance to provide an adequate prey base.

Impacts to mammals at incipient colony dissuasion sites identified during adaptive management (non—at-risk islands) are anticipated to be very similar to those at Goose and Crescent Islands and the at-risk islands. At potential habitat enhancement sites, some active management may include increased visits by field staff to implement control of predators that pose a risk to CATEs. Predators may include coyotes, gray fox, skunk, badger, river otter, mink, marmot, opossum, raccoon and nonnative rats. Goose, Crescent, and the at-risk islands are all small islands with occasional use by most mammal species. The direct impacts could include reducing or eliminating the usage of those sites by those predators. Direct impacts could also include mortality associated with lethal controls if they were necessary to maintain healthy CATE colonies. Site-specific examination of potential impacts to mammals at dissuasion sites identified as part of adaptive management or enhancement sites will be performed during supplemental/tiered NEPA analysis.

None of the controls would have significant population impacts to any of the affected species. Alternative B would have no significant negative impacts to mammals.

4.1.5.3 Alternative C

Effects to mammals under Alternative C are similar to those under Alternative B. The presence of hazers at Goose and Crescent Islands could potentially cause periodic disturbance to any mammals present at these locations. These impacts are also expected to be negligible. Alternative C would have no significant impacts to mammals.

4.1.5.4 Alternative D

Effects to mammals under Alternative D are expected to be very similar to those under Alternative C. Alternative D would have no significant impacts to mammals.

As part of the habitat enhancement site selection and planning process, proposed predator control techniques for each site will be fully evaluated as to minimize impacts to non-target species. In addition, each predator-control action will be coordinated with applicable state and federal agencies prior to and during implementation. Furthermore, supplemental/tiered NEPA documentation will address all site-specific effects associated with the development of new habitat enhancement activities including predator control, which will be tailored to prevent potential impacts to mammals.

4.1.6 Federally Endangered and Threatened Wildlife and Plants

4.1.6.1 Alternative A

No federally endangered and threatened wildlife or plant species are known to occur at the project sites, so no effect to these species would occur.

4.1.6.2 Alternative B

No federally endangered and threatened wildlife or plant species are known at Goose or Crescent islands or are anticipated to occur at the at-risk islands, so no effects to these species are expected. CATE dissuasion at incipient colony sites identified for adaptive management (non-at-risk islands) or the creation of habitat enhancement sites for CATE habitat could result in potential impacts to federally endangered and threatened wildlife or plant species if these species are present there, e.g., loss of habitat and changes in predator/prey relationships. Site-specific examination of potential impacts to federally endangered and threatened wildlife or plant species at these dissuasion and enhancement sites will be performed during supplemental/tiered NEPA analysis.

4.1.6.3 Alternative C

No federally endangered and threatened wildlife or plant species are known at Goose or Crescent islands or anticipated to occur at the at-risk islands, so no effect to these species are expected would occur.

4.1.6.4 Alternative D

No federally endangered and threatened wildlife or plant species are known at Goose or Crescent islands or anticipated to occur at the at-risk islands, so no effects to these species are expected.

4.1.7 Vegetation

4.1.7.1 Alternative A

Under this alternative no impacts to vegetation would occur on at-risk islands, as no management action would be performed. On Goose and Crescent Islands, vegetation would continue to be influenced by the presence of CATEs and gulls.

4.1.7.2 Alternative B

Alternative B includes modification of vegetation as an action. At Goose Island, rope and flagging and the placement of related support structures would likely have small (incidental damage to plants by workers and equipment) to insignificant impacts on vegetation on site due to the widely spaced sagebrush-dominated plant communities on site and the ability to place support structures in between these plants. If the use of rope and flagging is unsuccessful for CATE dissuasion at Goose Island, cobble material from an approved source may be used to modify the island. The potential emplacement of cobble may have some impact on these plant communities. However, the cobble material would be placed in a manner to avoid individual plants as much as possible, so minimal impacts to vegetation at Goose Island would occur.

Effects to plant species on the island during both construction and maintenance of the modified habitat on Crescent Island would occur during Phase 2. Construction activities at the existing CATE nesting site would include excavating soil, planting willows, placing silt fencing, creating a berm along the outside water edge of the nesting site, and potentially placing woody debris either from nonnative live trees present on the island, such as Russian olive, or the use of dead trees. Additionally, other potential relocation areas on the island would be covered with woody debris from either nonnative live trees present on the island or with dead trees. All of these actions have the potential to impact plants present in the area.

As a potential adaptive management action for CATE dissuasion at Crescent Island, cobble material from an approved source may be used to modify portions of the island. The potential emplacement of cobble may have some impact on plant communities. However, the cobble material would be placed primarily in areas devoid of vegetation. In locations with vegetation present, cobble would be placed in a manner to avoid individual plants so that any impacts to vegetation would be minimal.

Modification of vegetation would also have direct positive effects. Most of the excavation area is devoid of vegetation due to surface scratching by CATEs to create nest scrapes and potentially due to excessive amounts of ammonia from concentrated CATE and gull guano. The excavation of this area and the planting of native willow species would provide a greater presence of native plant assemblages on the island. Moreover, vegetated areas around the existing CATE nesting site and at other potential relocation areas around the island have large communities of nonnative noxious weeds such as perennial pepperweed, diffuse knapweed, and kochia. Removing these nonnative plant species would augment the succession of native vegetation on the island. Additionally, cutting down and using Russian olive as woody debris reduces the presence of nonnative species on the island, as these trees are nonnative species. To avoid excessive impacts on native vegetation near the northeast side of the excavation area, the berm would be offset ten feet from the waterline.

Any rope and flagging at the at-risk islands is also anticipated to have very small to insignificant impacts to vegetation, as installation related to support structures such as pier blocks and posts can be placed around plant communities on these islands.

Potential impacts to vegetation at incipient colony dissuasion sites identified during adaptive management (non-at-risk islands) or the creation of CATE habitat at potential enhancement sites could result depending on the level of disturbance. These impacts could be similar to those at Goose, Crescent and the at-risk islands such as weed and tree removal. Site-specific examination of potential impacts to vegetation at these locations will be performed during supplemental/tiered NEPA analysis.

Based on the above discussion, Alternative B would have no significant impacts to vegetation.

4.1.7.3 Alternative C

Alternative C is anticipated to have effects similar to those of Alternative B. Alternative C would have no significant impacts to vegetation.

4.1.7.4 Alternative D

Alternative D is anticipated to have effects similar to those of Alternatives B and C. Alternative D would have no significant impacts to vegetation.

4.2 Physical Environment

4.2.1 Geology and Soils

4.2.1.1 Alternative A

As the No Action Alternative, Alternative A would maintain existing geology and soil site conditions. In areas with concentrated CATE and gull nesting, CATE nest scrapes and CATE and gull guano would continue to impact soils in a manner similar to what exists currently.

4.2.1.2 Alternative B

Under this alternative, the installation of roping and flagging at Goose Island at the existing CATE nesting sites would not cause any significant disturbance of soils. Installation of support structures for rope and flagging would be placed directly on the ground surface. If CATE dissuasion is not successful using roping and flagging, the potential emplacement of cobbles on the site, in Phase 2, may cause some soil disturbance and related dust issues. However, this would be temporary in nature and is not likely to generate significant quantities of dust. If dust does become as issue as determined by Reclamation staff, dust suppression could be used at Goose Island. If water spray is used, it could act to cement loose materials into a more erosion-resistant crust. Water spray would likely be applied using a backpack sprayer or similar equipment. Any materials with loose fines that are stockpiled on site would be covered to prevent wind erosion.

As discussed in Section 2, during Phase 1 at Crescent Island limited soil excavation may be needed to facilitate establishment of willow at the test site. Phase 2 may include excavation of the existing CATE nesting site as well as an area around the periphery of the nesting area. Due to the potential presence of contaminants identified in Section 3.2.1, soil testing may be necessary to determine the concentrations of any contamination at the island prior to any soil-disturbing activities. Material from the CATE nesting site excavation would be utilized to create an approximately 4-foot-tall berm along the northeast limits of the existing nesting area as a visual deterrent for CATE nesting. The berm would be armored with a rocky substrate such as riprap or cobbles from a pre-approved source.

During Phase 1 and 2 habitat modification activities, there is a risk of wind erosion occurring. At the test willow planting site in Phase 1, it is anticipated that the willows themselves will act as a windbreak so that any loose soil materials are protected from wind erosion. The presence of the rooted willows will also provide soil stability limiting the potential for erosion during rainfall events. In Phase 2, the berm may have willow plantings at its base to provide additional CATE dissuasion and to act as windbreak and provide soil stability. Armoring the berm would protect it from erosion due to wind and rain events. During construction, if significant time exists between berm construction and berm armoring, loose materials would be covered to minimize the possibility of erosion. Additionally, cobble material may be used as a potential adaptive management action for CATE dissuasion at Crescent Island and may cause some minor soil disturbance and dust issues. For all phases of construction, best management practices (BMPs) would be utilized. As with Goose Island, dust suppression would be used if dust becomes as issue as determined by the Corps, USFWS, or contractor staff on site during construction; a backpack sprayer or similar equipment would be used for suppression.

Offsetting the berm by ten feet from the edge of the waterline would also minimize native vegetation disturbance, thereby retaining existing windbreaks and minimizing exposure of additional loose soil materials. Additionally, silt fencing used for CATE dissuasion during willow recruitment would also provide a windbreak. Post-habitat modification, the presence of armoring on the berm, the willow plantings, and coarse woody debris would minimize the potential for soil impact from wind erosion.

With regard to the at-risk islands, the installation of roping and flagging at identified CATE nesting sites would not cause any significant disturbance of soils, because the pier blocks used for supporting the posts would be placed directly on the ground surface.

Activities at incipient colony dissuasion sites identified as part of adaptive management (non-at-risk islands) and the creation of enhancement sites for CATE habitat could result in potential impacts to geology and soils depending on the level of disturbance caused by site creation. Soil disturbance such as excavation could contribute to wind erosion and dust issues. Site-specific examination of potential impacts to geology and soils at these locations will be performed during supplemental/tiered NEPA analysis.

Based on the above discussion, Alternative B would not have any significant impacts to geology or soils.

4.2.1.3 Alternative C

. Under this alternative, some minor additional soil disturbance activities such as scrape flattening by hazers would occur. However any effects to soils from these activities are anticipated to be minimal. Alternative C would not have any significant impacts to geology or soils.

4.2.1.4 Alternative D

Alternative D is anticipated to have effects similar to those of Alternatives B and C. Alternative D would not have any significant impacts to geology or soils.

4.2.2 Floodplain/Water Elevation

4.2.2.1 Alternative A

As the No Action Alternative, Alternative A would have no effects to floodplain/water elevation.

4.2.2.2 Alternative B

Although Goose and Crescent Islands and the at-risk islands are all located in floodways, any habitat modifications being performed at these islands would have no impacts on floodplains or on water elevations. All work at the islands would be performed above the ordinary high water mark and would occur on the surface of the islands.

Impacts to floodplains and water elevation at incipient colony dissuasion sites (non-at-risk islands) identified as part of adaptive management are anticipated to be similar to those at Goose and Crescent Islands and the at-risk islands. The creation of habitat enhancement sites for CATE habitat could result in potential impacts to floodplains or water elevation depending on the type of activity needed, e.g., the addition of fill material or excavation within a floodplain. However, site-specific examination of potential impacts to floodplains and water elevation at these locations will be performed during supplemental/tiered NEPA analysis.

Alternative B would have not have any significant impacts to floodplains or water elevations.

4.2.2.3 Alternative C

Alternative C is anticipated to have effects similar to those of Alternative B. Alternative C would not have any significant impacts to floodplains or water elevations.

4.2.2.4 Alternative D

Alternative D is anticipated to have effects similar to those of Alternatives B and C. Alternative D would not have any significant impacts to floodplains or water elevations.

4.2.3 Water Quality

4.2.3.1 Alternative A

As the No Action Alternative, Alternative A would have no effects to water quality.

4.2.3.2 Alternative B

Due to the arid climate surrounding both Goose and Crescent Islands and the at-risk islands, as well as the nature and location of all potential actions to be performed under Phase 1 and 2 (i.e., no in-water work, all work above ordinary high water), impacts to water quality are not anticipated. However, the BMPs implemented at the project sites for wind erosion would also provide protection for any potential water quality impacts, which, if they do occur, would primarily be due to sediment in stormwater runoff.

At Goose Island, the installation of roping and flagging at the existing CATE nesting sites would not cause any significant disturbance of soils. If CATE dissuasion is not successful using roping and flagging, the potential emplacement of cobbles on the site, in Phase 2, could cause some soil disturbance and related dust issues. However, this would be temporary in nature and would not likely generate significant quantities of loose materials. If dust became an issue, dust suppression could be used at Goose Island. If water spray is used, it could act to cement loose materials into a more erosion-resistant crust. The spray would be applied in quantities sufficient only to control dust and not in large enough quantities to create runoff. Any materials with loose fines that are stockpiled on site would be covered to prevent potential stormwater runoff and impacts to water quality.

At Crescent Island, during Phase 1, the willow plantings at the test site would minimize the potential for stormwater runoff in that area by promoting soil stability. During Phase 2, armoring the berm would protect it from water erosion by protecting the sandy substrate used for the berm. During construction, if significant time exists between berm construction and berm armoring, loose materials would be covered to minimize the possibility of stormwater runoff. The potential emplacement of cobbles on the site as an adaptive management issue could cause some soil disturbance and related dust issues. If dust becomes an issue, dust suppression could be used. It is likely that if water spray is used, it could act to cement loose materials into a more erosion-resistant crust. The spray would be applied in quantities sufficient only to control dust and not in large enough quantities to create runoff. Offsetting the berm by 10 feet from the edge of the waterline would minimize the possibility of materials entering the water during construction and would also minimize native vegetation disturbance, thereby minimizing exposure of additional loose soil materials which could end up in stormwater. Additionally, silt fencing used for CATE dissuasion during willow recruitment would also detain stormwater. Post-habitat modification, the presence of armoring on the berm, the berm itself, the depth of the excavated area, the willow plantings, and coarse woody debris would protect soils and trap loose materials and would minimize the potential for sediment-laden stormwater runoff.

With regard to the at-risk islands, the installation of roping and flagging at identified CATE nesting sites would not cause any significant disturbance of soils. Therefore, sediment impacts from stormwater are not anticipated.

Impacts to water quality at incipient colony dissuasion sites (non-at-risk islands) identified as part of adaptive management are anticipated to be similar to those at Goose and Crescent Islands and the at-risk islands. The creation of enhancement sites for CATE habitat could result in potential impacts water quality depending on the type of activity needed, e.g., the addition of fill material or excavation below the ordinary highwater mark. However, site-specific examination of potential impacts to water quality at these locations will be performed during supplemental/tiered NEPA analysis.

Based on the above discussion, Alternative B would have not have any significant impacts to water quality.

4.2.3.3 Alternative C

Alternative C is anticipated to have effects similar to those of Alternative B. Alternative C would not have any significant impacts to water quality.

4.2.3.4 Alternative D

Alternative D is anticipated to have effects similar to those of Alternatives B and C. Alternative D would not have any significant impacts to water quality.

4.2.4 Greenhouse Gas Emissions

4.2.4.1 Alternative A

As the No Action Alternative, Alternative A would have no effects to GHG emissions.

4.2.4.2 Alternative B

Impacts to GHG emissions from Alternative B would likely be limited primarily to construction activities for habitat modifications at Goose, Crescent and the at-risk islands in Phases 1 and 2. At Goose Island, motor boat transportation to and from the island in Phase 1 and the potential use of a helicopter for substrate modification in Phase 2 would cause limited and ephemeral emissions. Additionally, motor boat trips to the island to maintain habitat modification structures would similarly be limited and of short duration. Due to the very minor amount and the transitory nature of these emissions, no significant impacts to GHG are expected at Goose Island.

At Crescent Island, motor boat transportation to and from the island in Phase 1 for test willow planting and the potential use of small earthmoving equipment and related construction equipment in Phase 2 would cause limited and ephemeral emissions. Additionally, motor boat trips to the island to maintain habitat modification structures would similarly be limited and of short duration. Due to the very minor amount and the transitory nature of these emissions, no significant impacts to GHG are expected at Crescent Island.

For the at-risk islands, any emissions would be related to motor boat transportation to and from the islands for construction and maintenance of habitat modification structures. Due to the very minor amount and the transitory nature of these emissions, no significant impacts to GHGs are expected at the at-risk islands.

Impacts related to greenhouse gas emissions at incipient colony dissuasion sites (non-at-risk islands) identified as part of adaptive management and in the creation of habitat enhancement sites are anticipated to be similar to those at Goose and Crescent Islands and the at-risk islands. However, site-specific examination of potential impacts to water quality at these locations will be performed during supplemental/tiered NEPA analysis.

Based on the above discussion, Alternative B would not have any significant impacts to GHG emissions.

4.2.4.3 Alternative C

Alternative C is anticipated to have effects similar to those of Alternative B. Although periodic motor boats trips to Goose and Crescent Islands for hazing would be required, these trips would likely be coupled with other activities, such as habitat modification maintenance, so that hazing activities under this alternative do not represent a significant addition of boat-related emissions. Therefore, Alternative C would have no significant impacts to GHG emissions.

4.2.4.4 Alternative D

Alternative D is anticipated to have effects similar to those of Alternatives B and C. Alternative D would have no significant impacts to GHG emissions.

4.3 Cultural Resources

4.3.1 Alternative A

As the No Action Alternative, Alternative A would have no significant impacts to cultural resources.

4.3.2 Alternative B

Under Alternative B both Goose and Crescent Islands would be subjected to the type of ground disturbing activities with the potential to affect cultural resources. With regard to Goose Island, archaeological survey documented by archaeologists from the Corps (Hall 2013) confirmed that no archaeological sites were present. Consultation required under Section 106 of the NHPA also confirmed that no Indian Trust Assets or historic properties of cultural or religious significance to Indian tribes were present at Goose Island. Therefore, all of the proposed dissuasion activities at Goose Island would not have an impact on cultural resources.

Crescent Island in a non-historic, human-made island created with dredge spoils in 1985. All of the proposed CATE dissuasion activities here would not have impacts on cultural resources.

Alternative B calls for potential adaptive management actions at adjacent islands found throughout the interior Columbia Basin if levels of CATE predation increase in these areas. While only some adaptive management actions are specifically defined at this time and are contingent upon monitoring activities and coordination with the respective land managers, these actions do have the potential to cause impacts to cultural resources. As noted in Section 3.4.2.3 some of these potential adaptive management locations are known to have cultural resources. The plan discusses similar actions at some of these at-risk islands including the use of rope and flagging or the manipulation of substrates on the islands to dissuade birds. As noted in the NHPA Section 106 consultation report (Hall 2013), no specific actions associated with these at-risk sites, or any actions not specifically occurring at Goose and Crescent Islands, would occur without additional Section 106 consultation. Predation reduction activities including those at dissuasion sites identified for adaptive management (non-at-risk islands) or the creation of habitat enhancement sites would have to be evaluated on a site-by-site basis via supplemental/tiered NEPA analysis and a Section 106 determination of effect would be a contributing factor in decision-making for all future actions. It would be necessary to either avoid impacts or develop acceptable mitigation prior to the implementation of any actions that would result in significant impacts.

4.3.3 Alternative C

Alternative C is anticipated to have effects similar to Alternative B.

4.3.4 Alternative D

Alternative D is anticipated to have effects similar to Alternatives B and C.

4.4 Built Environment and Socioeconomics

4.4.1 Built Environment

4.4.1.1 Alternative A

As the No Action Alternative, Alternative A would have no effects to the built environment.

4.4.1.2 Alternative B

Since no built structures are at or immediately adjacent to Goose or Crescent islands or the at-risk islands, Alternative B would not have any significant impacts on the built environment. It is unknown at this time if socioeconomic impacts would be associated with activities at incipient colony dissuasion sites (non-at-risk islands) identified as part of adaptive management or habitat enhancement sites. Site-specific examination of potential impacts to the built environment and socioeconomics at these locations will be performed during supplemental/tiered NEPA analysis.

4.4.1.3 Alternative C

Since no built structures are at or immediately adjacent to Goose or Crescent islands or the at-risk islands, Alternative C would not have any significant impacts on the built environment.

4.4.1.4 Alternative D

Since no built structures are at or immediately adjacent to Goose or Crescent islands, or the at-risk islands, Alternative D would not have any significant impacts on the built environment.

4.4.2 Socioeconomic

4.4.2.1 Commercial and Recreational Fisheries

Alternative A

As the No Action Alternative, Alternative A would have no effects to commercial and recreational fisheries over those that currently exist. CATEs consume commercially and recreationally harvested fish species such as salmonids. In Alternative A, CATEs would likely continue to have the same impacts to commercially and recreationally available fish as currently exist.

Alternative B

With dissuasion of CATEs at Crescent and Goose Islands, the at-risk islands, sites identified during adaptive management (non-at-risk islands) and enhancement sites, benefits to salmonids could accrue as discussed in Section 4.1.3. The decrease in salmonid consumption by CATEs could result in beneficial effects to commercial and recreational fisheries if reduction of CATE predation aids overall salmon recovery in the Columbia River Basin.

Some minor effects to commercial and recreational fisheries related to non-ESA-listed salmonids and other fishes could occur. It is not anticipated that impacts to fisheries related to non-ESA-listed salmonids and other fish species would be significant under Alternative B. Within the context of a such a wide geographical area, the relatively small quantity of CATEs relocated from Goose and Crescent Islands and the at-risk islands would not be anticipated to have measurable effects to commercial and recreational fish species. Some CATEs would likely disperse to various locations outside of the inland Columbia River Basin along the western portion of North America or to an enhancement site (s) which would be selected based on availability of an adequate, sustainable food supply.

Impacts to commercial and recreational fisheries from birds dissuaded from incipient colony sites identified during adaptive management (non-at-risk islands) are anticipated to be very similar to those relocated from Goose and Crescent Islands and the at-risk islands. At habitat enhancement sites, CATEs could have increased predation upon non-ESA-listed salmonids and other fish related to commercial and recreational fisheries. However, site-specific examination of potential impacts at dissuasion sites identified as part of adaptive management or enhancement sites to commercial and recreational fisheries will be performed during supplemental/tiered NEPA analysis.

Based on the above discussion, Alternative B would have no significant impacts to commercial and recreational fisheries related to non-ESA-listed salmonids and other fish species.

Alternative C

The effects of this alternative to commercial and recreational fisheries are anticipated to be similar to those of Alternative B.

Alternative D

The effects of this alternative to commercial and recreational fisheries are anticipated to be similar to those of Alternatives B and C.

4.4.2.2 Tribal Fisheries

Alternative A

Effects are anticipated to be similar to those described above in Commercial and Recreational Fisheries. As the No Action Alternative, Alternative A would have no effects to tribal fisheries over those that currently exist. CATEs consume tribally harvested fish species such as salmonids. In Alternative A, CATEs would likely continue to have the same impacts to tribally available fish as currently exist.

Alternative B

With dissuasion of CATEs at Crescent and Goose Islands, the at-risk islands, incipient colony dissuasion sites identified as part of adaptive management (non-at-risk islands) and habitat enhancement sites, benefits to salmonids could accrue as discussed in Section 4.1.3. The decrease in salmonid consumption by CATEs could result in beneficial effects to tribal fisheries if reduction of CATE predation aids overall salmon recovery in the Columbia River Basin.

Some minor effects to tribal fisheries related to non-ESA-listed salmonids and other fishes could occur. It is not anticipated that impacts to fisheries related to non-ESA-listed salmonids and other fish species would be significant under Alternative B Within the context of a such a wide geographical area, the relatively small quantity of CATEs relocated from Goose and Crescent Islands would not be anticipated to have measurable effects to the availability of these fish species for tribal fisheries. Some CATEs would likely disperse to various locations outside of the inland Columbia River Basin along the western portion of North America or to an enhancement site (s) which would be selected based on availability of an adequate, sustainable food supply.

Impacts to tribal fisheries from birds dissuaded from incipient colony sites identified during adaptive management (non-at-risk islands) are anticipated to be very similar to those relocated from Goose and Crescent Islands and the at-risk islands. At habitat enhancement sites, CATEs could have increased predation upon non-ESA-listed salmonids and other fish related to tribal fisheries. However, site-specific examination of potential impacts at dissuasion sites identified as part of adaptive management or enhancement sites to tribal fisheries will be performed during supplemental/tiered NEPA analysis.

Based on the above discussion, Alternative B would have no significant impacts to tribal fisheries related to non-ESA-listed salmonids and other fish species.

Alternative C

The effects of this alternative to tribal fisheries are anticipated to be similar to those of Alternative B.

Alternative D

The effects of this alternative to tribal fisheries are anticipated to be similar to those of Alternatives B and C.

4.4.2.3 Incipient Colonies

Alternative A

Under the No Action Alternative, it is possible that incipient CATE colonies would develop throughout the inland Columbia River Basin. Although the distribution of CATEs may change, the overall inland population would likely not change. Because CATEs are currently not intensively managed, it is assumed that this lack of intensive CATE management would continue, even with the development of new incipient colonies. Therefore, Alternative A would have no socioeconomic effects over those that currently exist.

Alternative B

If incipient colonies develop in areas where the Action Agencies have no authority to act, and it is determined that these colonies are impacting salmonids or other resources, this could potentially result in a socioeconomic impact to other entities (states, PUDs, British Columbia, etc.). If dissuasion actions (e.g., visual deterrents) are necessary and implemented by these other entities while incipient colonies are still small (40 to 100 pairs), the economic impacts are also anticipated to be small. As a result, Alternative B would have no significant socioeconomic effects.

Alternative C

The effects of this alternative are anticipated to be similar to those of Alternative B.

Alternative D

The effects of this alternative are anticipated to be similar to those of Alternatives B and C.

Table 4-1. Summary of Effects

ANTICIPATED ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES[a]

	Alternative A	Alternative B	Alternative C	Alternative D
	No Action	**Habitat Modifications to Alter CATE Nesting Areas, Phase 1 and Phase 2**	**Alternative B, Habitat Modification Combined with CATE Hazing**	**Alternative C Habitat Modification and Hazing Combined with Egg Removal**
BIOLOGICAL ENVIRONMENT				
Federally Endangered and Threatened Fish	Impacts to threatened and endangered salmonids by CATE predation in the inland Columbia River Basin are anticipated to continue in similar trends to those currently present.	Alternative B would have positive impacts to threatened and endangered salmonids in the Columbia River Basin. Achieving 100% dissuasion at both sites would potentially save up to approximately 530,000 juvenile salmonids, both wild and hatchery, annually.	Alternative C is anticipated to have the same direct effects to Columbia River Basin salmonids as Alternative B but with an improved likelihood of success. Alternative C would have positive impacts to threatened and endangered salmonids in the Columbia River Basin.	Alternative D is anticipated to have the same direct effects to Columbia River Basin salmonids as Alternative B and C but with the highest potential for success. Alternative D would have positive impacts to threatened and endangered salmonids in the Columbia River Basin.
Other Fishes	Impacts to non-ESA-listed salmonids and other fish by CATE predation in the inland Columbia River Basin are anticipated to continue in similar trends to those currently present.	Effects to non-ESA-listed salmonids and other fish would likely increase with relocation of CATEs from Goose and Crescent Islands. It is anticipated that CATE fish consumption would shift to that of non-ESA-listed salmonids and other fish that are locally available at the dispersed sites over the wide geographical area that the CATEs would disperse over for nesting. Alternative B would not have significant impacts to non-ESA-listed salmonids and other fish species.	Effects to non-ESA-listed salmonids and other fish for Alternative C are anticipated to be similar to those of Alternative B. Alternative C would have no significant impacts to non-ESA-listed salmonids and other fish species.	Effects to non-ESA-listed salmonids and other fish for Alternative D are anticipated to be similar to those of Alternatives B and C. Alternative D would have no significant impacts to non-ESA-listed salmonids and other fish species.
Caspian Terns	No significant impacts to CATE.	This alternative has the potential to dissuade over 800 breeding pairs of CATEs from Goose and Crescent Islands collectively. Dissuaded CATE are anticipated to find new nesting sites because they are long-lived and nomadic and have a	Impacts are similar to Alternative B. Alternative C would not have significant impacts to CATE.	Alternative D includes the yearly removal of up to 200 CATE eggs at Goose and Crescent Islands and the at-risk islands combined. Alternative D impacts are similar to Alternatives B and C. Alternative D represents the most effective potential for

	Alternative A	Alternative B	Alternative C	Alternative D
	No Action	Habitat Modifications to Alter CATE Nesting Areas, Phase 1 and Phase 2	Alternative B, Habitat Modification Combined with CATE Hazing	Alternative C Habitat Modification and Hazing Combined with Egg Removal
		propensity to travel long distances to find nesting areas. The dissuasion of CATEs from Goose and Crescent Islands is not expected to have a significant impact on the western metapopulation of CATEs because they represent a small percentage of this population. Alternative B would not have significant impacts to CATE.		dissuading CATEs from Goose and Crescent Islands. Under Alternative D, no significant impacts to CATEs are expected.
Other Birds	No significant impacts to non-CATE bird species.	Gull nesting sites may be reduced due to CATE habitat modification with the potential of displacing 21,600 gulls (total adults, not pairs) at the two islands collectively. However, this is not anticipated to impact regional population levels because additional habitat is available throughout the Columbia River Basin and gulls are more flexible in their habitat requirements than are CATEs. Cutting live Russian olive or other nonnative trees on Crescent Island to create woody debris for visual barriers may have some small impact on nesting locations for Black-crowned Night Herons and Great Blue Heron, However, prior to any field activities, survey of existing trees would be performed to ascertain which trees may be supporting arboreal nesting. Any Trees supporting nest avian species would not be cut or utilized for placement of visual barriers.	Alternative C would have the same potential impacts as Alternative B with regard to habitat modification for non-CATE bird species. Because Alternative C also includes hazing activities, there is the potential that these hazing activities would disturb other birds, especially gulls, at Goose and Crescent Islands. Due to the co-location of CATE and gulls on these islands, it is anticipated that all gulls would have to be dissuaded from both islands to successfully accomplish CATE dissuasion without incurring any gull take. Hazing would be conducted on foot, and hazers would pass through areas with CATEs to scare them away while dissuading gulls and potentially other waterbird species. Alternative C would not have significant impacts to non-CATE bird species.	Alternative D has the same potential impacts as Alternatives B and C. As with Alternative C, CATE hazers would also haze gulls. CATE egg removal activities would not disturb non-CATE bird species any more than hazing by itself. No non-CATE bird eggs would be disturbed or taken. Alternative D would not have significant impacts to non-CATE bird species.

	Alternative A	Alternative B	Alternative C	Alternative D
	No Action	Habitat Modifications to Alter CATE Nesting Areas, Phase 1 and Phase 2	Alternative B, Habitat Modification Combined with CATE Hazing	Alternative C Habitat Modification and Hazing Combined with Egg Removal
		Alternative B would not have significant impacts to non-CATE bird species.		
Mammals	No significant impacts to mammals.	The passive dissuasion activities would have no or negligible impacts to mammals on Goose and Crescent Islands or the at-risk islands. Although CATE would be dissuaded from these areas (reducing their availability as prey), gulls would be still be at these sites in abundance to provide an adequate prey base. Some active management at the potential habitat enhancement sites may include increased visits by field staff to implement predator control. None of the controls would have population impacts to any of the affected species. Alternative B would not have significant impacts to mammals.	Effects to mammals under Alternative C are similar to those under Alternative B. The presence of hazers could potentially cause periodic disturbance to any mammals present at these locations but impacts are expected to be negligible. Alternative C would not have significant impacts to mammals.	Effects to mammals under Alternative D are expected to be very similar to those under Alternative C. Alternative D would not have significant impacts to mammals
Federally Endangered and Threatened Wildlife and Plants	No federally endangered and threatened wildlife or plant species are known to occur at the project sites so no effect to these species would occur.	No federally endangered and threatened wildlife or plant species are known to occur at Goose or Crescent islands or anticipated to occur at the at-risk islands, so no effects to these species are expected	No federally endangered and threatened wildlife or plant species are known to occur at Goose or Crescent islands or anticipated to occur at the at-risk islands, so no effects to these species are expected	No federally endangered and threatened wildlife or plant species are known to occur at Goose or Crescent islands or anticipated to occur at the at-risk islands, so no effects to these species are expected
Vegetation	No significant impacts to vegetation.	Roping and flagging would have negligible impacts on vegetation (e.g., sagebrush) on site. The potential emplacement of cobble may have some impact on these plant communities. However, the cobble material would be placed in a manner to avoid these plant communities so that	Alternative C is anticipated to have effects similar to Alternative B. Alternative C would not have significant impacts to vegetation.	Alternative D is anticipated to have effects similar to Alternatives B and C. Alternative D would not have significant impacts to vegetation.

	No Action	Alternative B Habitat Modifications to Alter CATE Nesting Areas, Phase 1 and Phase 2	Alternative B, Habitat Modification Combined with CATE Hazing	Alternative D Alternative C Habitat Modification and Hazing Combined with Egg Removal
		minimal impacts to vegetation at Goose Island would occur. Cobble material from an approved source may be used to modify portions of Crescent Island. The potential emplacement of cobble may have some impact on plant communities. However, the cobble material would be placed primarily in areas devoid of vegetation In locations with vegetation present, cobble would be placed in a manner to avoid these plant communities so that any impacts to vegetation would be minimal. Planting native willow species would be a positive impact. Native plants would replace invasive species which is a positive impact. Alternative B would not have significant impacts to vegetation.		
PHYSICAL ENVIRONMENT				
Geology and Soils	No significant impacts to geology and soils.	Earth moving and soil disturbance would occur at Goose and Crescent Islands. However, this would be temporary in nature and BMPs would be used to reduce any dust or potential erosion that may be generated. Alternative B would not have any significant impacts to geology or soils.	Alternative C is anticipated to have effects similar to Alternative B. Alternative C would not have any significant impacts to geology or soils.	Alternative D is anticipated to have effects similar to Alternatives B and C. Alternative D would not have any significant impacts to geology or soils.
Floodplain / Water Elevation	No significant impacts to floodplain or water elevation.	Any habitat modifications being performed at these islands would not have impacts on floodplains or on water	Alternative C is anticipated to have effects similar to Alternative B. Alternative C would not have any significant	Alternative D is anticipated to have effects similar to Alternatives B and C. Alternative D would not have any significant

	Alternative A	Alternative B	Alternative C	Alternative D
	No Action	Habitat Modifications to Alter CATE Nesting Areas, Phase 1 and Phase 2	Alternative B, Habitat Modification Combined with CATE Hazing	Alternative C Habitat Modification and Hazing Combined with Egg Removal
		elevations as all work is being performed above the ordinary high water mark and occurring on the surface of the islands.	impacts to floodplains or water elevations.	impacts to floodplains or water elevations.
Water Quality	No significant impacts to water quality.	Due to the arid climate surrounding both Goose and Crescent Islands and the at-risk islands, as well as the nature and location of all potential actions to be performed under Phases 1 and 2 (i.e., no in-water work, all work above ordinary high water), impacts to water quality are not anticipated. BMPs would address potential for any potential water quality impacts. Alternative B would not have any significant impacts to water quality.	Alternative C is anticipated to have effects similar to Alternative B. Alternative C would not have any significant impacts to water quality.	Alternative D is anticipated to have effects similar to Alternatives B and C. Alternative D would not have any significant impacts to water quality.
Greenhouse Gas Emissions	No significant impacts to greenhouse gas emissions.	Minor amounts of emissions would be released under this alternative due to motor boat trips to the islands for habitat modification, helicopter use for substrate modification, and limited construction equipment used to construct berms or move earth. Due to the minor amount and the transitory nature of these emissions, Alternative B would not have any significant impacts to GHGs.	Alternative C is anticipated to have effects similar to Alternative B. Periodic trips to the islands would be necessary for hazing, but these trips would only take place during the nesting period. Alternative C would not have significant impacts to GHG emissions.	Alternative D is anticipated to have effects similar to Alternatives B and C. Alternative D would not have significant impacts to GHG emissions.
CULTURAL RESOURCES				
Cultural Resources	No significant impacts to cultural resources.	Under Alternative B both Goose and Crescent Islands would be subjected to the type of ground disturbing activities with the potential to affect cultural	Alternative C is anticipated to have effects similar to Alternative B. Alternative C would not have significant impacts to cultural or historic	Alternative D is anticipated to have effects similar to Alternatives B and C. Alternative D would not have significant impacts to cultural or historic

	Alternative A	Alternative B	Alternative C	Alternative D
	No Action	Habitat Modifications to Alter CATE Nesting Areas, Phase 1 and Phase 2	Alternative B, Habitat Modification Combined with CATE Hazing	Alternative C Habitat Modification and Hazing Combined with Egg Removal
		resources. With regard to Goose Island, archaeological survey documented by Corps archaeologists confirmed that no archaeological sites were present. Consultation confirmed that no Indian Trust Sites or historic properties of cultural or religious significance to Indian tribes were present at Goose Island. All of the proposed dissuasion activities at Goose Island would not have an impact on cultural resources. Crescent Island is a non-historic, human-made island created with dredge spoils in 1985. All of the proposed CATE dissuasion activities here would not have impacts on cultural resources. No specific actions associated with at-risk islands, or any actions not specifically occurring at Goose and Crescent Islands would occur without additional Section 106 consultation. Alternative B would not have significant impacts to cultural or historic resources.	resources.	resources.
BUILT ENVIRONMENT AND SOCIOECONOMICS				
Built Environment	No significant impacts to the built environment.	No built structures are at or immediately adjacent to the dissuasion or at-risk islands. Alternative B would not have any significant impacts on the built environment.	No built structures are at or immediately adjacent to the dissuasion or at-risk islands. Alternative C would not have any significant impacts on the built environment.	No built structures are at or immediately adjacent to the dissuasion or at-risk islands. Alternative D would not have any significant impacts on the built environment.
Commercial and Recreational	CATEs would likely continue to have the same impacts to	100% dissuasion of CATE at Crescent and Goose Islands	The effects of this alternative to commercial and recreational	The effects of this alternative to commercial and recreational

		Alternative B		Alternative D
	No Action	**Habitat Modifications to Alter CATE Nesting Areas, Phase 1 and Phase 2**	**Alternative B, Habitat Modification Combined with CATE Hazing**	**Alternative C Habitat Modification and Hazing Combined with Egg Removal**
Fisheries	commercially and recreationally available fish as currently exist.	would increase the number of salmonids in the Columbia River Basin. The decrease in salmonid consumption by CATE could result in beneficial effects to commercial and recreational fisheries if reduction of CATE predation aids overall salmon recovery in the Columbia River Basin. Some minor effects to commercial and recreational fisheries related to non-ESA-listed salmonids and other fishes could occur. However, within the context of a such a wide geographical area, the relatively small quantity of CATEs relocated from Goose and Crescent Islands would not be anticipated to have measurable effects to the availability of these fish species for commercial and recreational fisheries. Alternative B would have no significant impacts to commercial and recreational fisheries related to non-ESA-listed salmonids and other fish species.	fisheries are anticipated to be similar to those of Alternative B.	fisheries are anticipated to be similar to those of Alternatives B and C.
Tribal Fisheries	CATEs would likely continue to have the same impacts to Tribally available fish as currently exist.	100% dissuasion of CATE at Crescent and Goose Islands would increase the number of salmonids in the Columbia River Basin. The decrease in salmonid consumption by CATE could result in beneficial effects to Tribal fisheries if reduction of CATE predation aids overall salmon recovery in the	The effects of this alternative to Tribal fisheries are anticipated to be similar to those of Alternative B.	The effects of this alternative to Tribal fisheries are anticipated to be similar to those of Alternatives B and C.

	Alternative A	Alternative B	Alternative C	Alternative D
	No Action	Habitat Modifications to Alter CATE Nesting Areas, Phase 1 and Phase 2	Alternative B, Habitat Modification Combined with CATE Hazing	Alternative C Habitat Modification and Hazing Combined with Egg Removal
		Columbia River Basin. Some minor effects to commercial and recreational fisheries related to non-ESA-listed salmonids and other fishes could occur. However, within the context of a such a wide geographical area, the relatively small quantity of CATEs relocated from Goose and Crescent Islands would not be anticipated to have measurable effects to the availability of these fish species for commercial and recreational fisheries. Alternative B would have no significant impacts to commercial and recreational fisheries related to non-ESA-listed salmonids and other fish species.		

a This only lists potential impacts related to activities at Goose and Crescent Islands and the at-risk islands and does not cover potential impacts that will be addressed under supplemental/tiered NEPA analysis for dissuasion sites identified during adaptive management or for enhancement sites.

SECTION 5.0 CUMULATIVE IMPACT

A cumulative impact is the impact on the environment that results from the incremental impacts or effects 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. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR § 1508.7). Input from resource agencies, Native American tribes, the IAPWG, and the public helped define the scope and scale of the cumulative impact analysis.

Actions that could potentially cause a cumulative impact when taken into consideration with the actions proposed under the alternatives evaluated in this EA are those past, present, and reasonably foreseeable future activities that may have an effect, either adverse or beneficial, on the human environment. These include, but are not limited to:

- Piscivorous bird dissuasion actions currently ongoing in the Columbia River estuary
- Avian predation activities at the FCRPS dams in the Columbia River Basin
- Habitat enhancement implemented for the Columbia River (Estuary) Tern Plan
- Operation of the FCRPS
- Other actions associated with implementation of the BiOp
- Other anthropogenic uses of the river including subsistence, commerce, transportation, and recreation
- Other programs aimed at conservation and/or recovery of federally listed fish or MBTA birds

The evaluation of cumulative effects was only conducted on the preferred alternative. This decision was based on the fact that the preferred alternative includes a combination of the actions considered for the other alternatives in this EA and therefore represents the maximum extent possible of the overall cumulative effects.

In addition to the FCRPS, there are many other federal and regional programs and plans to protect and restore salmonids in the Columbia River system. The activities under the proposed action would potentially have cumulative effects on resources also addressed by these plans via management actions aimed at CATEs and ESA-listed salmonids, as well other piscivorous birds such as DCCOs and gulls.

The cumulative effects analysis focuses on those resources that may be affected by the proposed action/alternatives and that lend themselves to truly meaningful analysis. Because the actions associated with IAPMP focus on reducing CATE predation of ESA-listed fish, this cumulative impacts analysis is likewise focused on potential effects to birds and fish.

5.1 Birds (CATEs and Other Birds)

5.1.1 Past, Present and Reasonably Foreseeable Future Actions

5.1.1.1 Corps Programs and Plans

The Corps maintains an annual Avian Predation Deterrent (APD) program at eight of its dams on the Lower Columbia and Lower Snake Rivers during the juvenile salmonid outmigration season as approved in the September 2005 FONSI for Avian Predation Deterrent Program, Lower Columbia and Lower Snake Rivers (Corps 2005). These dams include Ice Harbor, Lower Monumental, Little Goose, and Lower Granite dams on the Lower Snake River and McNary, Bonneville, The Dalles, and John Day on the Lower Columbia River.

The goal of the APD program is to implement the most practical and effective solutions for reducing piscivorous bird usage in areas near the dams where juvenile salmonids are susceptible to predation. The program entails implementing and maintaining an effective means of discouraging piscivorous bird predation at all forebay, tailrace, and bypass outfall locations at the Corps's dams on the Lower Columbia and Lower Snake Rivers. Currently, the U.S. Department of Agriculture Animal and Plant Health Inspection Service assists the Corps in implementation of the APD program primarily by conducting the hazing component of the Corps's program. While the APD is currently comprised solely of non-lethal measures, the Corps is considering implementing limited lethal take of gulls and DCCOs at McNary Dam on the Columbia River, and at Ice Harbor, Lower Monumental, Little Goose, and Lower Granite Dams on the Lower Snake River in Washington. This action could annually include take of up to 650 RBGUs, 1,200 CAGUs, and 150 DCCOs, if implemented.

Dam operations are generally focused on gull and DCCO species and rely primarily upon passive dissuasion measures (such as wires and spikes to discourage roosting and/or nesting) and active hazing measures (such as propane cannons and pyrotechnics). These activities affect very few CATEs and few, if any, CATEs are lethally taken as part of dam operations within the Columbia River Basin. Temporary disturbance of CATEs that attempt to feed at dams may occur as a result of these actions. As a result, the past, present, and foreseeable future actions, which are part of the APD program, will not have a measurable effect on CATEs.

The Corps is currently conducting CATE management activities in the Lower Columbia River estuary including dissuasion at East Sand Island which is included under the Estuary Caspian Tern Management Plan. One objective of the plan is to reduce the number of East Sand Island CATE nesting pairs to between 3,125 to 4,375 pairs by limiting habitat availability (USFWS 2005a). Additionally, CATE hazing and limited CATE egg take occur annually on Rice Island, Pillar Rock Island, and Miller Sands Spit in the Columbia River estuary upstream of East Sand Island to preclude establishment of CATE colonies on these islands. The impacts associated with these efforts were disclosed as part of an earlier environmental impact statement (EIS) and record of decision (ROD) which committed to implementation of CATE habitat enhancement as part of the plan. Implementation monitoring of this plan has been conducted annually to inform continued implementation of management actions. Subsequent environmental review, including NEPA analysis, has been conducted prior to implementation of actions associated with East Sand Island that were not originally anticipated within the EIS and ROD including development of alternate habitat enhancement sites and implementation of East Sand Island dissuasion measures that were not proposed as part of the EIS.

Per the Estuary Caspian Tern Management Plan, reduction of habitat in the estuary, at East Sand Island, was contingent upon creation of the new nesting habitat outside the basin, at a 2:1 ratio. During implementation of the Caspian Tern Plan, the response from CATEs was somewhat unexpected, particularly with respect to how many nesting pairs occupy available habitat. In 2012, nesting density at the East Sand Island tern colony increased to 1.06 nests per square meter, which is the highest nesting density ever observed at this colony (Roby et al. 2013). In 2012 approximately 6,400 nesting pairs occupied the space that was intended for 3,125 to 4,375 pairs (Roby et al. 2013). As part of adaptive management efforts, future NEPA analyses may consider further reductions of available CATE nesting habitat by approximately 0.5 acre on East Sand Island without constructing or enhancing additional nesting sites prior to reduction in habitat. This further reduction is being considered as a means to reduce the amount of predation on ESA-listed juvenile salmonids while addressing unexpected increased nesting density of CATEs since management efforts began.

Currently, 8.3 acres of habitat have been created on nine islands in Oregon and California with approximately 6.8 acres available in 2012 (Roby et al. 2013). To attract CATEs to newly created islands, a combination of social attraction methods (decoys and playback) as well as limited predator (gull) control have been used (Roby et al. 2013). Of the nine islands that were created as part of the Estuary Caspian Tern Management Plan, six had nesting CATEs in 2012, with the majority of the CATEs nesting on Malheur Lake, Sheepy Lake, Tule Lake, and Crump Lake and very few CATE pairs on East Link and Gold Dike (Roby et al. 2012). Low CATE nesting success on some newly created islands was due in part to predation (both mammalian and avian) and possibly low prey availability at two sites (Crump Lake and Summer Lake Wildlife Area) (Roby et al. 2013). The Portland District is currently using or planning to use a combination of social attraction and predator control as needed at some of these newly created islands to make them more attractive to nesting CATEs (Carlsen 2014 personal communication).

In addition to CATE hazing activities in the Columbia River estuary, hazing occurred at the Port of Bellingham in 2011 and 2012 (Roby et al. 2013). The Bellingham CATE colony was first noted in 2009 when 200 adult CATEs, some with young, were counted in early July. In 2010 this colony contained an estimated 1,400 to 2,000 CATE pairs and had limited nest predation, fledging an estimated 900 to 1,400 young CATEs (Roby et al. 2013). Based on band re-sightings, some of the Bellingham CATEs were determined to be from the inland Columbia River Basin (Roby et al. 2013).

5.1.1.2 Fish and Wildlife Service Plans, Policies, and Programs

Management and conservation measures for CATEs are described in the Status Assessment and Conservation Recommendations for the CATE in North America (Shuford and Craig 2002) and are intended for use by USFWS and other partners interested in CATE conservation. CATE conservation needs are also included in the Regional Seabird Conservation Plan (USFWS 2005b). The purpose of this plan is to identify USFWS goals and priorities for seabird conservation in the Pacific Region, including specific objectives and strategies to achieve these goals. The plan serves to direct and coordinate USFWS activities towards seabird conservation in the future.

Crescent Island is located within the McNary National Wildlife Refuge. USFWS's Comprehensive Conservation Plan (CCP) for the McNary National Wildlife Refuge provides management guidance for the refuge for the years 2007 to 2022. The CCP provides guidance for improving shrub-steppe, riparian, wetland, and cliff-talus habitats for the long-term conservation of native plants and animals and migratory birds. Objective 6a of the CCP is to maintain water bird populations, including those on Crescent Island. Strategies to achieve this goal include managing island substrate and vegetation to ensure that a diversity of nesting habitats for colonial waterbirds is available. It also includes the following:

> "In response to Endangered Species Act requirements for federally listed salmon stocks, consider a range of options to limit piscivorous waterbird depredation, if scientifically sound data demonstrates a critical need to limit depredation due to significant impacts on salmon survival. If controls are deemed appropriate, a written step-down plan and NEPA documentation shall be developed with evaluation of the effects to fish and waterbird populations. Actions shall be planned and implemented using a multi-agency approach and multiple funding sources." (CCP pg. 2-21)

Thus, while the CCP aims to protect CATE and other waterbird populations at Crescent Island, it also recognizes the need for CATE management for salmon protection.

The proposed action is unlikely to cause a significant adverse impact to the western North American CATE metapopulation. When viewed in the context of these USFWS plans that have the potential to affect this species, the proposed action is not anticipated to result in increased cumulative adverse effects to CATEs. The proposed action is anticipated to have beneficial cumulative impacts to ESA-listed salmonids in the Columbia River Basin when considered within the context of these USFWS plans.

5.1.1.3 Northwest Power and Conservation Council Subbasin Plans

The Northwest Power Act of 1980 directs the Northwest Power and Conservation Council (NPCC) to develop a program for the protection, mitigation, and enhancement of fish and wildlife of the Columbia River Basin and make annual funding recommendations to BPA for projects to implement the program. Subbasin plans are being developed and contain strategies that will drive the implementation of NPCC's Columbia River Basin Fish and Wildlife Program at the subbasin level.

The Draft Lower Mid-Columbia Mainstem Subbasin Plan (NPCC 2004a) describes the presence of the following avian predators to salmonids: CATEs, gulls, DCCOs, and pelicans. Strategies to reduce and eliminate the increased presence of avian predators or improve and maintain the abundance of salmonid populations include improving flow, covering available habitat, and increasing habitat diversity to reduce potential for predation.

The Upper Middle Mainstem Subbasin Plan (NPCC 2004b) describes the immigration of CATEs, DCCOs, and gulls in the upper middle mainstem and that their presence may be a limiting factor on juvenile salmonid survival. This plan cites the WDFW mission, statewide strategies, a wild salmonid policy, and management plans for steelhead and salmon as frameworks for protection of anadromous salmonids, but the plan does not specify protection of salmonids from avian predation.

The proposed action is unlikely to cause a significant adverse impact to the western North American CATE metapopulation or to other piscivorous birds such as DCCO and gulls. When viewed in the context of NPCC plans that have the potential to affect these species, the proposed action is not anticipated to result in increased cumulative adverse effects to CATEs or other piscivorous bird species. The proposed action is anticipated to have beneficial cumulative impacts to ESA-listed salmonids in the Columbia River Basin when considered within the context of these NPCC plans.

5.1.1.4 State of Washington

Through a 25-year agreement with Reclamation, WDFW has management responsibilities for wildlife resources on Reclamation lands in the Columbia Basin that include parts of Potholes Reservoir and Banks Lake. In addition, WDFW owns Cabin

Island and has specific fishing regulations to reduce human disturbance around the privately owned Harper Island.

The WDFW Columbia Basin Wildlife Area Management Plan prepared in 2006 includes descriptions of the management units, the management priorities and challenges, and goals designed to support the priorities. There is no specific information regarding Goose Island or CATEs in the management plan; however, the management plan recognizes that a few of the management units provide nesting habitat for colonial nesting birds, including CATEs. The management plan notes that the increasing DCCO population has caused concern regarding recreational fish availability.

5.1.2 Cumulative Effects

5.1.2.1 Caspian Terns

CATEs are not currently intensively managed on Goose and Crescent Islands, though they are highly managed elsewhere in the western metapopulation (e.g., East Sand Island). Their strict habitat requirements for nesting (open areas with bare sand and minimal predator access) make them less adaptable to habitat loss than are many other species of birds. When dissuasion activities are implemented on Goose and Crescent Islands, the CATE regional population may experience temporary declines while displaced CATEs search for new nesting sites.

Approximately 84 percent of the western North American metapopulation occurs on the coast and 16 percent away from the coast (Shuford and Craig 2002). Other colonies are scattered throughout the coastal states and provinces ranging from Alaska to Mexico. As of 2011, the current estimate of the CATE western metapopulation is approximately 11,600 breeding pairs with over half of those birds occurring on East Sand Island in coastal Oregon (USFWS 2013a personal communication) (Table 3-3).

Other ongoing actions that may affect the regional CATE population include dam operations to control or reduce avian predation, the ongoing activities at East Sand Island, and the creation of other habitat enhancement sites.

While an overall decline in the CATE nesting population has occurred since 2008, it is unclear if this is indicative of a long-term trend in the population or whether this disturbance is temporary in nature due to dissuaded CATEs continuing to seek new nesting sites.

The numbers of CATE breeding pairs on Goose Island (Potholes Reservoir) and Crescent Island in 2012 were 459 and 422, respectively (Table 3-6) for a total of 881 breeding pairs (USFWS 2013a personal communication). The two-island total represents approximately 7.5 percent of the total number of breeding pairs in the western metapopulation and 0.4 percent to 0.7 percent of the global CATE population. Consequently, the proposed dissuasion actions on Goose and Crescent Islands would affect a relatively small proportion of the population of the western North America CATE metapopulation and overall worldwide population.

As stated in Section 4 of this document, the proposed action is unlikely to cause a significant adverse impact to the western North American CATE metapopulation or the global CATE population. While a short-term decrease in productivity could be expected due to the temporary loss of nesting habitat on Goose Island and Crescent Island, the proposed action is not anticipated to result in increased long-term adverse effects to CATEs due to the phased approach and use of adaptive management to ensure flexibility in both dissuasion measures and creation of additional habitat. As a result, when considered within the context of the other past, present, or reasonably foreseeable actions in the inland Columbia River Basin and the Lower Columbia River estuary under the FCRPS and the other programs described in Section 5.1.1, the proposed action and alternatives are not anticipated to have a significant cumulative negative impact to CATEs.

5.1.2.2 Other Birds

The key activities that should be considered in terms of cumulative impacts to other bird species are the other piscivorous bird dissuasion actions currently ongoing in the Columbia River estuary directed at CATEs and DCCOs and the gull management activities at dams in the Columbia River Basin under the ADP (as discussed above). The Corps is currently undertaking a NEPA analysis to consider limited lethal take of gull species as part of the ADP. These activities may have some local impacts to species such as gulls but would not likely impact the overall populations. The proposed management activities at the Goose and Crescent Islands, as well as the potential actions at habitat restoration sites, would not have an effect on the overall cumulative impacts.

The Corps's Portland District obtained a depredation permit from USFWS to allow for the take of CAGU, RBGU, great horned owls and black-crowned night herons to protect incipient CATE colonies related to the CATE management activities in the Lower Columbia River estuary. It is likely that any enhancement site(s) developed during Phase 2 of the preferred alternative would require a similar depredation permit. Analysis to support the need for a depredation permit, however, would be part of the supplemental/tiered NEPA evaluation that would be performed for the enhancement sites, and the depredation permitting process would be initiated as necessary at that time. Any control actions directed at avian predator species would only affect a few individuals and would have no impact on overall populations of the species. As a result, when considered within the context of the other past, present, or reasonably foreseeable actions in the inland Columbia River Basin and the Lower Columbia River estuary under the FCRPS and the other programs described in Section 5.1.1, the proposed action and alternatives are not anticipated to have a significant cumulative negative impact to these species.

The proposed action is unlikely to cause a significant adverse impact to the western North American CATE metapopulation or to other piscivorous birds such as DCCO and gulls. When viewed in the context of the other past, present, or reasonably foreseeable actions in the inland Columbia River Basin and the Lower Columbia River estuary under the FCRPS and the other programs described in Section 5.1.1, the proposed action and alternatives are not anticipated to have a significant cumulative negative impact to other piscivorous bird species.

5.2 Fish (Threatened and Endangered Species and Other Fish)

5.2.1 Past, Present and Reasonably Foreseeable Future Actions

5.2.1.1 Corps Other FCRPS Programs

Actions to protect and improve survival of listed salmonids within the FCRPS have been ongoing since the 1950s. However, more recent actions (since 2008) are prescribed in the BiOp RPAs, with a premise on adaptive management. The Action Agencies use the best available scientific information to make decisions on the implementation of these actions, achieve established performance standards, and make adjustments so that actions meet the BiOp goals. As previously mentioned, the BiOp RPAs follow an All-H Approach that includes improvements in the areas of the hydropower system, tributary and estuary habitat, hatchery reform, harvest, and predator management.

Hydropower actions benefit all listed species. Hydrosystem strategies to provide juvenile and adult survival improvements include water management, dam passage improvements (e.g., bypass, turbine, surface spill for juveniles and fish ladders for adults), spill operations, and juvenile fish transportation. Specific performance standards (such as 96 percent and 93 percent dam survival for spring and summer migrating juvenile fish, respectively) and metrics guide the priorities for action.

Habitat actions benefit all listed species. Habitat actions under the BiOp are targeted at biological needs, addressing priority populations and limiting factors. The habitat strategies involve protecting and improving tributary and estuary habitat, respectively, to increase fish survival. The Action Agencies are currently and will continue to improve habitat quality, improve in-stream flows on tributaries, remove stream fish passage barriers, and monitor and manage watersheds.

Predator management actions are designed to improve the survival of juvenile and adult fish as they pass through the hydrosystem. Implementation strategies focus on three areas: piscine predation control measures to increase survival of juvenile fish; avian predation control measures to increase survival of juvenile fish; *and marine mammal control.*

Hatchery actions involve funding FCRPS mitigation hatchery programs in a way that contributes to reversing the decline of downward-trending species. There are two strategies to meet this overall objective: (1) ensuring that hatchery programs funded by the Action Agencies as mitigation for the FCRPS are not impeding recovery, and (2) preserving and rebuilding genetic resources through safety-net and conservation actions to reduce short-term extinction risk and promote recovery.

Harvest actions are not a primary responsibility of the Action Agencies, but the agencies are encouraging research into improved harvest techniques that can increase the survival of naturally spawning fish.

Research, monitoring, and evaluation (RM&E) provide information to support planning and adaptive management and demonstrate accountability related to the implementation of hydropower and offsite actions for all species. RM&E encompasses project implementation, compliance monitoring, fish status monitoring, action effectiveness research, and critical uncertainties research.

Regional efforts to protect and recover threatened and endangered fish in the Columbia River Basin are comprehensive and reflect the complex life cycles of the fish themselves. Progress has been made each year by building step by step on each preceding year's successful effort. The Action Agencies work with regional interests to implement actions to strengthen Columbia River Basin salmon and steelhead stocks. The Action Agencies work closely with the region through the federal-state-tribal Regional Implementation Oversight Group, the Columbia Basin Fish Accords, and the Northwest Power and Conservation Council's Fish and Wildlife Program.

5.2.1.2 State of Oregon

The Oregon Plan is designed to restore the healthy function of Oregon's natural aquatic systems. It represents commitments on behalf of governments, interest groups, and private citizens from all sectors of the state. While the plan originated as an effort to address declining populations of coho salmon, in the 2 years since its initiation, the plan has engaged new participants, addressed new fish species, attained regional significance, and promoted unique approaches to natural resource issues on a state-wide basis (OPSW 2013).

The proposed action is unlikely to cause a significant adverse impact to the western North American CATE metapopulation or to other piscivorous birds such as DCCO and gulls. When viewed in the context of the Oregon Plan, the proposed action is not anticipated to result in increased cumulative adverse effects to CATEs or other piscivorous bird species. The proposed action is anticipated to have beneficial cumulative impacts to ESA-listed salmonids in the Columbia River Basin when considered within the context of the Oregon Plan.

5.2.1.3 Tribal Governments

The Wy-Kan-Ush-Mi Wa-Kish-Wit, or Spirit of the Salmon, plan is a joint restoration plan for anadromous fish in the Columbia River Basin prepared by the Nez Perce Tribe, Confederated Tribes of the Umatilla Reservation, Confederated Tribes of the Warm Springs Reservation, and the Confederated Tribes and Bands of the Yakama Indian Nation. It provides a framework for restoring anadromous fish stocks, specifically salmonids, Pacific lamprey (eels), and white sturgeon in upriver areas above Bonneville Dam. These tribal governments are now seeking to implement this plan and salmon restoration in conjunction with the states, other tribes, and the federal government, as well as in cooperation with their neighbors throughout the basin’s local watersheds and with other citizens of the Northwest. The proposed action is anticipated to have beneficial cumulative impacts to ESA-listed salmonids in the Columbia River Basin when considered within the context of the Spirit of the Salmon plan.

Additionally, the Columbia Basin Fish Accords are a tribal partnership between the Confederated Tribes of the Umatilla Reservation, Confederated Tribes of the Warm Springs Reservation, Confederated Tribes and Bands of the Yakama Indian Nation, the Shoshone Bannock Tribes, the Columbia River Intertribal Fish Commission, BPA, the Corps, and Reclamation. The fish accords commit the agencies responsible for the FCRPS to 10 years of funding to continue existing fish programs and to implement new priority fish projects managed by the tribes and states. The accords began in 2008 and currently run until 2018. The proposed action is anticipated to have beneficial cumulative impacts to ESA-listed salmonids in the Columbia River Basin when considered within the context of the fish accords.

5.2.1.4 Public Utility Districts

Chelan County and Douglas County PUDs worked cooperatively with state and federal fisheries agencies and tribes to develop hydropower habitat conservation plans for anadromous salmon and steelhead. The plans commit the two utilities to a 50-year program to ensure that their hydro projects (Chelan PUD Rocky Beach and Rock Island Hydro Projects and Douglas PUD Wells Hydro Project) have no net impact on mid-Columbia salmon and steelhead runs. The plans include a combination of fish bypass systems, spill at the hydro projects, off-site hatchery programs and evaluations, and habitat restoration work conducted in mid-Columbia tributary systems (Chelan PUD 2013).

Grant PUD operates Wanapum and Priest Rapids Dam and performs fish protection activity related to the operation of these dams. As part of the Biological Opinion for the Priest Rapids Project, Grant PUD established and participates in the Priest Rapids Coordinating Committee (PRCC) to oversee the implementation of the anadromous fish activities. The PRCC also coordinates the implementation of the adaptive management program contained in the Salmon and Steelhead Settlement Agreement for species affected by the Priest Rapids Project not covered under the Biological Opinion (Grant PUD 2013). Additionally, Grant PUD conducts a variety of activities for anadromous fish conservation related to operation of the Wanapum and Priest Rapids Dams including fish passage, fish counts, predator control, and hatchery operation.

When viewed in the context of past, present, and reasonable foreseeable future activities related to Chelan, Douglas, or Grant PUDs, the proposed action is not anticipated to result in increased cumulative adverse effects to CATEs or other piscivorous bird species. Because the PUDs are currently involved in activities that promote salmonid conservation and restoration, the proposed action will be complimentary to these. The proposed action is therefore anticipated to have beneficial cumulative impacts to ESA-listed salmonids in the Columbia River Basin when considered within the context of PUD fish conservation and restoration activities.

5.2.2 Cumulative Effects

Reduction of avian predation on federally listed endangered and threatened salmonids in the inland Columbia River Basin is one additional action for improving juvenile salmonid survival. This action is considered to be an integral part of a comprehensive All-H Approach, as prescribed for in the BiOp RPA. As indicated in the BiOp analysis, avian predation actions compliment the array of hydropower, habitat, harvest, hatchery and other predation actions which are part of the RPA, and assist in the recovery of listed salmon and steelhead.

As a result, when considered within the context of the other past, present, or reasonably foreseeable actions in the inland Columbia River Basin and the Lower Columbia River estuary under the FCRPS and the other programs described in Section 5.2.1, the reduction of predation by CATEs is anticipated to have a positive direct impact on salmonid survival and population growth rates and, therefore, no adverse cumulative impact on salmonid survival and population growth rates.

With regard to other threatened and endangered or other fish species, the impacts of CATE colonization at potential habitat enhancement sites would be assessed in supplemental/tiered NEPA analysis. The choice of enhancement sites would include a robust analysis of biological resources, especially the presence of listed and sensitive species, to avoid significant conflicts between colonizing CATEs and these species. Therefore, the proposed action considered in this EA is anticipated to have no significant cumulative impacts.

SECTION 6.0 COMPLIANCE WITH LAWS AND REGULATIONS

This section provides a brief discussion of relevant laws and regulations that apply to the EA's preferred alternative and describes how the preferred alternative is or would be in compliance with these regulations. Unless stated otherwise, compliance in this section pertains to both Crescent and Goose Island, and the Corps's actions regarding consultation are on behalf of the Action Agencies.

Treaties with Native American Tribes.

Treaties between the United States and regional tribes document agreements reached between the federal government and the tribes. In exchange for the tribes ceding much of their ancestral land, the federal government established reservation lands and guaranteed that the government would respect the treaty rights including fishing and hunting rights. These treaties, as well as statutes, regulations, and national policy statements originating from the executive branch of the federal government, provide direction to federal agencies on how to formulate relations with Native American tribes and people. Treaties with area tribes explicitly reserved unto the tribes certain rights, including the exclusive right to take fish in streams running through or bordering reservations, the right to take fish at all usual and accustomed places in common with citizens of the territory, and the right of erecting temporary buildings for curing, together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed lands. These reserved rights include the right to fish within the project area identified in the EA.

NEPA, as amended, 42 USC §§ 4321 *et seq.*; 40 CFR Parts 1500-1508.

NEPA was enacted in 1969 to establish a national policy for the protection of the environment. The Council on Environmental Quality was established to advise the president and to carry out certain other responsibilities relating to implementation of NEPA by federal agencies. Federal agencies are obligated to comply with the NEPA implementing regulations promulgated by the Council on Environmental Quality (40 CFR Parts 1500-1508). These regulations outline the responsibilities of federal agencies under NEPA and provide specific procedures for preparing environmental documentation to comply with NEPA.

This EA was prepared to analyze and disclose whether the proposed action and alternatives would have a significant effect on the quality of the human environment. The signing of a Finding of no Significant Impact (FONSI), if appropriate, will satisfy supplemental/tiered NEPA requirements. Otherwise, an EIS/ROD will be prepared.

Clean Water Act (Federal Water Pollution Control Act), 33 USC §§ 1251 *et seq.*

The Clean Water Act is the principal law governing pollution control and water quality of the nation's waterways. It requires the establishment of guidelines and standards to control the direct or indirect discharge of pollutants to waters of the United States. Discharges of material into navigable waters are regulated under Sections 401 and 404 of the Clean Water Act. The Corps has the primary responsibility for administering the Section 404 permit program. Under Section 401, projects that involve discharge or fill to wetlands or navigable waters must obtain certification of compliance with state water quality standards. Under Section 402, construction projects that exceed 1 acre of clearing activities and that have the potential to discharge to surface water bodies are required to obtain a permit prior to construction activities.

The proposed action will not involve the discharge of dredged or fill materials into waters of the U.S. Sections 401 and 404 are, therefore, not applicable. Based on the nature of the likely actions proposed under the preferred alternative (i.e., roping and flagging, vegetation planting and modification), it is not anticipated that a National Pollutant Discharge Elimination System (NPDES) stormwater permit regulated under Section 402 be necessary. However, if substrate modification activities exceed an acre in area at Goose Island (e.g., emplacement of cobble) or Crescent Island (e.g., berm creation) Reclamation or the Corps, respectively, will obtain an NPDES stormwater permit, as necessary, in compliance with Section 402.

Rivers and Harbors Act, 33 USC §§ 401 *et seq.*

This act regulates the development and use of the nation's navigable waterways. Section 10 of the act prohibits unauthorized obstruction or alteration of navigable waters and vests the Corps with the authority to regulate discharges of fill and other materials into such waters. Actions that require Section 404 Clean Water Act permits are also likely to require permits under Section 10 of this act.

No obstruction or alteration of navigable waters would occur as a result of the preferred alternative, so Section 10 is not applicable.

ESA of 1973, 16 USC 1531 §§ *et seq.*, 50 CFR Parts 17, 222, 224.

The ESA directs all federal agencies to conserve endangered and threatened species and their habitats and encourages such agencies to utilize their authorities to further these purposes. Section 7 of the act requires that federal agencies consult with NMFS and USFWS to ensure their actions, which may affect listed species, are not likely to jeopardize these species or result in destruction or adverse modification of designated critical habitat.

The Corps coordinated with NMFS on potential effects to ESA-listed anadromous fish species. The Corps and NMFS agree the proposed actions in the preferred alternative are adequately addressed in the 2008 FCRPS biological opinion and 2010 supplement and no further Section 7 consultation is required.

The Corps consulted with USFWS on potential effects to bull trout. The Corps has prepared a Biological Assessment (BA) and determined the proposed action “may affect, but is not likely to adversely affect” bull trout or their designated critical habitat. The Corps received concurrence from the USFWS on that determination on January 6, 2014 (Appendix G).

Finally the Corps has determined there will be “no effect” on other ESA-listed species in the project area. These species include Canada lynx, pygmy rabbit, gray wolf, northern spotted owl, Ute ladies’-tresses, Umtanum desert buckwheat, and White Bluffs bladderpod. No consultation with USFWS is required for “no effect” determination.

Magnuson-Stevens Act (MSA) (formerly Magnuson-Stevens Fishery Conservation and Management Act, MSFCMA), 16 USC §§ 1801 *et seq.*, 50 CFR Part 600.

In 1996, the act was reauthorized and changed by amendments to require that fisheries be managed at maximum sustainable levels and that new approaches be taken in habitat conservation. EFH is defined broadly to include “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity” (62 Fed. Reg. 66551, § 600.10 Definitions). The act requires consultation for all federal agency actions that may adversely affect EFH. Under Section 305(b)(4) of the act, NMFS is required to provide advisory conservation and enhancement recommendations to federal and state agencies for actions that adversely affect EFH. Where federal agency actions are subject to ESA Section 7 consultations, such consultations may be combined to accommodate the substantive requirements of both ESA and MSA.

The actions being evaluated in this EA would not affect EFH. No consultation under the MSA is required.

Fish and Wildlife Coordination Act (FWCA), 16 USC §§ 661 *et seq.*

The FWCA requires that federal agencies consult with USFWS and state wildlife agencies whenever the waters of any stream or other body of water are proposed or authorized to be impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose whatever, including navigation and drainage. These consultations are generally incorporated into Section 404 of the Clean Water Act, NEPA, or other federal permit, license, or review requirements.

The proposed actions would not alter any stream or body of water. No coordination under the FWCA is required.

Migratory Bird Treaty Act (MBTA) of 1918, 16 USC §§ 703 *et seq.*

The MBTA (16 USC §§ 703-712, as amended) prohibits the taking of and commerce in migratory birds (live or dead), any parts of migratory birds, their feathers, eggs, or nests. Take is defined in the MBTA as “to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect” any migratory bird, nest, egg, or part thereof.

Much of the work being proposed in the proposed action would occur outside the migratory bird nesting season. Therefore there would be no impacts to nests or eggs from that work. A permit from the USFWS for take of up to 200 CATE eggs from Goose and Crescent Islands and the at-risk islands combined will be requested if the preferred alternative is implemented.

National Historic Preservation Act (NHPA), 16 USC §§ 470 et seq.

Section 106 of the NHPA of 1966, as amended and implemented primarily through 36 CFR Part 800, provides the legislative and regulatory basis for much of the nation’s historic preservation efforts. These regulations require the identification, evaluation, protection, and management of historic properties in federal undertakings. Protection is achieved by implementing deliberative and consultative processes that ensure that the consideration of effects to historic properties occurs for all federal undertakings. Consultation is required between the project’s federal lead agency, in this current case the Corps, the Oregon State Historic Preservation Office (SHPO) (or Washington Department of Archaeology and Historic Preservation [DAHP]), appropriate tribal governments, the public and other interested parties.

The Corps initiated consultation with the Oregon SHPO, Washington DAHP and relevant tribal governments regarding cultural and historical resources on September 12 and 13, 2013. No impacts to these resources in related to the preferred alternative are anticipated. The Corps received concurrence from the DAHP (Appendix H) on October 30, 2013, which covers dissuasion actions at Goose and Crescent Island. Separate consultation will be completed for habitat enhancement and, if necessary, the at-risk islands prior to implementation.

Indian Trust Assets 25 Code of Federal Regulations Chapter 1, Part 115, Subsection 115.002 (2001).

Indian Trust Assets (ITAs) are defined as “trust lands, natural resources, trust funds, or other assets held by the federal government in trust for Indian tribes and individual Indians. Trust land(s) means any tract or interest therein that the United States holds in trust status for the benefit of a tribe or an individual Indian" (United States 2001: 343). Examples of ITAs include land, minerals, instream flows, water rights, and hunting and fishing rights. A defining characteristic of an ITA is that these assets cannot be alienated, sold, leased, or used for easements without approval from the United States.

The United States has a trust responsibility to protect and maintain rights reserved to Indian Tribes or individuals originating from treaties, statutes, and executive orders. This trust responsibility requires that federal agencies take reasonable actions to protect trust assets when administering programs under their control.

Historically, the government and the Tribes have offered varied opinions as to what constitutes an ITA, and which tribe holds title to those ITAs. This document neither judges the validity of, nor defines the rights claimed by any Tribal government or member.

While the majority of ITAs are located on-reservation, ITAs also occur off reservation. Consequently, several American Indian Tribes and bands have interests in the project area. The majority of the area in and surrounding the project area is within lands ceded in the Yakama Treaty of June 9, 1855. The treaty established the Yakama Reservation and reserved rights and privileges to hunt, fish, and gather roots and berries on open and unclaimed lands to the 14 signatory Tribes and bands.

In addition to the Yakama Nation, the Spokane Tribe of Indians, Wanapum, the Nez Perce Tribe, Confederated Tribes of Warm Spring, Confederated Tribes of the Umatilla Indian Reservation, and the Confederated Tribes of the Colville Indian Reservation may also have interests in the project area.

In a review of the Crescent and Goose Island project areas the Action Agencies identified no ITAs.

Executive Order 11514 (35 FR 4247; March 7, 1970): Protection and Enhancement of Environmental Quality, as amended.

This executive order directs federal agencies to monitor, evaluate, and control their activities in order to protect and enhance the quality of the nation's environment, to inform and seek the views of the public about these activities, to share data gathered on existing or potential environmental problems or control methods, and cooperate with other governmental agencies.

The preferred alternative would have the result of protecting and enhancing endangered populations of salmonids in the Columbia River Basin and is, therefore, in compliance with this executive order.

Executive Order 11988 (42 FR 26951; May 25, 1977): Floodplain Management.

On May 24, 1977, President Carter issued Executive Order 11988, Floodplain Management. This executive order requires each federal agency to provide the opportunity for early public review of any plans or proposals for actions in floodplains in accordance with Section 2(b) of Executive Order 11514, as amended, including the development of procedures to accomplish this objective.

The actions in the preferred alternative would occur above the ordinary high water mark and would have no effects to floodplains. It is, therefore, in compliance with this executive order.

Executive Order 12898 (59 FR 7629, February 16, 1994): Environmental Justice.

This executive order instructs federal agencies to make achieving environmental justice part of its mission. Agencies must address disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. Environmental justice means the fair treatment of people of all races, incomes, and cultures with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment implies that no person or group of people should shoulder a disproportionate share of negative environmental impacts resulting from the execution of environmental programs.

The preferred alternative would not have a disproportionate effect on minority or low income populations and is, therefore, in compliance with this executive order.

Executive Order 12962 (60 FR 30769; June 9, 1995): Recreational Fisheries.

This executive order directs federal agencies to, among other things, foster and promote restoration that benefits and supports viable, healthy, and sustainable recreational fisheries.

The preferred alternative would have beneficial effects to threatened and endangered populations of salmonids and therefore benefits and supports sustainable recreational fisheries. The preferred alternative would have no significant impact to fisheries and is, therefore, in compliance with this executive order.

Executive Order 13007 (61 FR 26771; May 29, 1996): Indian Sacred Sites and Executive Order 13175 65 FR 67249, November 9, 2000): Consultation and Coordination with Indian Tribal Governments.

Executive Order 13007 describes federal policy for accommodating sacred Indian sites. This executive order requires federal agencies with statutory or administrative responsibility for managing federal lands to (1) accommodate access to and ceremonial use of Indian sacred sites by Indian religions practitioners, (2) avoid adversely affecting the physical integrity of such sacred sites where appropriate, and (3) maintain the confidentiality of these sacred sites.

Executive Order 13175 exists to (1) promote regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications, (2) strengthen the United States government-to-government relationships with Indian tribes, and (3) reduce the imposition of unfounded mandates upon Indian tribes.

The Corps initiated consultation with relevant tribal governments regarding Indian sacred sites and other tribal resources on September 12 and 13, 2013, and is, therefore, in compliance with this executive order. No impacts to these sites or resources related to the preferred alternative are anticipated.

Executive Order 13112 (64 FR 6183, February 8, 1999): Invasive Species.

The purpose of Executive Order 13112 is to prevent the introduction of invasive species and provide for their control, and to minimize the economic, ecological, and human health impacts that invasive species cause.

The preferred alternative would not introduce invasive species and would have beneficial effects to promoting native species at Crescent Island if vegetation planting is performed. The preferred alternative is in compliance with this executive order.

SECTION 7.0 AGENCIES CONSULTED AND PUBLIC INVOLVEMENT

7.1 Coordination with Other Agencies and Tribal Governments

This EA and IAPMP was created with input from the Inland Avian Predation Working Group (IAPWG). The IAPWG is composed of multiple agencies, with a core membership of representatives from the Corps, Reclamation, BPA, USFWS, NMFS, Washington, Oregon, Idaho, USDA-WS, Chelan County PUD, Grant County PUD, Douglas County PUD, Columbia River Inter-Tribal Fish Commission, Confederated Tribes and Bands of the Yakama Nation, the Colville Tribe, and mid-Columbia River Basin tribes. During the development of the EA, the IAPWG held regular meetings to provide input on the development of the IAPMP and EA. The IAPWG will likely form the basis of an adaptive management working group that will include tribes.

7.2 Scoping and Public Outreach

The Corps and Reclamation have worked together closely to create a scope for this EA that fulfills NEPA requirements, complies with the BiOp, and analyzes inland avian predation management actions that have the greatest potential to positively impact salmonid growth rates in the Columbia River Basin, while remaining within the authority of the Action Agencies and taking into account cost and biological effectiveness.

As part of the scoping process, the IAPWG met regularly to discuss research and studies on inland avian predation and development of an IAPMP. To further define the scope of the analysis, the Corps hosted a public meeting at the Three Rivers Convention Center in Kennewick, Washington, on Wednesday, March 14, 2012. Attendees were encouraged to share their ideas and concerns related to development of the draft EA, either in writing at the scoping meeting or before the end of a 30-day comment period that ended on April 14, 2012. A summary of the scoping meeting and comments received is located in Appendix F. All comments received were addressed by the Corps, as necessary, during the development period of the EA.

7.3 Agency Consultation and Coordination

Coordination was conducted with the following agencies during the preparation of this draft EA:

7.3.1 Federal

- U.S. Fish and Wildlife Service
- National Oceanic and Atmospheric Administration National Marine Fisheries Service
- U.S. Department of Agriculture Wildlife Services

7.3.2 Tribal

- Columbia River Inter-Tribal Fish Commission
- Confederated Tribes and Bands of the Yakama Nation
- The Confederated Tribes of the Umatilla Indian Reservation
- Nez Perce Tribe
- The Confederated Tribes of Warm Springs Reservation of Oregon
- The Confederated Tribes of the Colville Reservation
- The Wanapum Tribe
- The Spokane Tribe

7.3.3 State

- Washington Department of Fish and Wildlife
- Oregon Department of Fish and Wildlife
- Washington Department of Archaeology and Historic Preservation
- Oregon State Historic Preservation Office

7.3.4 Local

- Chelan County PUD
- Grant County PUD
- Douglas County PUD

7.4 Public Involvement

A public scoping meeting was held in Pasco, Washington on March 14, 2012.

In compliance with NEPA rules and regulations, letters were sent to resource agencies and interested residents who identified themselves, and notifications of availability of this draft EA were published in the form of three (3) column by 5-inch newspaper ad displays in the following newspapers between October 31 and November 3, 2013, announcing the public comment period for the draft FONSI and EA. Public notices of availability are also posted at public libraries within the project vicinity. Public comments will be accepted and incorporated into the final decision.

- La Voz-Pasco -- Thursday, October 31, 2013
- Columbia Basin Herald -- Friday, November 1, 2013
- Hermiston Herald -- Saturday, November 2, 2013

- The Dalles Chronicle -- Sunday, November 3, 2013
- Lewiston Tribune -- Sunday, November 3, 2013
- Spokesman Review -- Sunday, November 3, 2013
- Tri-City Herald -- Sunday, November 3, 2013

SECTION 8.0 IMPACT AVOIDANCE AND MINIMIZATION MEASURES

This section describes the impact avoidance and minimization measures, including BMPs that would be conducted as part of the proposed action, to avoid and minimize impacts to species and associated critical habitat.

- No in-water work would occur as part of the proposed project.
- The alteration of habitat on the islands would be conducted away from the waterline and in a manner that would not allow for materials to enter the water and affect water quality.
- All work would be performed according to the requirements and conditions of any permits issued by federal, state, and local governments.
- All equipment to be used for proposed project activities would be cleaned and inspected prior to arriving at the project site to ensure no potentially hazardous materials are exposed, no leaks are present, and the equipment is functioning properly.
- If necessary, a temporary erosion and sediment control plan would be developed prior to excavation, vegetation removal, grading, berm construction, and/or other substrate alteration activities.
- A spill prevention, control, and countermeasures (SPCC) plan would be developed prior to beginning project activities involving the use of machinery. The SPCC Plan would identify the appropriate spill containment materials, as well as the method of implementation. All elements of the SPCC Plan would be available at the project site at all times.
- Both additional willow plantings and silt fence repairs would occur outside CATEs nesting periods.

All work occurring at locations other than Goose and Crescent Island, with the exception of visits to other locations for the purpose of monitoring or active hazing, will require additional review under Section 106 of the National Historic Preservation Act.

APPENDIX A

Inland Avian Predation Management Plan

US Army Corps of Engineers®
Walla Walla District

Inland Avian Predation Management Plan

January 2014

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Acronyms and Abbreviations

Acronyms and Abbreviations	Agency/Term
Action Agencies	U.S. Army Corps of Engineers and Bureau of Reclamation
AMP	Adaptive Management Plan
AMWG	Adaptive Management Work Group
CATE	Caspian Tern
Corps	U.S. Army Corps of Engineers
EA	Environmental Assessment
ESA	Endangered Species Act
IAPMP	Inland Avian Predation Management Plan
IAPWG	Inland Avian Predation Working Group
MBTA	Migratory Bird Treaty Act
NEPA	National Environmental Policy Act
PIT Tag	Passive Integrated Transponder Tag
Reclamation	U.S. Bureau of Reclamation
SRWG	Study Review Work Group
USFWS	U.S. Fish and Wildlife Service

Definitions

Active hazing: Humans chasing birds away from an area.

Anadromous: Fishes that reproduce in freshwater, and the progeny (offspring/juveniles) migrate to the ocean to grow and mature and return to freshwater to reproduce.

At-risk islands: Islands in the Columbia River Basin (Badger, Blalock, Cabin, Foundation, Harper, Miller Rocks, Richland, Solstice, Tree-mile Canyon, and Twinning) where dissuaded CATEs may attempt to nest and where more dissuasion would possibly then be needed.

Columbia River Basin: The Columbia and Snake rivers within Washington and Oregon, including nearby water bodies.

Dissuasion: Active or passive hazing to discourage birds from nesting in an area.

Dissuasion islands: Goose Island in the Potholes Reservoir and Crescent Island in the Columbia River.

ESA-listed: Listed under the Endangered Species Act.

Gulls: California and/or ring-billed gulls. The species are very similar in appearance and nest on Columbia River Basin islands, mostly upstream of the Bonneville Dam.

Habitat enhancement site(s): Where CATEs dissuaded from Goose or Crescent Islands will be encouraged to relocate, e.g., a created or existing site with habitat enhanced to make it more appealing to nesting CATEs. These sites may already have good habitat, or the habitat on the site may need enhancements to make it suitable for CATE nesting.

Inland Basin: The Columbia River upstream from the Bonneville Dam and the Snake River, including water bodies between or near the two rivers.

Lambda (λ): A symbol representing geometric population growth rate, which is calculated as the population size at a later time divided by the population size at an earlier time. An increase in lambda for a declining population indicates that the population is declining less rapidly and moving closer to a stable population.

Passive hazing: Temporary or permanent habitat modification (e.g., use of ropes and flagging, silt fencing, plantings) to discourage birds from nesting in an area; this is called habitat management and dissuasion by U.S. Fish and Wildlife Service.

Piscivorous: Fish-eating.

PIT tag: Passive integrated transponder (PIT) tags are used in a wide array of applications including the study of salmonids and determination of avian predation rates. The most common type of PIT tag used in the Columbia River Basin is the 12 mm x 2 mm version typically placed inside salmonids' body cavities. If the fish is later consumed by a bird, the tag may be deposited with guano (droppings) on nesting or roosting sites.

Salmonid: A fish in the family Salmonidae, which includes salmon, trout, and steelhead.

Take: As defined in the Migratory Bird Treaty Act (50 CFR 10.12), “To pursue, hunt, shoot, wound, kill, trap, capture, or collect,” or any attempt to carry out these activities. A take does not include habitat destruction or alteration, as long as there is not a direct taking of birds, nests, eggs, or parts thereof.

EXECUTIVE SUMMARY

Avian predation on juvenile anadromous salmonids during out-migration is considered potentially limiting to the recovery of populations in the Columbia River Basin that are listed under the U.S. Endangered Species Act (ESA; Lyons et al. 2011).

This Inland Avian Predation Management Plan (IAPMP) outlines steps that will be taken to dissuade Caspian terns (*Hydroprogne caspia;* CATEs) from nesting on two islands (dissuasion islands) in the inland Columbia River Basin above Bonneville Dam (the Inland Basin). This IAPMP was developed as a guide for the implementation of the preferred alternative in the associated Environmental Assessment and includes detailed recommendations for implementation, monitoring, and adaptive management. Approval of the IAPMP is contingent upon the signing of a Finding of No Significant Impact with the preferred Alternative D.

Crescent Island in the Columbia River and Goose Island in the Potholes Reservoir were created by human actions—Crescent from dredge materials and Goose from the creation of the Potholes Reservoir. CATEs nesting on these two islands are consuming high numbers of ESA-listed salmonids. In order to avoid take under the Migratory Bird Treaty Act, this plan will secondarily discourage nesting by two other salmonid predators on the dissuasion islands: California gulls (*Larus californicus*) and ring-billed gulls (*L. delawarensis*).

As a means to reduce predation and prevent losses of ESA-listed salmonids, this IAPMP will dissuade CATEs nesting on Goose and Crescent Islands and provide conditions suitable for new CATE colonies outside of the Inland Basin and distant from ESA-listed salmonid populations.

This IAPMP includes an Adaptive Management Plan (AMP) that describes uncertainties associated with implementation, monitoring activities that will be conducted, and potential follow-on actions that may be required during implementation.

The IAPMP will be implemented using a two-phased approach. This strategy has four objectives to reduce avian predation on ESA-listed salmonids in the Inland Basin:

1. Reduce CATE consumption of ESA-listed salmonids including Upper Columbia and Snake River steelhead, Chinook salmon, and sockeye salmon in the Inland Basin
2. Dissuade CATEs nesting on Goose and Crescent Islands and at-risk islands if necessary
3. Preclude the formation of incipient CATE nesting colonies on Crescent Island during Phase 1
4. Provide conditions suitable for CATE colony establishment outside of the Inland Basin

Phase 1 of this approach includes the following actions:

- On Goose Island, passive hazing will be combined with active hazing of CATEs and gulls, and, if needed, limited CATE egg take.
- If needed, formation of incipient CATE colonies on Crescent Island will be prevented by using passive hazing and active hazing of CATEs and gulls, and, if needed, limited CATE egg take.
- Willows will be experimentally planted on Crescent Island to evaluate their survival.
- If necessary, dissuasion actions will be implemented on at-risk islands.
- CATE habitat enhancement site research and supplemental/ tiered National Environmental Policy Act (NEPA) analysis will be completed.

Phase 2 of the plan includes the following actions:

- Habitat enhancement site(s) will be prepared to attract CATE nesting.
- If necessary, CATE nesting areas on Goose Island may be further modified by adding materials such as large cobble and/or planting drought tolerant vegetation to further dissuade nesting. The adaptive management process will dictate details of these actions.
- To dissuade the primary CATE colony on Crescent Island, passive hazing will be conducted through planting of vegetation and/or construction of a berm . As necessary, active hazing of CATEs and gulls, and, if needed, limited CATE egg take may be conducted.
- CATE dissuasion will be performed as needed on at-risk islands.

This two-phased approach will require supplemental/ tiered NEPA compliance prior to implementation of the habitat enhancement in Phase 2 to document site-specific conditions and potential environmental effects. As part of implementation, continued coordination with stakeholders and resource agencies will occur throughout both phases of the project.

This IAPMP is a living document and may be modified as needed to address changes in the objectives, targets, monitoring plans, or other related aspects of the project throughout the period of adaptive management. While input will be sought from stakeholders and resource agencies throughout the process, the Federal Columbia River Power System Action Agencies (U.S. Army Corps of Engineers and Bureau of Reclamation) will be responsible for implementing the IAPMP including any potential changes identified through adaptive management.

1.0 INTRODUCTION AND BACKGROUND

Salmonids (*Oncorhynchus* spp.) in the Pacific Northwest are an anadromous species that out-migrate to the ocean as juveniles to grow and mature and return to their freshwater spawning grounds to reproduce as adults. Avian predation on juvenile anadromous salmonids during out-migration is considered a limiting factor in the recovery of populations in the Columbia River Basin that are listed under the U.S. Endangered Species Act (ESA; Lyons et al. 2011). Research to identify major avian predators of out-migrating salmonids has been conducted since 1997 (Roby et al. 2013).

Initially, the U.S. Army Corps of Engineers (Corps) and Bureau of Reclamation (Reclamation) considered a broad range of potential actions to arrive at the set of actions considered in this Inland Avian Predation Management Plan (IAPMP). Before narrowing the scope of IAPMP dissuasion actions to Caspian terns (*Hydroprogne caspia*; CATEs) on Goose and Crescent Islands, the agencies considered other islands or island groups in the Inland Basin (e.g., Foundation Island, Miller Rocks, Badger Island, Blalock Islands) for dissuasion activities due to the presence of nesting predators of ESA-listed salmonids.

Based on results of a ‘Benefits Analysis’’ (Lyons et al. 2011), the Federal Columbia River Power System Action Agencies (U.S. Army Corps of Engineers and Bureau of Reclamation; Action Agencies) decided to focus efforts on CATEs on Goose and Crescent Islands due to the high overall rates of ESA-listed salmonid consumption. Based on the large concentration of CATEs nesting on these two islands (Table 1–1), it was determined that focused actions here will produce a higher benefit than dispersed actions over a larger area.

Crescent and Goose Islands were created by human actions—Crescent from dredge spoil and Goose from the creation of the Potholes Reservoir. These islands are in the Inland Basin. Crescent Island is located in the Columbia River about 9 miles south of the confluence with the Snake River, and Goose Island is in Washington’s Potholes Reservoir approximately 65 miles to the north.

This IAPMP outlines steps that will be taken to dissuade Caspian terns (*Hydroprogne caspia*; CATEs) from nesting on Crescent and Goose Islands (dissuasion islands; Figure 1–1), contingent upon the signing of a Finding of No Significant Impact. To avoid take under the Migratory Bird Treaty Act (MBTA), the Action Agencies may temporarily dissuade two other salmonid predators nesting on the dissuasion islands: California gull (*Larus californicus*) and ring-billed gull (*L. delawarensis*). The IAPMP was developed as a means to reduce predation on and prevent loss of ESA-listed salmonids.

The IAPMP has four objectives that will be accomplished using a two-phased approach (see Section 2) over a 5-year period:

1. Reduce CATE consumption of ESA-listed salmonids including Upper Columbia and Snake River steelhead, Chinook salmon, and sockeye salmon in the Inland Basin
2. Dissuade CATEs nesting on Goose and Crescent Islands and at-risk islands if necessary
3. Preclude the formation of incipient CATE nesting colonies on Crescent Island during Phase 1
4. Provide conditions suitable for CATE colony establishment outside of the Inland Basin

This IAPMP includes an Adaptive Management Plan (AMP) that describes uncertainties associated with implementation, monitoring activities that will be conducted, and potential follow-on actions that may be required to meet the project objectives during implementation.

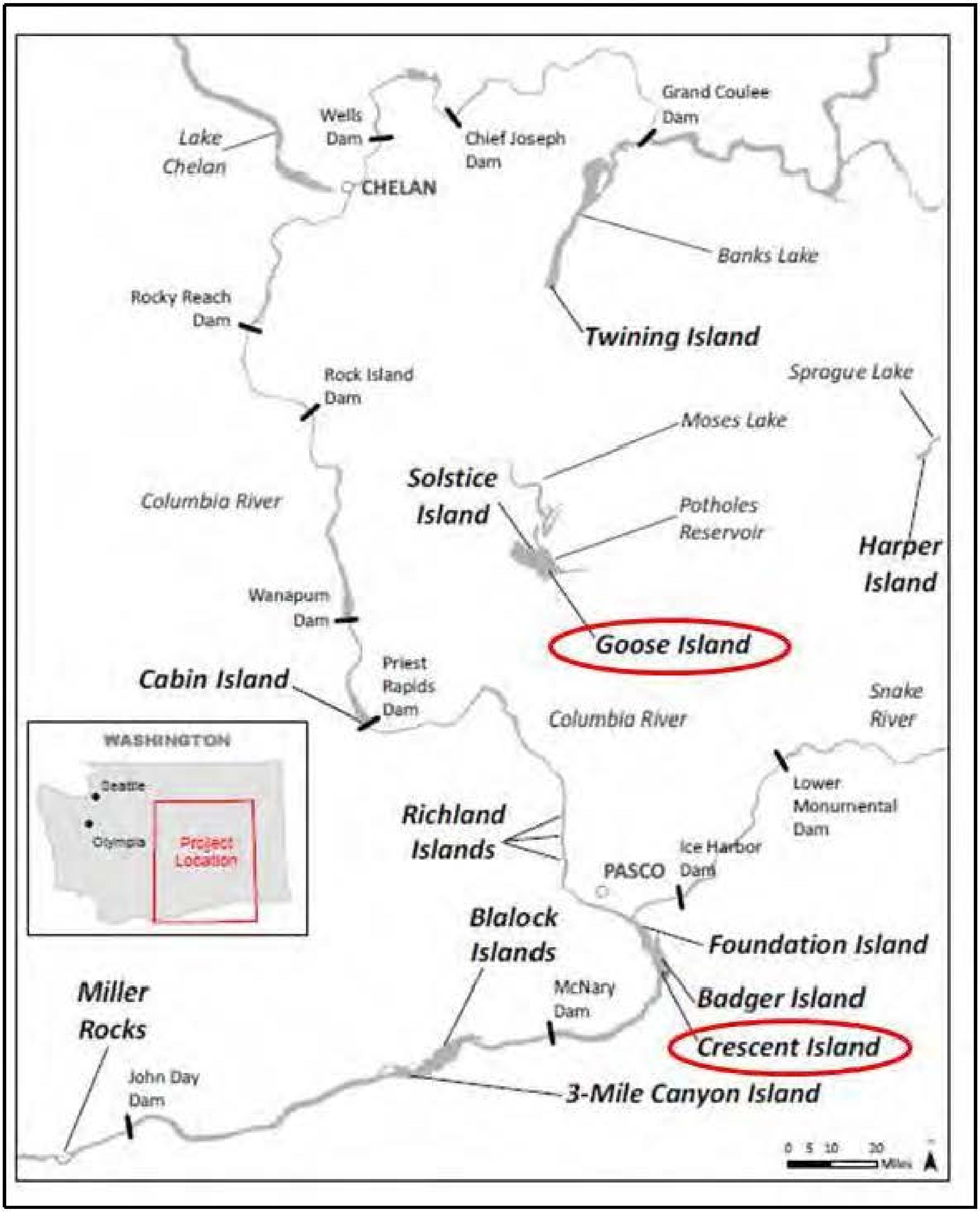
While input will be sought from stakeholders and resource agencies throughout the process, the Actions Agencies will be responsible for implementing the IAPMP including any potential changes identified through adaptive management. The IAPMP may be reevaluated and updated pending the results of Phases 1 and 2, or based on the results of a new National Marine Fisheries Service Biological Opinion scheduled for 2018.

To achieve the desired objectives of this IAPMP, actions will be directed at the two islands in the Inland Basin (dissuasion islands) with the highest numbers of breeding CATEs (Table 1–1) and highest predation rates on ESA-listed salmonids (see Section 2).

Table 1–1. Number of CATE Breeding Pairs on the Dissuasion Islands

Island	2004	2005	2006	2007	2008	2009	2010	2011	2012
Crescent Island (Columbia River)	530	476	448	355	388	349	375	419	422
Goose Island (Potholes Reservoir)	87	325	273	282	293	487	416	422	459

Sources: Adkins et al. 2011; Roby et al. 2011a, 2013



Source: Modified from Roby et al. 2013

Figure 1–1. Inland Basin showing location of the dissuasion islands (Goose and Crescent) outlined in red and at-risk islands in bold.

2.0 IMPLEMENTATION PLAN

2.1 Phases and Timeline

This section describes the two-phased approach to implementing the IAPMP as well as the base actions that are expected to occur as the plan is implemented. It includes a brief description of the relationship of the MBTA to the plan, including the effects of dissuasion and dispersal on CATEs and potential impacts to other species (covered in more detail in the environmental assessment [EA]). Base actions are described for the dissuasion islands, habitat enhancement site(s), and at-risk islands.

As a result of the supplemental/ tiered National Environmental Policy Act (NEPA) review, discussions among the Action Agencies, National Marine Fisheries Service, and U.S. Fish and Wildlife Service (USFWS) along with input from the Inland Avian Predation Working Group (IAPWG) and other partners, it was decided that a two-phased approach would be used to implement the IAPMP (Table 2–1). The identified years are a general timeframe for actions, and actions in Phase 2 may occur earlier or later depending on the progress made with additional planning efforts and/or decisions made through adaptive management. This phased approach has the following benefits that support the purpose and need for action to reduce avian predation on ESA-listed salmonids in the Inland Basin:

1. Allows the project to be implemented in an adaptive management context that acknowledges and addresses uncertainties associated with the proposed actions
2. Promotes flexible decision-making through regular monitoring and assessment of data related to the anticipated outcomes of proposed actions and the potential to alter activities to better achieve the stated objectives
3. Allows for a major portion of the project benefits to salmonids to be achieved in Phase 1, while Phase 2 actions are either tested or more fully defined or while uncertainties are resolved through monitoring
4. Allows for cessation or reversal of Phase 1 actions, if necessary, through adaptive management

Monitoring is not included in the timeline but is important for addressing uncertainties and determining progress towards objectives during implementation of the IAPMP. Dissuasion islands will be monitored daily, or as warranted, for CATE nesting activity during the nesting season concurrently with hazing activities. At-risk islands will be monitored less frequently, but at least twice during the nesting season for evidence of nesting CATEs. Once the CATE habitat enhancement site(s) has been identified and prepared to receive nesting CATEs, it will be monitored during the ensuing CATE nesting season to assess the success of the habitat enhancement effort. Other Columbia River Basin islands that are not considered at-risk islands and are part of the western CATE metapopulation outside the Inland Basin will be monitored as part of adaptive management by the Action Agencies or other partners. Information gathered by others outside the direct area of concern of the IAPMP may be useful to consider during adaptive management. More details on monitoring plans are contained in the AMP (see Section 3).

Table 2–1. IAPMP Phases and Actions Timeline (Parentheses Indicate Action is Optional)

Action	Year 1	Year 2	Year 3	Year 4	Year 5
Phase 1					
On Goose Island, passive hazing will be combined with active hazing of CATEs and gulls, and, if needed, limited CATE egg take.	X	X	X	(X)	(X)
If needed, formation of incipient CATE colonies on Crescent Island will be prevented by using passive hazing and active hazing of CATEs and gulls, and, if needed, limited CATE egg take.		(X)	(X)		
Willows will be experimentally planted on Crescent Island to evaluate survival.	X				
Dissuasion will be performed as needed on at-risk islands in coordination with landowners.		(X)	(X)		
CATE habitat enhancement site research and supplemental/ tiered NEPA analysis will be completed.	X	(X)			
Phase 2					
Habitat enhancement site(s) will be prepared to attract CATE nesting.			X		
If necessary, Goose Island substrate may be modified by adding material such as large cobble as a lower maintenance dissuasion method.				(X)	(X)
To dissuade the primary CATE colony on Crescent Island, vegetation may be planted and/or a berm may be constructed (passive hazing). As necessary, active hazing of CATEs and gulls, and, if needed, limited CATE egg take may be conducted.				X	(X)
CATE dissuasion will be performed as needed on at-risk islands in coordination with landowners.				(X)	(X)

Note: (X) is implemented only if warranted.

2.2 Migratory Bird Treaty Act Compliance

The Migratory Bird Treaty Act of 1918 (MBTA), codified at 16 U.S.C. §§703–712 (§709 omitted), is a United States federal law, first enacted in 1916 to implement the convention for the protection of migratory birds between the United States and Canada. The statute makes it unlawful without a waiver to pursue, hunt, take, capture, kill, or sell the over 800 species of migratory birds listed therein. The statute does not discriminate between live or dead birds and it grants full protection to any bird parts including feathers, eggs, and nests.

2.2.1 General MBTA Considerations

The IAPMP will be implemented to minimize impacts to birds protected under the MBTA that are present in the project area, while also seeking to achieve the objectives of protecting juvenile ESA-listed salmonids.

Some of the proposed actions could result in take (see definitions) of CATE adults, chicks, or eggs and could potentially result in take of other bird species protected by the MBTA (specifically gull species). More details of these and other actions are found in the AMP (see Section 3). The following actions require a depredation permit under the MBTA and could apply to this IAPMP:

1. Lethal measures that would result in take of CATEs (not proposed as part of the IAPMP)
2. CATE egg take (may be implemented as part of the IAPMP if warranted)

MBTA depredation permit requirements are typically focused on reporting and methods to minimize site-specific impacts. Depredation permit conditions typically require the following types of activities:

1. Nonlethal measures (i.e., harassment and habitat management that does not result in take) be taken prior to any lethal measures (i.e., CATE egg take) to minimize the extent of lethal measures.
2. If lethal measures are proposed, it should first be documented that nonlethal measures were tried and found to be ineffective.
3. Timing of actions should be managed to avoid unnecessary impacts (i.e., to the extent possible, passive hazing should be done when no birds are nesting on the islands).
4. Measures would be taken to avoid lethal impacts to nontarget species (i.e., gulls and other MBTA species). These measures could include proactively hazing gulls and dissuading gulls from nesting in areas where CATEs may also attempt nesting.

The following proposed actions would not require a permit under the MBTA:

1. Habitat-based CATE dissuasion actions (e.g., placement of ropes and flagging) that occur outside the breeding season of migratory birds
2. CATE and/or gull hazing activities (i.e., passive and active measures including removal of CATE and gull scrapes that do not result in take) both prior to nest initiation and during nesting season, provided that those activities would not cause a bird to abandon an active nest containing eggs, resulting in nest failure.

To meet these guidelines, personnel will actively haze all gulls nesting in the vicinity of CATE colonies on Goose and Crescent Islands prior to nest establishment to ensure hazing does not lead to depredation of eggs, chicks, or adult gulls which could occur if gull nests become established in these areas. More details on these hazing actions are presented in sections 2.4 and 2.5. To most effectively limit the loss of CATE eggs, hazing actions will be performed to the maximum extent possible before nesting begins.

In the unlikely event that gulls manage to successfully nest on an island despite hazing efforts, hazing actions may continue after gull eggs are laid, though all dissuasion activities would be conducted in a manner that avoids take of gulls (eggs, chicks or adults), and thus total dissuasion of CATEs may not be possible. Personnel familiar with the behavior of gulls and CATEs on the dissuasion islands would conduct hazing activities (e.g., keeping a certain distance from nesting gulls and observing behavioral cues) to ensure that unpermitted take does not occur. Active hazing activities would be terminated in a given area if personnel determine that activities can no longer occur without resulting in unpermitted take.

2.2.2 Egg Take

For this IAPMP, the Action Agencies anticipate that passive and active hazing efforts at Goose and Crescent Islands will result in very few to no CATE breeding pairs remaining on the islands, thus it is expected that far fewer than 100 eggs per year per island (200 eggs total per year) will be laid. Due to the extent of the passive hazing actions, frequency of active hazing actions, and adaptive management options, it is anticipated that only a limited number of CATE eggs will need to be taken from Goose, Crescent, and the at-risk islands (no more than 200 per year on all islands combined) to meet the goals of the IAPMP.

The IAPMP dissuasion measures and anticipated need for limited egg take measures were developed based on other management and research efforts within the region. This includes efforts in the Columbia River estuary to reduce CATE predation on juvenile salmonids. The Portland District Corps has an active hazing and nonlethal deterrent program in Columbia River estuary for Rice Island, Miller Sand Spit, and Pillar Rock Sands Island. In support of the nonlethal dissuasion program, the USFWS has issued depredation permits annually from 2009 to 2012 for the collection of up to 100 CATE eggs to prevent CATE colonies from reestablishing on sites with documented higher salmonid consumption than East Sand Island (USFWS 2005). These permits are valid for 1 year and must be renewed each year. Through the breeding season of 2012, fewer than nine eggs per year have been collected in support of hazing actions associated with implementation of estuary CATE management efforts (Roby et al. 2013).

2.3 Benefits of Proposed Actions and Thresholds for Potential Follow-On Actions

CATE predation rates for Snake River and Upper Columbia River salmonids were previously determined for numerous islands with nesting avian predators in the Inland Basin through monitoring and analysis (Table 2–2). Based on results of the Benefits Analysis (Lyons et al. 2011), it was determined that the greatest potential for increasing juvenile salmonid survival by managing inland avian predators would be gained by focusing efforts on CATEs at Crescent and Goose Islands. The reduction of these CATE colonies would have particularly large survival benefits to Snake River and Upper

Columbia River steelhead stocks (Lyons et al. 2011). Lower predation rates, such as those by CATEs and double-crested cormorants on Blalock and Foundation Islands, were not considered high enough to warrant dissuasion actions.

Analyses of data from passive integrated transponder (PIT) tags showed that the highest Goose Island predation rates on Inland Basin steelhead (14.6%) were during the 2007–2009 seasons when colony size averaged 369 CATE pairs (Lyons et al. 2011). This was used to represent the worst-case scenario for high per capita predation rates (14.6% predation / 369 pairs = 0.04% predation rate per nesting pair) in the Inland Basin. When applied, a maximum population of 50 pairs would be allowed to remain at or below a 2% predation threshold (369 pairs / 14.6% predation x 2.0% predation = 50.5 pairs). While higher predation rates have been recorded in the past, they fall within a similar range of per capita predation. For example, in 2004 the predation rates by Crescent Island CATEs on Snake River steelhead was 22.2% (Roby et al. 2011b). This provides a confirmation of the assumed worst-case scenario: a 22.2% predation rate from 530 CATE pairs is approximately 0.04% predation per pair.

Table 2–2. CATE, DCCO, and Gull Predation Rates from 2007 to 2010 on Select Islands Adjusted to Account for the Fraction of the Evolutionarily Significant Unit Transported Around the Inland Basin Waterbird Colonies

Bird	Island	Chinook			Sockeye	Steelhead	
		SR[a] (sp/su)	SR[a] (fall)	UCR[b] (sp)	SR[a]	SR[a]	UCR[b]
CATE	Goose	-	-	3.0%	-	-	14.6/11.4%[c]
CATE	Crescent	0.6%	0.6%	0.4%	0.6%	2.8%	2.7/2.3%[c]
CATE	Blalock	0.1%	<0.1%	0.1%	≤0.1%	<0.4%	0.7%
DCCO	Foundation	0.8%	0.4%	<0.1%	1.1%	1.6/1.4%[c]	0.1%
Gulls[d]	Miller Rocks	0.3%	0.3%	0.4%	0.6%	1.2%	1.6%

[a] SR=Snake River

[b] UCR=Upper Columbia River

[c] Hatchery reared fish and/or wild fish where there was a significant difference

[d] Both ring-billed and California gulls

Source: Lyons et al. 2011

Based on these figures, it was decided that a conservative threshold of 40 CATE pairs on any one island would be used as a trigger to consider initiation of PIT tag monitoring to determine site-specific predation rates and/or planning of additional dissuasion actions. While this is an important trigger at a site-specific level, if numerous smaller colonies form, the anticipated benefits of the IAPMP may be reduced. Therefore, an Inland Basin trigger was also established. Estimates of CATEs at Inland Basin sites other than Crescent and Goose Islands have ranged from a low of 41 pairs in 2004 (when the Goose Island colony was established) to a high of 173 in 2010 with an average of 91 pairs. As it is anticipated that some of the approximately 850 pairs of CATEs from Goose and Crescent Islands may remain in the Inland Basin, including up to 40 pairs remaining on dissuasion or at-risk islands, a basin-wide threshold of 200 CATE pairs will be used as a trigger to consider follow-on actions to determine predation rates and/or planning of additional dissuasion actions. Any dissuasion actions not covered in the existing EA would require supplemental/ tiered NEPA analysis. If site-specific and basin-wide populations remain below these thresholds, it is anticipated that the primary objective of the plan (reduced CATE consumption on ESA-listed salmonids) will have been met.

Due to the phased nature of the implementation, interim performance metrics will be used to judge success of the IAPMP: CATE predation rates on Goose Island during Phase 1 and CATE predation rates on Crescent Island during Phase 2. See Section 3 for discussion on monitoring and metrics.

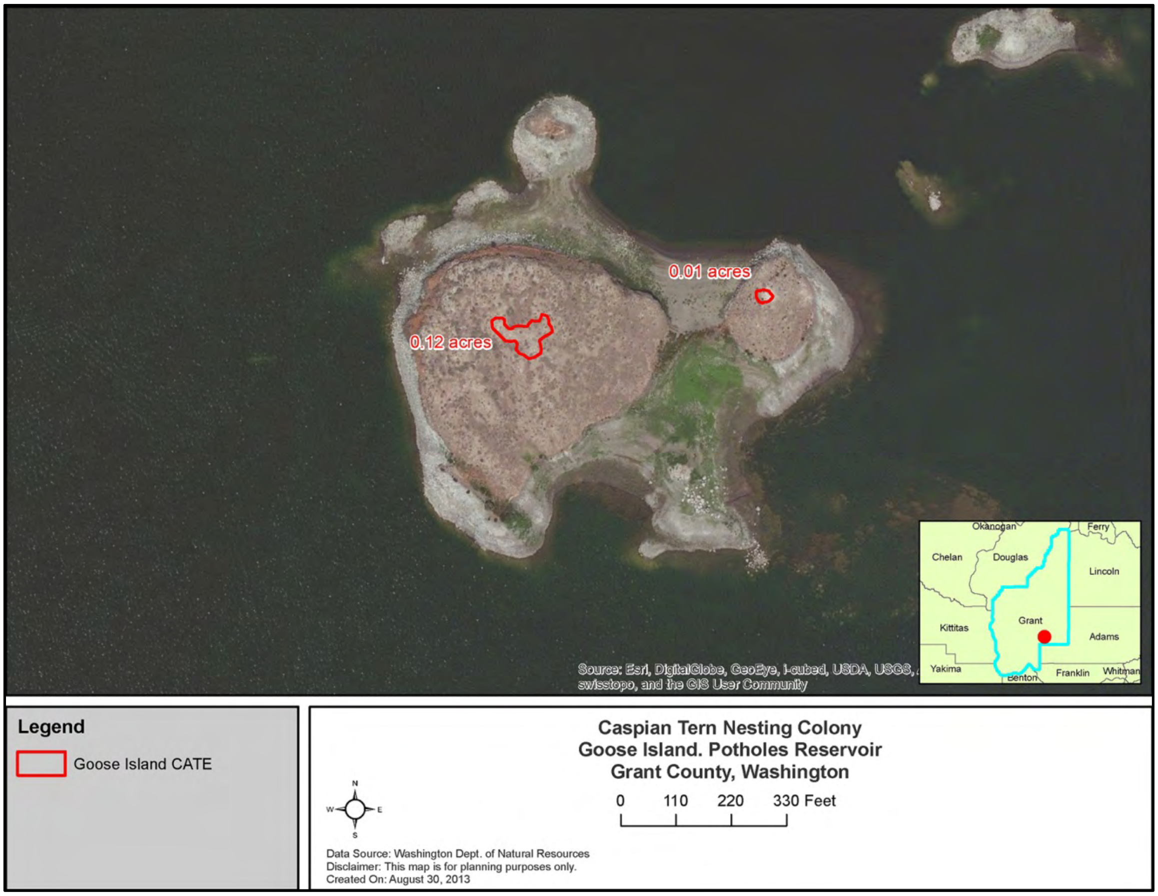
2.4 Goose Island Dissuasion Plan

This section covers all base actions (nonadaptive management actions) on Goose Island, including passive and active hazing (dissuasion, including limited egg take if needed) and monitoring. Additional details are contained in the AMP (see Section 3). To avoid potential take of gulls during CATE hazing activities, both CATEs and gulls will be dissuaded from establishing nests in the vicinity of either the east or the west colony sites during the hazing period.

2.4.1 Phase 1

Passive Hazing Methods

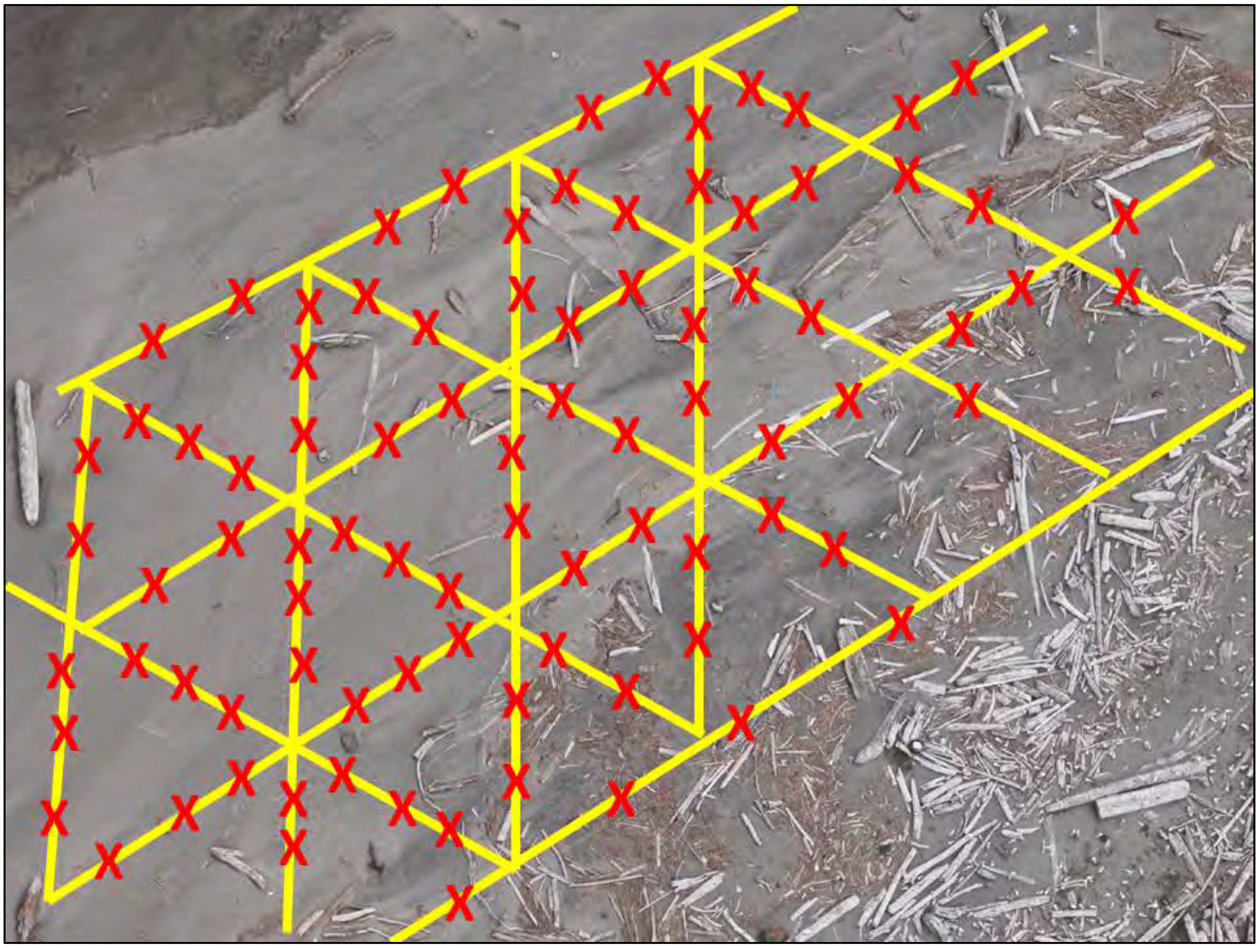
In Phase 1, a network of rope and flagging supported by upright structures (e.g. posts) would be installed to dissuade CATEs from their existing nesting areas. Posts would be spaced at 10-foot intervals. Rope, approximately 0.25- to 0.5-inch in diameter, would be strung between the posts and elevated approximately 2 to 4 feet above the ground. Flagging material would then be inserted into the rope between each post so the flagging pieces hang down and flutter in the wind to act as a visual deterrent (Figure 2–2).



Source: Bird Research Northwest (20 May 2011)

Figure 2–1. Locations of CATE colonies on Goose Island, Potholes Reservoir.

Rope and flagging on Goose Island will provide a proven, effective, and inexpensive solution where soil characteristics (rocky substrate with deep water table), precipitation levels, and in places steep slope limit other available dissuasion options, such as planting vegetation (Roby et al. 2013). This is similar to an approach used to dissuade CATEs from nesting at East Sand Island in the Columbia River estuary. To prevent CATEs from expanding their nesting into areas immediately beyond the present colony locations on Goose Island—into areas currently used by nesting gulls and other small plots where CATEs have attempted to nest in the past—the dissuasion area will be expanded to cover all likely potential nesting areas on the west island (approximately 1.2 acres) and east island (approximately 0.3 acres), which is a total dissuasion area of approximately 1.5 acres. Table 2–3 lists the estimated amount of materials required to cover the dissuasion area on Goose Island.



Source of underlying photograph: Bird Research Northwest (19 May 2012)

Figure 2–2. Layout of posts and flagging used to dissuade CATE nesting on East Sand Island. Yellow lines designate rope and each red X represents a length of flagging tied to the rope.

Table 2–3. Estimated Quantity of Passive Hazing Materials on Goose Island

Area	Dissuasion Area	Pier Blocks and Posts	Rope (ft)	Flagging (ft)
Goose Island West	51,400 sf = 1.2 ac	565	17,810	21,440
Goose Island East	13,450 sf = 0.3 ac	155	4,650	5,570
Totals:	**64,900 sf = 1.5 ac**	**750**	**22,460**	**27,010**

If CATEs begin nesting beyond the initial 1.5-acre installation on Goose Island, the need for additional dissuasion measures will be assessed. Locations will be determined based on reconnaissance efforts, with additional passive hazing measures expected to cover no more than 1 acre.

Phase 1 will generally occur in project Years 1 through 3, with the option to continue during Phase 2 if results of the first 3 years meet the objectives and do not have unintended negative consequences . Unintended negative consequences of Phase 1 actions could include but are not limited to dissuaded CATEs relocating to areas in which they have an equal or greater impact on ESA-listed salmonids. Results of hazing activities on Goose Island will be monitored daily or as warranted during the CATE nesting season from approximately late February to early July or until nest initiation attempts have stopped. Active hazing efforts (see Active Hazing Methods below) may be reduced in Years 2 through 4 if passive hazing measures appear to be successful. Unless more permanent substrate modifications are implemented in Phase 2 (see Passive Hazing in Section 2.4.4), temporary passive hazing structures on Goose Island will continue until a decision is made that it is no longer needed (e.g., CATEs nest on the island in sufficiently low numbers to no longer warrant dissuasion efforts [e.g., estimated to be 40 pairs of fewer]). It is anticipated that CATEs would return to nest on Goose Island if these passive hazing structures were to be removed.

Active Hazing Methods

In contrast to the habitat modifications used as part of passive hazing, active hazing on Goose Island will consist of actions directed specifically at the birds themselves. Active hazing will consist of people chasing CATEs and gulls away from potential nest sites and flattening nest scrapes. Active daily hazing will be employed during the CATE and gull breeding season, starting with the arrival of the first CATEs or gulls at the colony and ending when the first gull eggs are laid (i.e., from approximately late February to early July). If CATEs lay eggs, take would be allowed and hazing could continue until a maximum number of CATE eggs are taken (see Egg Take below). Active hazing will be used in conjunction with passive hazing throughout the dissuasion periods. To successfully dissuade all CATEs and gulls from nesting on Goose Island, hazing will begin prior to sunrise and finish after sunset.

Maintaining a regime of daily hazing will prevent CATEs and gulls from nesting on dissuasion islands. This daily hazing may be interrupted due to inclement weather that could make boat access challenging and/or dangerous. In cases where hazing is expected to be precluded by inclement weather, hazing staff may camp overnight to ensure hazing activities are commenced the following day. However, hazing staff will not camp overnight in cases of lightning storms or other weather events deemed unsafe. Active hazing on Goose Island will continue through Phase 2 as warranted.

Egg Take

Even with the passive and active hazing activities in place, it is possible that some CATE eggs may need to be taken from Goose Island. CATE egg take will only be instigated after active and passive hazing activities have been conducted to the maximum extent possible and actions are still required to prohibit reestablishment of the colony. It is likely that no more than three or four eggs per year would actually need to be taken to achieve the IAPMP goals, based on experience in the Columbia River estuary where there are many more CATEs (Roby et al. 2013). A permit for the take of up to 200 eggs on both dissuasion islands and all at-risk islands combined per year will be requested by the Action Agencies to ensure success of dissuasion activities. It is assumed that five consecutive years of active hazing plus egg take will discourage CATEs from nesting on Goose Island.

Monitoring and Performance Metrics

Goose Island will be monitored for CATEs daily during hazing activities from approximately late February to early July. Monitoring of CATEs on Goose Island may be conducted using early morning ground counts made by observers in blinds at the edge of each colony, by boat, and on foot in areas with potential for minimal disturbance to nesting birds. Monitoring will determine the annual number of CATE nesting pairs on Goose Island. The measure of success of dissuasion activities in Phase 1 will be 100% dissuasion of CATEs from Goose Island during Years 1 through 3 of implementation.

The reduction in predation on ESA-listed salmonids will be assessed based on the established relationship between monitored predation rates and CATE colony sizes (see Section 2.3). Success will be determined through annual CATE population surveys, extrapolated predation rates, and PIT tag recovery for confirmation, as needed. The final target metric is for a predation rate of less than 2% on any ESA-listed salmonid stock.

2.4.2 Phase 2

Passive Hazing Methods

Depending on the success achieved during the first 3 years of the project and the operations and maintenance costs and challenges, permanent substrate modification will be considered for Goose Island in Phase 2. The use of baseball-size (or larger) cobble or boulders to create an unsuitable nesting substrate for the CATEs would be a more permanent and less maintenance intensive dissuasion method that would cover the same area where roping and flagging was deployed in Phase 1. An established rock pit near Banks Lake could provide a source for cobble and/or boulder material, which could be hauled and deposited on Goose Island by helicopter or boat then spread across the nesting area by a labor crew of up to 10 people. If substrate modification is not undertaken, passive hazing using rope and flagging would occur until a decision is made that it is no longer warranted.

Monitoring and Performance Metrics

Monitoring will continue during Phase 2 as described for Phase 1. The measure of success of dissuasion activities in Phase 2 will be fewer than 40 CATE pairs nest on Goose Island in Years 4 and 5.

2.4.3 Summary of Goose Island Dissuasion Plan

Management actions are focused on achieving 100% dissuasion of CATEs nesting on Goose Island during Phase 1. To achieve this, management activity will include passive and active hazing of CATEs and gulls on Goose Island along with monitoring, and, if needed, limited CATE egg take.

Phase 1

Installation of passive hazing structures (i.e., pier blocks with ropes and flagging) will occur immediately prior to the Year 1 nesting season and will be repeated as necessary before each breeding season.

Active daily hazing of CATEs and gulls will be conducted throughout the day as necessary during the nesting season from late February to early July starting before the arrival of gulls and CATEs. Active hazing may consist of chasing CATEs and gulls away from potential nest sites and flattening nest scrapes.

If all other available options have been attempted, egg take of up to 200 eggs on both dissuasion islands and at-risk islands combined per year may occur. Egg take is not expected to be necessary with daily active hazing, but during periods of poor weather, limited island access could permit CATEs and gulls to start nesting. Under these circumstances, some CATE egg take may be necessary.

Dispersal of CATEs away from Goose Island during Years 1 through 3 will be monitored during the breeding season on a local level (in the Columbia River Basin) and less intensively monitored by partners on a regional level on the Pacific Coast from Alaska to Mexico and at other CATE nesting areas east to Montana. Monitoring actions will be similar to actions conducted on these islands prior to initiation of management efforts. During these dissuasion activities on Goose Island, the search will continue for a habitat enhancement site within the western CATE metapopulation.

Phase 2

During Phase 2, it may be determined that a more permanent dissuasion solution is desired, in which case large cobble or rocks would be added to the Goose Island CATE nesting areas to permanently dissuade nesting in those areas. Passive and active hazing on Goose Island will continue through Phase 2 as warranted, with as many as 40 CATE pairs allowed to nest on Goose Island. Monitoring will continue during Phase 2 as described for Phase 1. Both passive and active dissuasion actions may continue on Goose Island beyond Year 5 if needed.

2.5 Crescent Island Dissuasion Plan

This section covers all base (non-adaptive management) actions on Crescent Island, including passive and active hazing (dissuasion) and monitoring. It includes a reference to measurements and targets associated with dissuasion activities during Phase 1 and Phase 2 activities. Additional details are contained in the AMP (see Section 3). To minimize the potential for take of gull eggs during CATE hazing activities, both CATEs and gulls will be dissuaded from establishing nests in the vicinity of the existing CATE colony at Crescent Island. If additional CATE nesting occurs outside of the anticipated areas of nest establishment (area immediately adjacent to existing colony site), hazing of this newly established nest area may be delayed until the successive nesting season if it would potentially cause take of gulls.

2.5.1 Phase 1

Passive Hazing Methods

Passive hazing on Crescent Island in Phase 1 will consist of experimental vegetation plantings along with temporary ropes and flagging as needed to limit the formation of incipient CATE colonies. Experimental willow plantings (*Salix exigua* or similar native species) would be used to gather additional information on planting needs during Phase 1. Experimental plantings will be made along the shoreline near the 2010/2012 failed colony site at least 100 ft from the existing CATE colony to assess planting success. An estimated 75 willow whips will be planted approximately 1 ft apart to a depth of approximately 4 ft to facilitate access to groundwater. Experimental planting techniques could include planting whips at different depths, using different sizes, using different watering schemes, or other methods yet to be determined. The Phase 1 experimental plantings are designed to assess effectiveness of planting techniques with potential ancillary benefits of precluding the formation of incipient CATE colonies.

In the event that incipient CATE colonies form on Crescent Island away from the primary colony, temporary passive hazing structures (i.e., ropes and flagging) would be placed on the island prior to the following nesting season. Temporary passive hazing structures may be installed in conjunction with active hazing measures, as described below, to limit the formation of incipient CATE colonies during implementation of Phase 1. The methods to be utilized for these passive hazing structures would be similar to those used for Goose Island.

Active Hazing Methods

The Crescent Island colony will be monitored during Phase 1 to ascertain whether CATEs and gulls dissuaded from Goose Island attempt to relocate to Crescent Island. If monitoring indicates that one or more incipient colonies begins to establish on Crescent Island away from the primary colony location, active hazing of CATEs and gulls will be conducted in these areas throughout the day as necessary. Hazing will likely be in both morning and late afternoon hours during the nesting season beginning as early as Year 2 and continuing through the remainder of Phase 1. Active hazing actions will occur from approximately late February to early July. Active hazing will not occur in Year 1 because nesting gulls may preclude CATEs from establishing incipient colonies on the island. However, if CATEs are able to create one or more incipient nesting colonies outside of their current colony area in Year 1, active hazing of gulls and CATEs would occur in Year 2. Active hazing will consist of people chasing CATEs and gulls away from potential nest sites and flattening nest scrapes.

Maintaining a regime of daily hazing will prevent CATEs and gulls from nesting on dissuasion islands. This daily hazing may be interrupted due to inclement weather that could make boat access challenging and/or dangerous. In cases where hazing is expected to be precluded by inclement weather, hazing staff may camp overnight to ensure hazing activities are commenced the following day. However, hazing staff will not camp overnight in cases of lightning storms or other weather events deemed unsafe. Because Crescent Island is part of the USFWS McNary National Wildlife Refuge Complex, a conditional permit for camping on the island would be requested from the USFWS. A predefined access route will be established for hazing trips to and from the colony site.

Egg Take

In the event that these dissuasion activities are not fully successful such that CATEs lay eggs in incipient colony areas, these eggs will be collected in support of dissuasion activities and to allow nonlethal measures to continue. While egg take is expected to be unnecessary with daily active hazing, events such as inclement weather may limit island access for hazing such that CATEs and gulls may start nests and lay eggs in dissuasion areas. It is likely that no more than three or four eggs per year would actually need to be taken to achieve the IAPMP goals based on experience in the Columbia River estuary where there are many more CATEs (Roby et al. 2013). Up to 200 CATE eggs may be taken per year at dissuasion sites and at-risk sites combined. Egg take will be done in accordance with applicable USFWS permits.

Monitoring and Performance Metrics

Crescent Island will be monitored for CATEs daily during hazing activities from approximately late February to early July. Monitoring of CATEs on Crescent Island will be conducted using early morning ground counts made by observers in a blind at the edge of the colony, by boat, and on foot in areas with potential for minimal disturbance to nesting birds. Monitoring will determine the annual number of CATE nesting pairs on Crescent Island. The measure of success of dissuasion activities will be 100% dissuasion of CATEs from Crescent Island during Years 4 and 5.

The reduction in predation on ESA-listed salmonids will be assessed based on the established relationship between monitored predation rates and CATE colony sizes (see Section 2.3). Success will be determined through annual CATE population surveys, extrapolated predation rates, and PIT tag recovery for confirmation, as needed. The final target metric is a predation rate of less than 2% on ESA-listed salmonid stock.

2.5.2 Phase 2

To dissuade CATEs from nesting on Crescent Island, daily active hazing will be employed in conjunction with passive hazing as needed in Phase 2 during the CATE and gull breeding season starting with the arrival of the first CATEs and gulls at the island.

Passive Hazing Methods

The existing CATE colony on Crescent Island covers approximately 0.1 acre and would be the focus of the most intensive passive dissuasion methods upon implementation of Phase 2 (Figure 2–3). Phase 2 passive hazing will include the following habitat modification actions designed to create long-term visual barriers that will prevent CATEs from nesting at the site:

- Vegetation plantings to provide a low maintenance, long-term deterrent to CATE nesting
- Silt fencing to dissuade CATE nesting and protect vegetation plantings
- Wire fencing to protect vegetation plantings
- Wood debris to create a visual barrier and an unsuitable nesting substrate
- Possible soil excavation to facilitate vegetation establishment and create berm

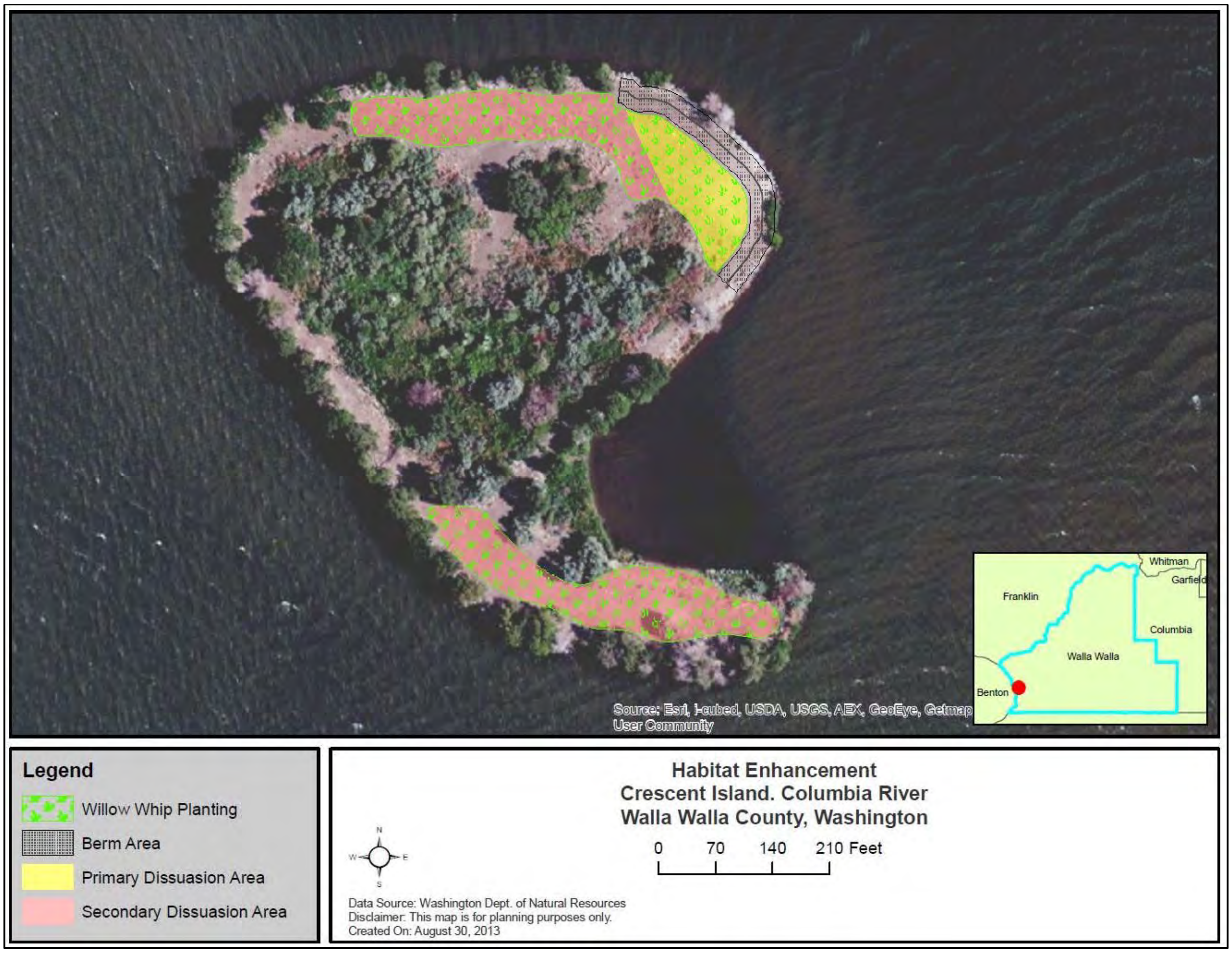
Vegetation Plantings

Based on the presence of abundant trees, shrubs, and herbaceous plants on parts of Crescent Island, vegetation is a readily available device to provide a low maintenance, long-term deterrent to CATE nesting. Vegetation will provide a more robust deterrent to nesting than blocks, posts, rope, flags, or any other passive hazing actions.

Based on results of experimental plantings in Phase 1, whips of coyote (narrowleaf) willow (*Salix exigua* or similar native species) will be planted across the primary dissuasion area and in the secondary dissuasion area (Figure 2–4). In addition to the ability to grow quickly in conditions at Crescent Island, coyote willows are preferred because they are shrubby and would not support cormorant nests. Willows will be obtained from local sources, most likely from McKay Creek National Wildlife Refuge, which is about 60 miles from Crescent Island (L. Glass, USFWS, personal communication). When collected, willows will be stripped of branches and bundled before transport to Crescent Island. Immediately before whips are planted, approximately 1 inch will be cut off the bottom of each whip to facilitate water transpiration. The willow whips will be planted approximately 1 ft apart and to a depth of approximately 4 ft to facilitate access to groundwater. Lines of planted willows will be arranged in rows 10 ft apart at the primary dissuasion area and 15 ft apart in the secondary dissuasion areas (other open areas of the island where gulls and a few CATEs nest; Figure 2–4). Holes for willow whips will be dug approximately 4 ft deep using equipment such as a water jet stinger. Willow whips will be at least 7 ft long, but likely 8 ft long or longer so that they project at least 4 ft above the ground.

Source of underlying photo: Bird Research Northwest (20 May 2011)

Figure 2–3. Location of primary CATE colony (red outline) and previous failed CATE colony attempts (red and white outline) on Crescent Island.



Source of underlying photo: Bird Research Northwest (20 May 2011)

Figure 2–4. Sketch of planting rows in the primary dissuasion area (yellow) and planting rows in secondary dissuasion areas (pink). Excavation in the primary dissuasion area is up to 2 ft below surface level with a berm up to 4 ft high on the northeast side of the island.

Willow whips will be planted in early February because they are dormant at that time and will establish more successfully. Hunters often use the island until the end of January but will be gone in February. There is also no danger of disturbing bird species of concern because none will be nesting at that time (L. Glass, personal communication, September 12, 2012).

Approximately 20,000 willow whips will be needed (Table 2–4). If more than half of the willows do not respond well in the experimental planting of Phase 1, slightly deeper holes will be dug to allow the willows more access to water during the Phase 2 planting.

It is anticipated that additional vegetation will volunteer or reestablish from onsite sources with the reduced bird abundance. Fast growing grasses and other groundcover plants will likely establish as a result of nest dissuasion and may provide protection for shrubs that establish more slowly (Benson et al. 2011) while also dissuading nesting by CATEs. Herbaceous vegetation could also provide additional protection for willow plantings from animal disturbance (e.g., beavers).

Both ring-billed and California gulls often nest amongst vegetation, but ring-billed gulls (Pollet et al. 2012; Quinn et al. 1996) may better tolerate vegetation than California gulls (Jehl and Mahoney 1987; Winkler 1996). Thus the 15-ft spacing of willow rows in the secondary dissuasion areas may allow ring-billed gulls, and California gulls to a lesser extent, to continue to nest while dissuading CATE nesting (see Roby et al. 2002).

Table 2–4. Estimated Quantity of Dissuasion Planting Material and Silt Fencing Needed on Crescent Island

Area	Dissuasion Area	Approx. Number Willow Whips	Approx. 3-ft Tall Silt Fencing Needed (ft)
Primary Dissuasion (CATE-nesting) Area	25,200 sf = 0.6 ac	13,840 (installed every foot on center)	2,290[a]
Secondary Dissuasion (gull-nesting) Area	42,100 sf = 1.0 ac	6,630 (installed every foot along two rows for every row of silt fencing placed 15 ft apart)	3,320 (installed at 15-ft intervals)
Totals	**67,300 sf = 1.6 ac**	**20,475**	**5,600**

[a] If installed at 10-ft intervals in excavation areas, plus one row horizontally offset 3 ft on berm from toe of cut area, and two rows at 3-ft horizontal intervals on berm slope facing water, starting at toe of slope.

If significant (e.g., >75%) plant failure occurs in the first 3 years after planting, willow whips (or other native species as approved by Corps and USFWS National Wildlife Refuge managers) will be replanted to restore the original planting density. Planting of additional willows will occur in February or earlier in the winter before CATEs begin to nest on the island.

Silt Fencing

Before the CATE breeding season and after willow planting in Year 3, a temporary silt fence will be installed to dissuade nesting and help vegetation become established. This fence will be erected among the planted willows in rows 10 ft (primary area) and 15 ft (secondary area) apart (see Figure 2–4) and will be removed once the willows are established and the dissuasion efforts are successful. The more conservative 10-ft spacing is denser than the minimum 15-ft spacing used to dissuade CATEs from nesting at Rice Island (Roby et al. 2002) because of anticipated aggressive efforts by CATEs to nest in this area as well as the potential for some willow plantings to fail. In the secondary dissuasion areas, the 15-ft intervals have already been shown to dissuade CATEs from nesting while potentially allowing gull nesting (Roby et al. 2002).

To minimize frequency of maintenance, high quality landscape fabric will be used for silt fencing due to its resistance to weathering. The silt fence will be at least 3 ft tall and will be attached with hog rings (both top and bottom edges) to galvanized bailing wire suspended between metal T-posts (fencing posts) at the prescribed intervals. Bailing wire will be strung at the tops and bottoms of the T-posts so that it is taut and anchored every 3 ft. This arrangement will increase the life span of the silt fence and help prevent damage from wind. Up to 5,600 ft of silt fencing may be needed on Crescent Island (Table 2–4).

If silt fencing becomes damaged, it will be repaired or replaced as needed. Silt fence repairs will typically occur in February, before CATEs begin to nest on the island, with potential for some limited in-season repairs to be performed as warranted.

Wire Fencing

The goal of wire fencing is to prevent beaver and other animal and human damage to vegetation plantings. Rows of wire field fencing at least 4 ft tall with 6- to 8-inch square mesh will be placed around the perimeter of the primary dissuasion area and around the water-facing side of the secondary dissuasion areas. The exact amount of wire fencing will be determined based on the final site layout including the position of willows and silt fences. Wire fencing will be maintained and replaced as necessary for 5 years after planting.

Woody Debris

Woody debris collected from the island could be placed in potential CATE nesting areas to create a visual barrier and an unsuitable nesting substrate that would make the island less favorable for nesting CATEs. Woody debris would be placed in 3- to 5-ft tall piles that are several feet wide around the perimeter of the island and between silt fences in the secondary dissuasion areas (Figure 2–4). The actual height, width, and distribution of woody debris piles would depend on the amount of debris available on site at the time of construction. Currently there is downed woody debris at several locations around the island, particularly along the western side. Most of this downed debris could be moved or realigned on the southern part of the island. Standing dead trees along the perimeter of the island would remain standing for use as perches for bald eagles and other raptors. In addition to existing downed woody debris, live Russian olive trees or shrubs are extensive on the island and could be cut and used to create debris piles. Debris piles are anticipated to be created in Year 4 or 5 as part of Phase 2 activities and would not be an ongoing maintenance activity.

Soil Excavation

If experimental plantings in Phase 1 are successful at the same elevation as the proposed Phase 2 planting (greater than 50% survival rate), then Phase 2 plantings will be done without soil excavation. If experimental plantings in Phase 1 are unsuccessful, a layer of soil will be removed before Phase 2 plantings are installed to decrease the distance between the willow roots and water table.

If soil excavation is necessary to establish plantings, this excavated soil would be used to form a 4-ft tall berm on the northeast side of the island, creating a further visual barrier for CATEs that might attempt to nest (Table 2–5). Soil excavation will be accomplished with small earth moving machinery. The berm would be formed from material scraped from the primary dissuasion (and planting) area on the northeast side of the island (see Figure 2–4).

Table 2–5. Estimated Area and Materials of Cut and Fill on Crescent Island

Area	Area footprint (sf)	Volume (cf)	Volume (cy)
Cut[a]	15,377	-22,514	-834
Fill[b]	9,852	22,514	834
Total Cut/Fill	25,229	0	0
Berm Cap[c]	9,852	2578	95

a Cut side slopes 3:1, depth 1.6 ft.
b Berm 3:1 side slopes, 4 ft top width, 4 ft high from existing ground.
c Assume 3-inch thick riprap or cobbles.

To deter CATEs and other piscivorous waterbirds from nesting on the berm, it would be armored with rock, such as cobble or riprap, using an in-house source (Reclamation has some nearby rock pits) or a commercial source from a preapproved facility. If the experimental willow plantings are successful, soil excavation and berm construction would not be necessary and willow plantings, as described above, would be extended over the berm footprint.

Active Hazing Methods

Active hazing will consist of people chasing CATEs and gulls away from potential nest sites and flattening nest scrapes. Active daily hazing will be employed during the CATE and gull breeding season, starting with the arrival of the first CATEs or gulls at the colony and ending when the first gull eggs are laid (i.e., approximately from late February to early July). If CATEs lay eggs, take would be allowed and hazing could to continue until a maximum number of CATE eggs are taken (see Egg Take below). Active hazing will be used in conjunction with passive hazing throughout the dissuasion periods. To successfully dissuade all CATEs and gulls from nesting on Crescent Island, hazing will begin prior to sunrise and finish after sunset.

Egg Take

The Action Agencies anticipate that passive and active hazing efforts at Goose and Crescent Islands will result in very few to no CATE breeding pairs remaining on the islands. CATE egg take at Crescent Island will only be started after active and passive hazing activities have been conducted to the maximum extent possible. Based on hazing activities in the Columbia River estuary, it is anticipated that no more than three or four eggs per year may need to be taken based on CATE experience at East Sand Island where an intensive hazing schedule was employed (Roby et al. 2013). A permit for take of up to 200 eggs on both dissuasion islands and at-risk islands combined per year will be requested by the Action Agencies to ensure success of dissuasion activities.

Monitoring and Performance Metrics

CATE Monitoring

Monitoring of CATEs on Crescent Island will be conducted to assess pertinent colony information such as colony size, habitat use, and total area occupied by CATEs. Information will be collected by observers in blinds at the edge of each colony, as well as by boat, on foot, and via aerial surveys. The measure of success of dissuasion activities will be 100% dissuasion of CATEs from Crescent Island in Year 5.

The number of CATE nesting pairs outside the main colony area at Crescent Island will be determined through monitoring during frequent visits to the island and from boat and aerial surveys.

If CATEs begin to nest beyond the dissuasion areas of Crescent Island, the need for additional silt fencing and/or willow planting will be assessed in cooperation with the National Wildlife Refuge. Any in-season actions that may be taken are adaptive management actions (see Section 3). If CATE nesting attempts occur along the shoreline in the vicinity of the 2010/2012 failed colony attempt (see Figure 2–3), cobbles and/or willow plantings may be added to create an unsuitable nesting substrate.

The success of the reduction in predation rates on ESA-listed salmonids will be assumed based on the relationship between historical monitored predation rates and CATE colony sizes. Success will be determined through annual CATE population surveys extrapolated to predation rates and confirmed through predation studies (e.g., PIT tag recovery) as needed. The final target measured over 3 years is for predation rates of less than 2% per ESA-listed salmonid stock.

Vegetation and Fencing Monitoring

Plantings will be monitored at the time of hazing activities for successful establishment (≥25% survival). No additional planting is anticipated unless significant (e.g., >75%) plant failure occurs in the first 3 years after planting. If this occurs, willow whips (or other native species as approved by Corps and USFWS National Wildlife Refuge managers) will be replanted to restore the original planting density. Planting of additional willow will occur in February or earlier in the winter before CATEs begin to nest on the island.

Silt fencing will be monitored at the time of hazing activities for damage. If silt fencing becomes damaged, it will be repaired or replaced as needed. Silt fence repairs will typically occur in February before CATEs begin to nest on the island with potential for some limited in-season repairs to be performed as warranted. Silt fencing is a short-term action that will be reevaluated from year to year, and fencing will be removed after willow plantings become established and dissuasion activities are successful.

Wire fencing will be monitored and maintenance and replacement will continue as necessary for 5 years after planting to encourage a high survival rate of willows.

2.5.3 Summary of Crescent Island Dissuasion Plan

Management activity is focused on preventing formation of incipient colonies through recruitment of displaced birds during Phase 1, followed by 100% dissuasion of CATE nesting on Crescent Island during Phase 2. To achieve this, management activities will include experimental plantings and measures to address the formation of incipient CATE colonies in Phase 1 as warranted. Additional measures could include passive hazing (e.g., such as vegetation planting and other actions including possible berm creation) and active hazing of all CATEs and gulls in Phase 2.

Phase 1

Experimental willow planting will occur during Phase 1 to improve success of plantings during Phase 2. Experimental plantings will take place prior to the gull nesting season and away from the current CATE colony.

Crescent Island will also be monitored during Year 1 to ascertain whether CATEs dissuaded from Goose Island attempt to relocate to Crescent Island. Aside from the experimental planting area, there will be no Phase 1 dissuasion activity at Crescent Island if CATEs do not establish incipient colonies on the island. If an incipient CATE colony is detected through monitoring, dissuasion of CATEs and gulls will be conducted in the vicinity of the incipient colony if this is possible while avoiding gull egg take. Egg take is not expected to be necessary with daily active hazing unless unusual circumstances prevent hazing actions. For example, during periods of inclement weather, limited island access for hazing may allow CATEs and gulls to start nests. Under these circumstances, some CATE egg take might be necessary.

Phase 2

During implementation of Phase 2, management actions will consist of habitat modifications (passive hazing) and active hazing. Habitat modification measures on Crescent Island as described above will include vegetation planting combined with silt fencing, protective wire fencing, and possible construction of a berm topped with cobble. In addition, active hazing and monitoring will continue as necessary. Implementation of the habitat modification actions are timed to coincide with implementation of habitat enhancement actions occurring at habitat enhancement sites. Both passive and active dissuasion actions may continue on Crescent Island beyond Year 5 if needed.

If CATEs attempt to nest outside of primary dissuasion areas on Crescent Island at any time during Phase 2, temporary ropes and flagging may be placed in the area to render it unsuitable for nesting, though this is not anticipated.

2.6 Habitat Enhancement Site Plan

This section addresses project Objective 4: *Provide conditions suitable for new CATE colony establishment outside the Inland Basin as a means to reduce losses to ESA-listed salmonids*. This section describes all base (nonadaptive management) actions, measurements, and targets for the habitat enhancement sites including a brief summary of the site assessment study (Collis et al. 2012), and it describes in general terms the criteria for success at the habitat enhancement sites.

Criteria for habitat enhancement sites for this IAPMP are based on three documents (Appendix G of USFWS 2005, Seto et al. 2003, and Collis et al. 2012) and include the following:

1. Contains sufficiently available, suitable nesting habitat to support approximately 1,000 nesting CATE pairs, does not experience frequent flooding or drought events, and has suitable base substrates
2. Has no long-term expensive operations and maintenance requirements
3. Is in sufficient proximity to a relatively stable and abundant prey source for CATEs
4. Is located in an area with minimal potential conflicts with ESA-listed species including fish
5. Potential mammalian and avian predators and human disturbances are absent, not a limiting factor, or controllable

As part of developing the IAPMP and EA, the Corps and Reclamation have conducted initial efforts to identify suitable sites for habitat enhancement based on the site assessment report conducted by Oregon State University (Collis et al. 2012) and other readily available information. For the site assessment study, Collis et al. (2012) used existing information on biotic (e.g., prey suitability, predation pressure) and abiotic (e.g., land ownership) factors to rank the suitability of approximately 150 sites in the western North America CATE metapopulation for potential habitat enhancement. As part of Phase 1, the Corps and Reclamation will further investigate these and additional sites, conduct analysis as appropriate including supplemental/ tiered NEPA review, and select a site for implementation as part of Phase 2 (see Table 2–1).

Potential CATE enhancement sites will be evaluated for suitability for nesting CATEs based on the five criteria above and any new information that becomes available during analysis efforts. The availability of suitable CATE nesting areas as well as metrics of habitat quality (e.g., substrate type, lack of predators, access to forage) will be used to determine the success of the habitat enhancement site(s). Once suitable site(s) and site-specific uncertainties are identified, these metrics will be further defined to the specifics of the habitat enhancement site(s).

2.7 At-Risk Islands Plan

As a consequence of CATE dissuasion on Goose and Crescent Islands and potential other movements of CATEs within the western North America metapopulation, it is possible that CATEs will move to other islands in the Inland Basin (i.e., at-risk islands) and continue to consume ESA-listed salmonids. There are higher risk and lower risk sites among the at-risk islands within the Columbia River Basin. Ten of the potentially highest at-risk islands have been identified (see Table 2–6 and Figure 1–1), but other sites could develop during any given nesting season. The ten islands identified as at-risk islands are considered at risk because they are believed to hold potential for CATE nesting and would likely contribute to similar predation losses of ESA-listed salmonids at Goose and Crescent Islands. Therefore, limiting CATE breeding on at-risk islands is part of the IAPMP's Objective 1: *Reduce CATE consumption of ESA-listed salmonids including Upper Columbia and Snake River steelhead, Chinook salmon, and sockeye salmon in the Inland Basin*.

These identified at-risk islands will be surveyed at least once per CATE nesting season. Furthermore, the Inland Basin will be monitored for any CATE colony that grows large enough to have a substantial negative impact on ESA-listed salmonids. Additional details related to monitoring of the Inland Basin, including at-risk islands, are covered in the AMP (see Section 3).

Table 2–6. At-risk Islands in the Columbia River Basin

Island Name	Location	Risk Level
Badger Island	Columbia River	Higher
Blalock Islands	Columbia River	Higher
Cabin Island	Columbia River	Lower
Foundation Island	Columbia River	Lower
Harper Island	Sprague Lake	Higher
Miller Rocks	Columbia River	Lower
Richland Islands (e.g., Islands 18 and 20)	Columbia River	Lower
Solstice Island	Potholes Reservoir	Lower
Three-mile Canyon Island	Columbia River	Lower
Twinning Island	Banks Lake	Higher

At-risk islands that have 40 or more nesting pairs of CATEs may be further monitored for consumption rates of ESA-listed salmonids (e.g., PIT tag recovery type studies) and possibly be subject to dissuasion activities depending on the situation. The assumed rates of predation by CATE colony size will be determined based on existing information about observed CATE predation rates in similar areas. Dissuasion on at-risk islands could be passive (e.g., temporary ropes and flagging or other measures) or active as local conditions dictate. See Section 2.3 for more information about triggers for dissuasion actions.

The final target is for fewer than 40 CATE pairs nesting on any one at-risk island and fewer than 200 CATE pairs nesting on all 10 at-risk islands combined with a predation rate of less than 2% per island or less than 5% for all islands averaged over 3 years.

3.0 ADAPTIVE MANAGEMENT PLAN

This AMP outlines steps to adapt or adjust management actions in response to the results of monitoring and assessment. The purpose is to consider possible scenarios and approaches to best achieve IAPMP objectives. The plan serves as a guide for implementing the IAPMP, monitoring, and decision-making over both phases of the project.

This AMP also describes potential actions for plan implementation and lists uncertainties associated with management actions. It addresses events that may require unplanned actions on dissuasion islands, enhancement sites, and at-risk islands.

3.1 Uncertainties

This section provides a general overview of the major uncertainties related to achieving the goals of the IAPMP. More objective-specific uncertainties are contained in the sections for each objective. These uncertainties include issues such as the efficacy of dissuasion methods, where nesting CATEs will disperse to establish colonies, and what species and quantities of ESA-listed fish they will consume.

3.1.1 Dissuasion Methods

While dissuasion methods to be used in the IAPMP have proven successful in other situations (USFWS 2005), biological and physical conditions vary from site to site and what works at one site cannot be guaranteed to work at another site. To address this uncertainty, multiple dissuasion methods including passive and active dissuasion, egg take, habitat modification, and enhancement of habitat in other areas are considered in the plan.

3.1.2 Habitat Enhancement Site(s) Establishment

A variety of issues could be associated with establishment of the habitat enhancement site(s). Within the past 30 years, a variety of techniques have been developed to greatly increase the chance of success when establishing new seabird colonies (Jones and Kress 2012; Kress and Hall 2002).

Predation on CATEs

CATE predators have the potential to limit successful establishment of colonies at habitat enhancement sites and may warrant short-term predator-control actions (Jones and Kress 2012; Kress 1983; Kress and Hall 2002). Techniques for predator control vary depending on the species being controlled. These predators could include animals such as American mink (*Neovison vison*) or great horned owls (*Bubo virginianus*) that eat adult CATEs, or animals such as California gulls (*Larus californicus*) or black rats (*Rattus rattus*) that consume CATE eggs. Control techniques may be lethal or nonlethal. Hazing of predatory gulls early in the nesting season is especially important to enable successful establishment of new CATE colonies (Kress and Hall 2002), though there is some evidence that gull culling might need to be repeated every year to allow successful tern nesting (Guillemette and Brousseau 2001). In some cases, predator control may not be permitted (e.g., prohibited by landowner) or feasible (e.g., limited access). Permits for nonlethal and lethal control will be obtained as needed from the appropriate agencies.

Social Attraction

The use of decoys and broadcast bird sounds to attract nesting birds to a location is known as social attraction. This technique has proven valuable in attracting seabirds to potential nesting sites (Jones and Kress 2012; Kress 1983; Kress and Hall 2002) and was successfully used to attract CATEs to East Sand Island (Jones and Kress 2012; Roby et al. 2002). Social attraction will likely be employed to attract CATEs to habitat enhancement sites as part of this IAPMP.

3.1.3 CATE Feeding Habits

The IAPMP is written assuming that the predation rate on juvenile salmonids by CATEs will remain more or less constant within the dissuasion area if no action is taken. Additionally, distances from CATE nests to foraging areas are assumed to remain relatively constant. Large changes in either of these factors could influence future management actions.

3.2 Adaptive Management Principles

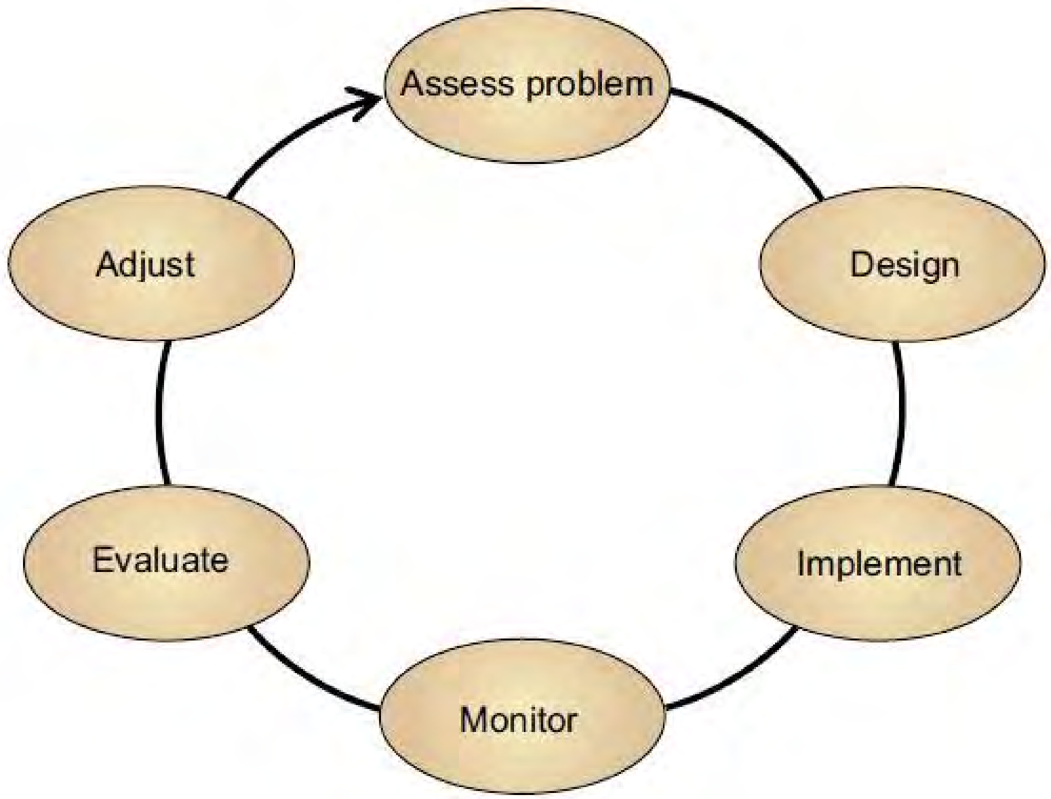
Adaptive management principles allow for flexibility and maximization of efficiency and effectiveness within a project. The U.S. Department of the Interior Adaptive Management Work Group defines adaptive management as a process that

> *…promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a ‘trial and error’ process, but rather emphasizes learning while doing (Williams et al. 2009).*

The six steps of adaptive management (Figure 3–1) correspond to the following actions in this IAPMP:

1. Assess problem: The problem has been determined to be high levels of predation by CATEs on ESA-listed juvenile salmonids in the Upper Columbia River and Lower Snake River.
2. Design: The IAPMP was designed during meetings of the Action Agencies with input from partners and IAPWG meetings.
3. Implement: The IAPMP will be implemented in a two-phase process starting with Goose Island and continuing at Crescent Island.
4. Monitor: Results of dissuasion and habitat enhancement actions will be monitored during implementation to resolve uncertainties associated with anticipated project outcomes.
5. Evaluate: Results of monitoring will be evaluated on a regular basis to determine if objectives are being met.
6. Adjust: If project objectives are not met, actions will be adjusted to more effectively accomplish them.

The Action Agencies will conduct work relevant to the IAPMP in concert with other ongoing monitoring and evaluation tasks. In the Columbia River Basin, these may include but are not limited to basin-wide ESA-listed salmonid monitoring programs and basin-wide CATE monitoring programs. These specific scientific investigations may help reduce uncertainties and answer questions relating to the successful implementation of the IAPMP, including but not limited to overall population trends of both ESA-listed salmonids and CATEs.



Source: Williams et al. 2009

Figure 3–1. The six steps of the adaptive management process

3.3 Objective 1: Reduce CATE Consumption on ESA-Listed Salmonids including Upper Columbia and Snake River Steelhead, Chinook Salmon, and Sockeye Salmon in the Inland Basin

This is the primary objective of the IAPMP and involves actions to dissuade CATEs from nesting sites with high rates of predation on ESA-listed salmonids in the Inland Basin. The primary uncertainty that this objective addresses is where dissuaded birds will nest and whether or not they will seek out other nesting sites in the Inland Basin.

3.3.1 Monitoring

The monitoring plan incorporates two CATE monitoring elements that have been implemented over the past decade: system level monitoring and colony level monitoring. Colony level monitoring is at the short-term and local scale. It consists of collecting data on colony attendance, colony size, productivity, and limiting factors for colony size and productivity. System level monitoring is at the long-term and regional scale. It consists of periodic aerial, road, and/or boat surveys of the Inland Basin for CATEs (Roby et al. 2011b).

In addition to monitoring CATE populations at dissuasion sites, monitoring of at-risk islands will be another focus of monitoring and adaptive management activities, as this is where unexpected CATE populations may appear, requiring unplanned actions. As a consequence of CATE dissuasion on Goose and Crescent Islands for example, it is possible that CATEs will move to other islands (at-risk islands) in the Inland Basin and continue to consume ESA-listed salmonids. CATE populations and, if necessary, CATE predation rates on ESA-listed salmonids may need to be monitored on all islands where CATEs nest (e.g., see Table 2–6 and Figure 1–1) in the Columbia River Basin.

Monitoring will be described in annual reports. As part of the adaptive process, results of all three categories of monitoring—system level, colony level, and on at-risk islands—will inform adaptive management decisions.

System Level Monitoring of CATE Populations

Monitoring methods discussed here apply to both Goose and Crescent Islands as well as at-risk islands and other Inland Basin areas where CATEs may be found nesting. Monitoring on Goose and Crescent Islands will occur during all 5 years of IAPMP implementation.

Monitoring of CATE populations in the Inland Basin is important because it allows assumptions to be made about consumption rates of ESA-listed salmonids based on past calculations of predation rates. Adaptive management recommendations made on the basis of monitoring results will be implemented in the same season or the season following monitoring.

Monitoring the CATE consumption rate of ESA-listed salmonids through PIT tag recovery may occur if more than 40 CATE pairs attempt to nest on an at-risk island, or if more than 200 pairs total nest in the Inland Basin. The rationale for these numbers is provided in Section 2.3. These nesting levels will be used as triggers for predation analysis studies (e.g., PIT tag recovery studies), which will help determine if further adaptive action is warranted.

Colony Level Monitoring of CATE Populations and Salmonid Predation Rates

Short-term, local monitoring will occur during the 5 years of implementation and will comprise three components: (1) monitoring for CATE colonies in the Inland Basin, (2) monitoring the success of willow plantings and the condition of silt fencing on Crescent Island, and (3) monitoring for potential effects on nontarget species (i.e., gulls). To maximize efficiency and minimize the number of visits to the islands, colony level monitoring efforts will be combined with dissuasion activities.

Intensively monitored sites will be checked at least monthly while less intensively monitored sites will be checked with varying frequency, from weekly to seasonally or incidentally, depending on observed nesting and availability of local monitoring resources. Monitoring will consist of searching for roosting CATEs and will be coordinated with local monitoring efforts so that the majority of monitoring outside of the Inland Basin will be conducted by entities other than the Action Agencies. This monitoring outside of the Inland Basin is not part of the IAPMP and is not described here.

As the nesting season approaches, both Goose and Crescent Islands will be monitored for the presence of CATEs. Monitors will also conduct hazing activities as described in previous sections to save the need for a separate hazing team. Monitors will record data on the number of CATEs present at each island, CATE behavior that may indicate nesting intent (i.e., courtship behavior), number and location of potential and actual nests, number and location of eggs, and predation rates if CATE colonies become established in spite of dissuasion efforts.

The Benefits Analysis (Lyons et al. 2011) showed Goose Island CATE predation rates on hatchery reared Upper Columbia River steelhead for 2007–2010 to be 14.6% (see Table 2–2). Because there were, on average, approximately 300 to 400 nesting CATE pairs on the island during the last 3 years of the period analyzed within the Benefits Analysis (Lyons et al. 2011), it could be extrapolated that a 90% reduction of the colony size (i.e., down to approximately 40 nesting pairs at the maximum colony size) could result in a reduction in predation rate to approximately 1.5%.

At-Risk Island Monitoring

At-risk islands will be the other focus of monitoring and adaptive management activities, as these are areas where unexpected CATE populations may appear, potentially requiring additional dissuasion actions.

Of the ten identified at-risk islands, four (Table 3–1) have a potentially higher likelihood for attracting nesting CATEs due to their recent history of CATE nesting. These four islands will likely be surveyed with greater frequency as CATEs could use them for roosting as well as nesting. If nesting CATEs are found at additional nesting areas (i.e., islands or other nesting sites such as rooftops) in the Columbia River Basin, these sites may also be more intensively monitored for CATE breeding activity and, if necessary, for CATE predation rates on ESA-listed salmonids.

Table 3–1. Number of CATE Pairs Attempting to Nest on Four Higher Risk Islands in the Inland Basin, 2005–2011

Island(s) Name	2005	2006	2007	2008	2009	2010	2011
Twinning Island (Banks Lake)	12	24	30	27	61	34	19
Badger Island	NA	NA	NA	NA	NA	NA	33
Blalock Islands	6	110	16	104	80	135	20
Harper Island	10	7	0	11	4	4	4

Source: USFWS, unpublished data

The remaining six islands (Table 3–2) have less potential to attract nesting CATEs for a variety of reasons. These islands have habitat of lower suitability for CATE nesting.

Most of these islands had little to no suitable habitat in the summer of 2013, but conditions for nesting could change due to shifting water levels that could create nesting habitat around the edge of the islands or habitat alterations such as fire that could clear areas of vegetation and create potential nesting areas. If conditions remain similar, there appears to be little chance that CATEs will nest on these islands; nevertheless, the islands will be surveyed as part of the Inland Basin CATE surveys to assess the movements of CATEs following dissuasion. If conditions remain the same or worse for CATE nesting on these islands, there is little chance that the small numbers of CATEs attempting to nest will have any appreciable negative impact on ESA-listed salmonids. If conditions change, however, CATEs could rapidly colonize one of these islands in large numbers.

Table 3–2. At-risk Islands in the Inland Basin with no Successful Nesting Attempts in Recent Years, but with Potential for CATE Nesting

Island(s) Name	Notes on CATE nesting
Foundation Island	CATEs tried unsuccessfully to nest in 2011. No suitable habitat in 2013.
Miller Rocks	CATEs tried unsuccessfully to nest in 2005. No suitable habitat in 2013.
Solstice Island (Potholes Reservoir)	There were 248 CATE pairs and an estimated 217 fledged chicks in 2001, but habitat is ephemeral due to variable water levels and vegetation growth. Human disturbance is also a potential issue.
Three-Mile Canyon Island	There were 275 CATE pairs in 2000, but all abandoned the site. No nesting occurred after 2000. No suitable habitat in 2013.
Cabin Island	No nesting CATEs since the 1990s. No suitable habitat in 2013.
Richland Islands	No CATEs nesting history, but there appears to be habitat for >1,000 CATE pairs, especially on islands 18 and 20. One possible reason for lack of nesting is ease of access to the island by predators.

Sources: Antolos et al. 2004; D. D. Roby, Oregon State University, and K. Collis, Real Time Research, Inc., personal communication

In addition to the islands mentioned above, it is possible that CATEs dissuaded from Goose or Crescent Islands could attempt to nest at other sites in the Columbia River Basin. For example, several adult CATEs were observed in the summer of 2013 feeding recently fledged young at Evergreen Reservoir (M. S. Lesky, Reclamation, personal communication). Because there is an extended period of postfledging parental care in CATEs, it is likely that these birds were from a nearby colony, possibly Goose or Crescent Island, and unlikely that they were born in a new colony in Evergreen Reservoir (D. D. Roby, personal communication), but it demonstrates that other islands such as this one could potentially be attractive for breeding CATE.

To gain an understanding of dispersal patterns of CATEs within the Inland Basin, aerial surveys and behavioral observations will be conducted to determine where colonies are being established. All known and potential CATE nesting areas in the Inland Basin will be monitored at least twice a season by low-flying airplanes to check for presence of incipient colonies. Special attention will be paid to at-risk islands during aerial surveys. At a minimum, aerial surveys will cover potential nesting areas between Bonneville and Wanupum dams and from the mouth of the Snake River upstream to Lewiston along with the Potholes Reservoir and Sprague and Banks lakes.

3.3.2 Performance Metrics and Adaptive Actions

Metric: Consumption of Upper Columbia River and Snake River stocks of Chinook salmon and steelhead and Snake River sockeye salmon by CATEs nesting in the Inland Basin

Measurement: CATE colony size will be measured and an assumed rate of predation will be applied to determine potential predation rates. At some sites, these may be confirmed by predation studies (e.g., PIT tag recovery).

Target: Less than 2% predation rate per stock per island, or less than 5% predation rate per stock spread out over all islands; measured after the initiation of Phase 2.

Potential Actions: If CATEs initiate nesting at at-risk islands, efforts will be undertaken to dissuade CATEs from these sites. For sites that are owned by the Action Agencies and where there is legal authority to undertake actions, the Action Agencies will undertake passive and active hazing and limited egg take as described in the IAPMP. This may include additional surveys and permits that are required to implement these actions (e.g., Section 106 clearance). For those sites that are owned by other entities or where the Action Agencies do not have the authority to implement dissuasion actions, the Action Agencies will work with the landowner to encourage dissuasion actions. If CATEs initiate nesting at unforeseen sites in the Inland Basin, a determination will be made as to the ownership and legal authority of the Action Agencies to undertake dissuasion. If an action is legally allowable, a planning and supplemental/ tiered NEPA effort will be initiated to determine the legal effects of this action.

3.4 Objective 2: Dissuade CATE Nesting on Goose and Crescent Islands and At-Risk Islands if Necessary

The primary means for achieving Objective 1 is by dissuading CATEs currently nesting at Goose and Crescent Islands. The main uncertainty associated with this Objective is whether or not the selected habitat modifications and hazing techniques will successfully dissuade CATEs from nesting at these sites.

3.4.1 Monitoring

Metrics for quantifying dissuasion success for an individual site such as Goose and Crescent Islands will be based on the potential for a 0.5% increased growth rate (λ) for each evolutionarily significant unit or distinct population segment (i.e., 1% to 5%

predation rate). Data collection and research methods will remain consistent with current methods (Roby et al. 2013) for comparison purposes.

Associated with uncertainty of what methods will be successful for the dissuasion of CATEs at Crescent and Goose Islands, there are a number of possible scenarios that can be explored to guide adaptive management actions. The following scenarios could occur during the dissuasion of CATEs on Goose and Crescent Islands:

1. CATEs continue to nest on Goose Island
2. CATEs nest beyond the Crescent Island dissuasion area
3. Beavers damage Crescent Island vegetation plantings
4. Hazing is insufficient to dissuade CATEs at Goose or Crescent Islands
5. Populations of other piscivorous birds increase
6. Vandals damage habitat modifications or structures (so that CATEs begin to nest on Goose or Crescent Islands)

These situations are described in more detail below. Additional uncertainties associated with the IAPMP are found in Section 3.1.

CATEs Continue to Nest on Goose Island

The IAPMP defines an area of 1.5 acres, as well as the potential for an additional acre, that will be proactively staked and flagged on Goose Island along with active dissuasion as needed over the entire island during the duration of the project. Nevertheless, there remains the possibility that CATEs will nest on Goose Island, especially if active hazing actions are not possible for one or more days due to inclement weather.

If CATEs begin a nest scrape but do not lay eggs, hazers will fill in the scrape and potentially increase active and/or passive hazing efforts to dissuade CATEs from nesting in the area. If CATEs lay eggs, as many as 200 eggs on all dissuasion and at-risk islands combined may be collected per year to dissuade CATEs from further nesting attempts. To comply with the MBTA requirement of no gull take, if gulls lay eggs in the vicinity of CATE nests, all hazing activities will cease until gulls have finished nesting.

CATEs Nest Beyond the Crescent Island Dissuasion Area

Although gulls currently nest in high densities outside the current CATE nesting area on Crescent Island, there is a possibility that CATEs could attempt to nest outside of the current Crescent Island CATE colony. These CATEs could be from the Crescent Island colony, dissuaded from Goose Island, or from other areas. During Year 1 of Phase 1, the existing CATE and gull colonies will be monitored for evidence of CATEs nesting outside of the existing Crescent Island CATE colony area (i.e., incipient colony formation). While no dissuasion actions will occur during Year 1 at Crescent Island to comply with the MBTA requirement of no gull take, active and passive dissuasion measures could be implemented in Years 2 and 3 to dissuade incipient colony formation at Crescent Island as part of Phase 1 efforts. During Phase 2, if CATEs nest within or beyond the dissuasion areas, additional dissuasion measures will be implemented as described in Sections 2.4 and 2.5.

Beavers Damage Crescent Island Vegetation Plantings

Although the IAPMP describes fencing measures to prevent beaver damage to willows, it is possible that beavers will cause more damage than anticipated on Crescent Island, such that CATEs will attempt to nest within the dissuasion area. If this occurs, additional wire fencing of the type described above will be installed around willows in 5-ft diameter circles instead of around the entire primary dissuasion area and perimeter of the secondary dissuasion area. Additional anchoring and different types of wire fencing will also be explored if necessary.

Hazing is Insufficient to Dissuade Cates at Goose or Crescent Islands

Although the daily hazing program proposed in the IAPMP is expected to be sufficient to deter CATEs from nesting on either Goose or Crescent Islands, it is possible that some CATEs will continue to attempt to nest despite hazing activities, especially if weather precludes access by hazers to either island for an extended period of time. If this occurs, additional passive hazing measures similar to those described in Sections 2.4 and 2.5 could be deployed prior to the next nesting season.

Populations of Other Piscivorous Birds Increase

Although other piscivorous birds occur on both Goose and Crescent Islands and at other islands, this management plan addresses measures to obtain benefits to ESA-listed salmonids from reduction of predation by CATEs. In the future, consumption rates could change for other piscivorous birds, but actions directed at any birds aside from CATEs are not a part of this IAPMP. Any actions related to other species would be explored under a planning and supplemental/ tiered NEPA effort based on new information on these changing conditions.

Vandals Damage Habitat Modifications or Structures

Both Crescent and Goose Islands are accessible to humans by boat. The planned pier block, rope, and flagging dissuasion system could potentially be susceptible to vandalism. Although staff will be on both islands conducting hazing, monitoring, and other activities during a large part of the year, very few project personnel are anticipated to visit the islands during winter months. To address vandalism, the following options will be available to the Action Agencies if needed:

1. Replace missing or damaged components (e.g., rope, flagging, and pier blocks)
2. Substitute missing or damaged components with alternative materials (e.g., replace wooden posts with metal posts if wooden posts are used for firewood)
3. Erect fencing to prevent access at Goose Island; a fence could be constructed from the north and south beach areas
4. Install “No trespassing” signs or other signage
5. Place trail cameras in areas of vandalism concern

3.4.2 Performance Metrics and Adaptive Actions

Metric: Number of CATEs on Goose Island (Phase 1) and Crescent Island (Phase 2)

Measurement: Number of CATE nesting pairs at Goose Island (Phase 1) and Crescent Island (Phase 2) determined through annual CATE population surveys.

Target: 100% dissuasion of CATEs nesting on Goose and Crescent Islands in the first 3 years of implementation and no more than 40 pairs remaining at each site after 3 years of implementation.

Potential Actions: If initial dissuasion activities are unsuccessful, dissuasion areas may need to be expanded to their full extent or the intensity of hazing efforts may need to be increased as addressed in the EA. If rope and flagging proves unsuccessful at Goose Island, or vandalism becomes a recurring issue, the Action Agencies may implement substrate modification at this site to institute a more permanent solution during Phase 2. Limited egg take will be employed if initial passive and active hazing efforts are unsuccessful.

3.5 Objective 3: Preclude the Establishment of Incipient CATE Nesting Colonies on Crescent Island During Phase 1

There is a possibility that CATEs dissuaded from Goose Island in Phase 1 will establish an incipient colony at Crescent Island prior to implementation of dissuasion actions at this location in Phase 2. Adaptive management actions were developed to specifically address this uncertainty.

3.5.1 Monitoring

While CATEs are being dissuaded from Goose Island during Phase 1, the CATE colony at Crescent Island will be monitored. This monitoring will occur at least twice during the nesting season and potentially more frequently if regular monitoring of the existing colony is undertaken to identify the establishment of any incipient colonies.

3.5.2 Performance Metrics and Adaptive Actions

Metric: Formation of incipient CATE colonies on Crescent Island (Phase 1)

Measurement: Number of CATEs outside the colony area at Crescent Island (Phase 1). Colony areas at Crescent Island determined through annual CATE population survey as well as more frequent visits to island (as needed) during the nesting season.

Target: No establishment of incipient CATE colonies at Crescent Island.

Potential Actions: Active and passive hazing as needed to prevent any new CATE nests outside colony areas on Crescent Island. Limited egg take if needed.

See Objectives 1 and 2 above for monitoring and hazing details.

3.6 Objective 4: Provide Conditions Suitable for CATE Colony Establishment Outside of the Inland Basin

The enhancement of 0.5 acres of suitable CATE habitat at areas outside of the Inland Basin will be undertaken to reduce the potential for renesting of CATEs within the Inland Basin and to reduce the potential for negative impacts to CATEs as a result of the project. There are numerous potential uncertainties including habitat suitability, forage availability, and predation that could prohibit the successful establishment of a colony at habitat enhancement sites.

3.6.1 Monitoring

Several conditions must be met to effectively provide conditions suitable for CATE colony establishment at one or more habitat enhancement sites outside the Inland Basin. Appendix G of the Columbia River Estuary CATE Final Environmental Impact Statement (USFWS 2005) and the CATE site assessment report (Collis et al. 2012) include criteria for CATE habitat enhancement sites. This IAPMP and AMP focus on a set of five criteria for the CATE habitat enhancement site(s). These criteria will each play a role in the search for and creation of a habitat enhancement site:

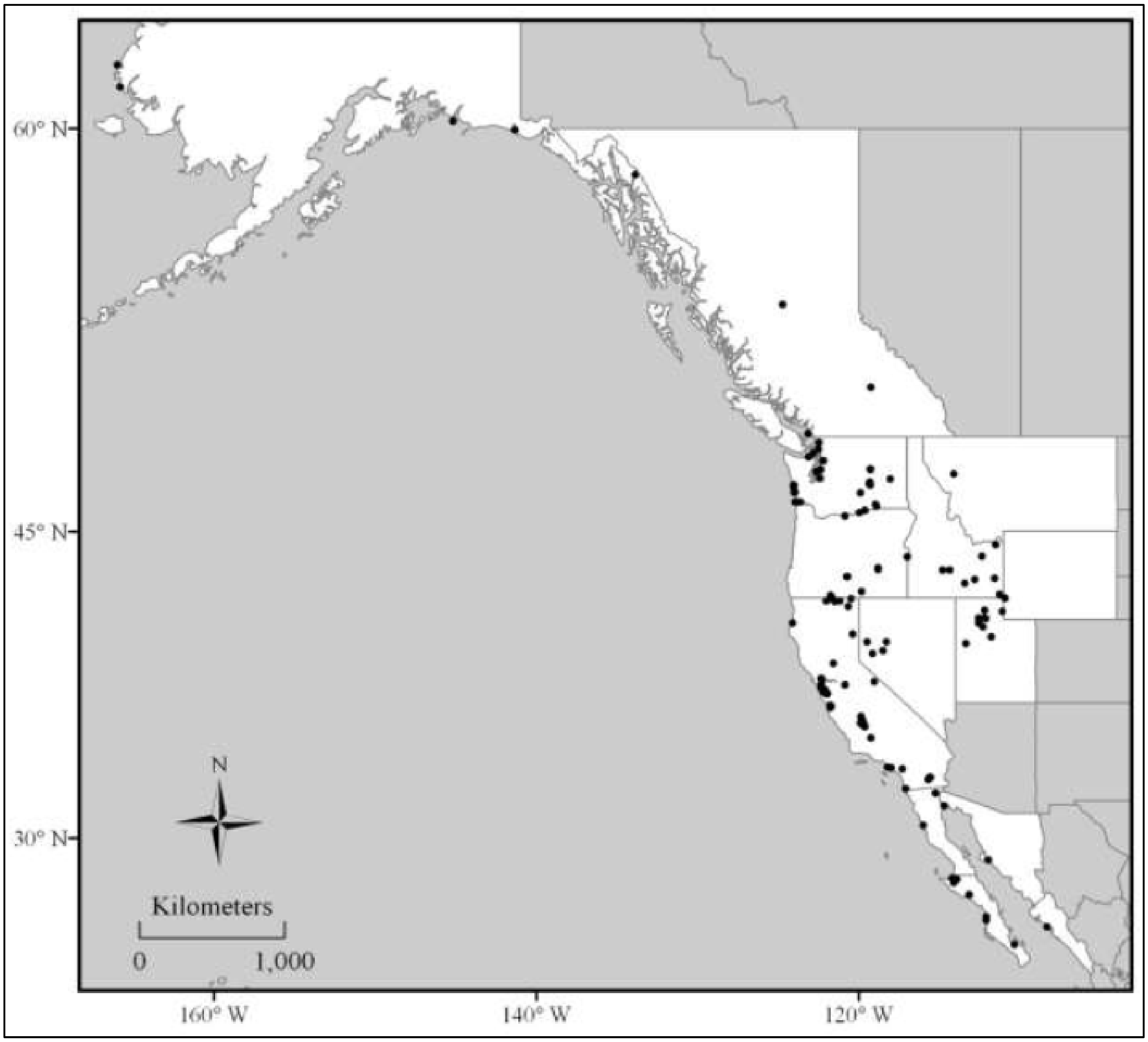
1. Contains sufficiently available, suitable nesting habitat to support approximately 1,000 nesting CATE pairs, does not experience frequent flooding or drought events, and has suitable base substrates.
2. Has no long-term expensive operations and maintenance requirements.
3. Is in sufficient proximity to a relatively stable and abundant prey source for CATEs.
4. Is located in an area with minimal potential conflicts with ESA-listed species.
5. Potential mammalian and avian predators and human disturbances are absent, not a limiting factor, or controllable.

Social attraction (e.g., CATE decoys, playing CATE calls from speakers), habitat management (e.g., clearing vegetation to create suitable nesting habitat), and predator management may be needed on the habitat enhancement site to provide conditions suitable for colony establishment.

While temporary dissuasion activities are occurring on Goose Island during Years 1 and 2, the search will continue for habitat enhancement site(s) within the western North America CATE metapopulation. This search will include sites for habitat enhancement at existing or historical CATE nesting sites as well as creation of new site(s). Potential enhancement sites for CATEs will include those listed in the Collis et al. (2012) site assessment study. Exploration of additional sites beyond what is covered in this document will also occur, if necessary, to locate sufficient areas for CATE habitat enhancement. While the search is ongoing for a viable habitat enhancement site, it is also possible that CATEs displaced from Goose Island will find alternate nesting sites that were not identified in Collis et al. (2012).

Potential enhancement sites will contain suitable CATE nesting substrate, enough food for nesting CATEs, and little predation pressure on CATEs. Potential enhancement sites will be located in areas with minimum potential ESA-listed fish conflicts (see Collis et al. 2012). In the process, the Action Agencies may create or improve CATE nesting habitat through such measures as vegetation control, island creation, predator control, and other means. Details of habitat enhancement at potential sites are not discussed here in detail as these will be location specific. The Action Agencies will coordinate with appropriate agencies regarding potential enhancement sites, and follow-on supplemental/ tiered NEPA coordination will be conducted prior to implementation of habitat enhancement.

Though not specifically part of this plan, movements of dissuaded CATEs may be tracked by partners through sightings of color-banded CATEs. For example, between 2005 and 2011, 522 CATEs (110 adults and 412 chicks) were color-banded at Goose Island. These birds, identifiable by their unique band color combinations, have been sighted as far north as southern British Columbia, as far south as west-central Mexico (Mazatlan), and as far east as Idaho (Collis et al. 2012). While CATEs dissuaded from Goose and Crescent Islands may initially move to nesting sites in close proximity to these islands, displaced birds are expected to relocate throughout the western North America CATE metapopulation (Figure 3-2).



Source: Collis et al. 2012.

Figure 3–2. Distribution of current and historical CATE breeding colonies in the western North America metapopulation.

3.6.2 Performance Metrics and Adaptive Actions

Metric: Suitability of CATE Habitat Enhancement Site(s)

Measurement: For each potential CATE nesting area, the following will be evaluated for suitability for nesting CATEs: substrate, food availability, limited predation on CATEs, and, potentially, measures of productivity. Once a site has been identified and site-specific uncertainties are understood, measurements and metrics will be updated to reflect the information most needed to determine success in meeting the objective.

Target: One-half acre of suitable nesting habitat. This represents an area twice the size of the colonies at both Goose and Crescent Islands. Other conditions for suitability of nesting must also be met as discussed above in Section 2.6.

Potential Actions: Social attraction measures and predation management may be necessary in the first few years of habitat enhancement to provide conditions suitable for CATE colony establishment. Additional habitat modification may also be necessary if substrate conditions deteriorate over time or other unforeseen circumstances alter conditions at the habitat enhancement sites.

3.7 Applying the Adaptive Management Plan

The AMP will be coordinated with stakeholders through an Adaptive Management Work Group (AMWG) made up of the Action Agencies, resource agencies, tribes, and other interested parties with relevant experience. This AMWG will be coordinated with the Corps' Anadromous Fish Evaluation Program (AFEP) and Study Review Work Group (SRWG). It is anticipated that the AMWG will meet on a semi-regular basis during implementation of the IAPMP. Meeting frequency may range from weekly to annually depending on the topics to be discussed and implementation status of the IAPMP. The AMWG will meet to discuss the results of monitoring and analyses conducted as part of implementing the IAPMP, adaptive management efforts and to discuss implementation and adaptive management actions, such as the following:

1. Initiation and success of Goose and Crescent Island dissuasion actions
2. CATE population status and movements of CATEs within the Inland Basin
3. Status of CATE colonies on at-risk islands
4. Development and review of follow-on research efforts as necessary to inform AMP
5. Research and decision-making related to habitat enhancement at alternate nesting sites

The Action Agencies will consider comments and input from the AMWG during implementation of the plan (at least annually) as part of implementing IAPMP and AMP efforts. The AMP will be updated as needed to address changes that occur during project implementation. If adaptive management actions affect stakeholders who are not yet involved, these additional stakeholders will be invited to participate in the process. Potential additional stakeholders could include but would not be limited to private landowners, land management agencies, nongovernmental organizations, and avian experts. The Action Agencies will consult applicable legal authorities to determine whether recommended actions are feasible and will follow standard decision-making protocols for the appropriate programs (e.g., Columbia River Fish Mitigation, Operations, and Maintenance) to prioritize monitoring, construction, operations, and maintenance activities. The Action Agencies will communicate with the AMWG regarding the outcome of those discussions. All monitoring, analyses, and decisions will be documented in an annual adaptive management report.

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APPENDIX B

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APPENDIX C

Agency and Public Comments and Responses

This section presents comments received on the Draft EA and responses to these comments. Comments were submitted in writing through letters and email. A total of 14 comment submittals were received. Each comment submittal was given an identifying number that corresponds to the order in which the submittal was logged into the official comment file. Comment submittals were received from the following individuals, organizations, and agencies:

- Comment 1: Arnold J. Theisen
- Comment 2: Pilchuck Audubon Society
- Comment 3: Bonneville Power Administration
- Comment 4: Northwest River Partners
- Comment 5: Washington Department of Fish and Wildlife
- Comment 6: Public Power Council
- Comment 7: Wildlife Center of the North Coast
- Comment 8: Colville Confederated Tribes
- Comment 9: Idaho Department of Fish and Game
- Comment 10: Columbia River Inter-Tribal Fish Commission
- Comment 11: Public Utilities Districts (Grant County, Chelan County, Douglas County) and the Yakima Nation
- Comment 12: U.S. Fish & Wildlife Service
- Comment 13: North Fork Composites
- Comment 14: Peter Johnson

Each comment submittal is reproduced in its entirety in this chapter. Where a comment submittal included multiple comments, each of these comments was assigned a sequential number.

1-01 I applaud the concern over avian predation of salmon smolts on the Columbia River. Over the past 20 years I have spent many hours on the river in my boat, generally between lateral marks 45 and 75. I authored the book entitled "Fishing the Mid- Columbia" published in 2004 by Frank Amato Publications, Inc. of Portland, Oregon.

During that time I have noted a marked increase in the numbers of Pelicans and Cormorants. These are easily observed in great numbers right across the river from the Irrigon Marina at what is locally called "Pelican Point". I have also noted the establishment of a combined Heron/Egret rookery on Sand Island at lateral mark 49. These birds can be seen in great numbers patrolling the shoreline.

I believe you may be focusing on the wrong predators as I have not seen a corresponding increase in the numbers of Caspian Terns or Ospreys. Almost all the Ospreys I have observed are occupying the same lateral marks every year. I don't know where the young from these nests have been settling, but it seems to me that the Osprey population is confined pretty much to the lateral marks and of course these have not been multiplying in numbers.

I don't know where the Terns have been nesting in this stretch of the river, but my observations suggest that their numbers may actually be declining as opposed to rising over the last 20 years. Where once I used to observe many of the Terns diving and bringing up smolts I seldom see them in similar numbers recently.

Best regards,
Arnold J. Theisen
Irrigon, Oregon

Response to comment 1-01

The Benefits Analysis (Lyons et al. 2011) showed that the greatest reduction to ESA-listed salmonid predation would be gained by management of CATE predation. EA Section 1.2.2 (Research and Studies) describes results of the Benefits Analysis while the Purpose and Need “to increase survival of ESA-listed juvenile salmonids by reducing predation-related losses from CATE colonies at Crescent and Goose Islands” is given in EA Section 1.3. Osprey are not noted in the literature as significant salmonid predators.

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ATTN: PM-PD-PF, IAPMP Project Manager
201 North Third Avenue
Walla Walla, WA 99362-1876
avianpredator@usace.army.mil

30 November 2013

Re: Draft Predation Management Plan

2-01 Please accept the following comments for public record on behalf of Pilchuck Audubon Society of Washington regarding Caspian Tern management in Central Washington, specifically the Draft *Inland Avian Predation Management Plan* that calls for the removal of Caspian Terns from Goose Island and Crescent Island.

This Predation Management Plan proposes actions to reduce avian predation of federal Endangered Species Act (ESA)-listed salmonids in the inland Columbia River Basin above Bonneville Dam. The life histories of salmon are complex and unique and their ecosystems are dependent upon their return to natal streams.

Actions to target and manipulate native wildlife species in an effort to protect salmon from natural predators is a political and punitive strategy that fails to address the primary causes of declining wild salmon populations including low-flow years, toxicity, anthropocentric policies of dam construction, over-fishing, and habitat removal.

2-02 Moreover avian predators, including Caspian Terns, are most likely to consume non-ESA, hatchery raised salmonids. Hatchery salmonids are released en masse during the day, congregate near the surface, and lack predator evasion habits inherent by nature in wild salmonids.

2-03 It should be noted that Goose Island lies within the Potholes Reservoir, designated as an Important Bird Area and removing Caspian Tern nesting sites could result in significant, unforeseen changes in Caspian Tern and other wildlife distributions and numbers in eastern Washington. Further, Caspian Terns are subject to the guidelines of the Migratory Bird Act.

2-04 The purpose of the ESA is to protect species, their habitat, and their genetic preservation. Pilchuck Audubon Society recognizes the importance of vibrant ecosystems that preserve biodiversity and ensure that all native species can sustain their populations.

2-05 Pilchuck Audubon Society of Washington finds that the manipulation of Caspian Tern colonies is unwarranted and requests that the US Army Corps of Engineers reconsider its preferred Alternative D and instead select Alternative A. Please take no action to harass, manipulate, or eradicate Caspian Terns from Goose Island or Crescent Island.

Thank you for your consideration of these comments.

Sincerely,

Kathleen Snyder

Kathleen Snyder, President
w/Joan Poor, Avian Science Director

Response to comment 2-01

EA Section 1.4.1 lists the project responsibility for the Corps (per the 2008 NMFS FCRPS BiOp RPA Action 47) as "The FCRPS Action Agencies will develop an avian management plan (for double-crested cormorants, Caspian terns, and other avian species as determined by research, monitoring, and evaluation) for Corps-owned lands and associated shallow water habitat." The Purpose and Need of the project (EA Section 1.3) is "to increase survival of ESA-listed juvenile salmonids by reducing predation-related losses from CATE colonies at Crescent and Goose Islands." The Purpose and Need does not address effects of low-flow years, toxicity, dam construction, over-fishing, or habitat removal. Other "causes" are outside the scope of this proposed action and are addressed in other actions/efforts by the Corps and other Action Agencies.

Response to comment 2-02

As shown in the Benefits Analysis and in Table 1-1 in the EA, in general CATEs consume similar numbers of hatchery-reared and wild salmonids.

Response to comment 2-03

Text was added to Section 4.1.4 of the EA to note that Goose Island lies within the Potholes Reservoir IBA per the Cullinan (2001) IBA document. New text also notes the individual criteria for which the IBA was designated. The anticipated impacts to the IBA are described in the EA, Sections 4.1.3 and 4.1.4. Discussion of the MBTA link are more appropriate in the EA than the IAPMP and are given in various sections of the EA, including Section 6.0, Compliance with Laws and Regulations.

Response to comment 2-04

Comment noted.

Response to comment 2-05

The No Action alternative did not meet the Purpose and Need as stated in Section 1.3 of the EA, "to increase survival of ESA-listed juvenile salmonids by reducing predation-related losses from CATE colonies at Crescent and Goose islands." The remaining alternatives identified did meet the Purpose and Need, which includes minimizing impacts to CATEs and other sensitive species. The preferred alternative provides measurable benefits to ESA-listed salmonids and does so (as documented in the EA Sections 4.1 and 5.1) while minimizing impacts to other species.

Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

ENVIRONMENT, FISH AND WILDLIFE

November 29, 2013

In reply refer to: KEW-4

Lieutenant Colonel Kelly
Department of the Army
Walla Walla District, Corps of Engineers
201 North 3rd Avenue
Walla Walla, WA 99362-1876

Dear Colonel Kelly:

3-01 The Bonneville Power Administration (BPA) appreciates the opportunity to comment on the draft Finding of No Significant Impact (FONSI) and Environmental Assessment (EA) prepared for the Inland Avian Predation Management Plan (IAPMP). Development of the IAPMP is a requirement of the National Oceanic and Atmospheric Administration National Marine Fisheries Service 2008 Federal Columbia River Power System Biological Opinion, as updated in 2010, Reasonable and Prudent Alternative Action 47.

BPA staff attended some of the IAPMP workgroup meetings over the course of the last year. We understand that the preferred alternative does not contain implementation strategies that include a gull depredation permit in support of Caspian Tern management. BPA is supportive of the Corps of Engineers selection of the preferred alternative, Alternative D. The phased approach of Alternative D, utilizing habitat modification at Goose and Crescent Islands to discourage Caspian tern (CATE) nesting, active CATE hazing and limited egg removal is likely to provide the greatest increase in survival of ESA-listed juvenile salmonids through the inland Columbia Basin above Bonneville Dam.

Thank you for providing BPA the opportunity to comment.

Sincerely,

William C. Maslen

William C. Maslen
Director, Fish and Wildlife

Response to comment 3-01

Comment noted.

December 2, 2013

Walla Walla District, Corps of Engineers
Attn: PM-PD-PF, IAPMP Project Managers
201 North Third Avenue
Walla Walla, WA 99362-1876

Dear IAPMP Project Manager:

4-01

Northwest RiverPartners (NWRP) represents public, private, municipal and cooperative utilities as well as ports, farmers and businesses throughout the Northwest. Our members' constituents include more than 40,000 farmers and 4 million electric utility customers, and embody thousands of port jobs, 7,000 small businesses, and hundreds of large businesses – all of whom rely upon affordable, clean and reliable power. The majority of this power comes from the Columbia River hydrosystem, and our constituents pay for the costs of regional fish and wildlife programs through their electric rates. We support restoration actions that are grounded in sound science and provide measurable benefits. Avian predation on juvenile salmon in the Columbia River Basin is a significant and growing problem and we appreciate the opportunity to comment on the US Army Corps of Engineers (Corps) draft IAPMP.

While the IAPMP addresses avian predation generally, proper management of inland avian predation management is critical, in particular the impact of Caspian terns on the survival of juvenile Upper Columbia River (UCR) steelhead and spring Chinook, both listed for protection under the Endangered Species Act. It is our understanding that Caspian tern predation on listed upper Columbia steelhead has reached levels as high as 20.8% within the past 5 years (Evans et al. 2013), and listed spring chinook also are experiencing high predation levels. This is of great concern to our members who pay hundreds of millions annually to protect and restore listed salmon and support actions that provide the best biological return for that investment.

The Corps' preferred alternative in the IAPMP – alternative D – includes habitat modification, hazing, and limited egg removal at both Goose and Crescent Islands. However, we feel that these actions are not enough to decrease inland avian predation to levels sufficient to protect juvenile salmon and steelhead. NWRP is concerned that these actions will merely disperse avian predation to other nesting locations in the Columbia River Basin and predation will continue at the same levels.

Therefore, we urge the Corps to consider more aggressive approaches to resolving this problem, including but not limited to, reducing available nesting habitat in all potential nesting locations in the Columbia Basin Plateau, reducing nesting success in areas already established, and relocating the predators to areas outside of the Plateau without contributing to or creating Caspian tern problems elsewhere in the Basin. These measures should be implemented expeditiously and should include monitoring and adaptive management methods to ensure the actions are meeting the objectives of the program.

4-01 Avian predation remains a serious threat to listed salmon and steelhead in the Basin and regional fish and wildlife restoration efforts overall. The Caspian tern population in the mid-Columbia Basin has grown significantly over time and there needs to be a realignment of priorities to provide better protections for Upper Columbia River ESA-listed salmon stocks. We ask that more aggressive and immediate measures be taken to control these tern populations to better protect salmon and regional ratepayers' investments in salmon restoration.

Thank you for your time and consideration of our comments.

Sincerely,

Terry Flores

Terry Flores, Executive Director

Literature Cited:

Evans, A.F., N.J. Hostetter, and K. Collins. 2013. Caspian Tern Predation on Upper Columbia River Steelhead in the Priest Rapids Project: A Retrospective Analysis of Data from 2008-2010.

Response to comment 4-01

The Action Agencies have developed a management plan for CATEs that strives to provide a balance of protecting ESA-listed salmonids while minimizing impacts to other sensitive species or resources. However, it is fully recognized that the effectiveness of CATE dissuasion at Goose and Crescent islands would be enhanced by actions to limit CATEs from forming new colonies and/or expanding existing colonies within the Columbia River Basin. Therefore, the IAPMP includes habitat enhancement measures to attract CATEs to areas outside the basin, and more aggressive adaptive management dissuasion actions to limit the formation or expansion of incipient colonies within the basin. Because it is impossible to predict with certainty where incipient colonies may develop, the adaptive management dissuasion actions can be expanded, if necessary and within Action Agency authority, as new information is garnered to deal with unforeseen incipient colony development. The expansion of the actions covered under the IAPMP may require supplemental/tiered NEPA. In addition, not all CATE colonies pose a measurable impact on salmonids It is also important to note that measures to dissuade CATEs from all potential nesting areas is outside the authority of the Action Agencies, which is explicitly limited as stated in Section 1.4 of the EA.

State of Washington
DEPARTMENT OF FISH AND WILDLIFE

Mailing Address: 600 Capitol Way N · Olympia, WA 98501-1091 · (360) 902-2200, TTY (800) 833-6388
Main Office Location: Natural Resources Building · 1111 Washington Street SE · Olympia, WA

December 2, 2013

Walla Walla District, Corps of Engineers
ATTN: IAPMP Project Manager, PM-PD-PF
201 North Third Avenue
Walla Walla, Washington 99362-1876

SUBJECT: Review of Draft Inland Avian Predation Management Plan and Environmental Assessment

Dear Project Manager:

5-01

The Washington Department of Fish and Wildlife (WDFW) have reviewed the Draft Inland Avian Predation Management Plan and Environmental Assessment. We appreciate the efforts of the U.S. Army Corps of Engineers (Corps) to seek our input to this document.

As you know, WDFW supports the all-H approach to conservation and management of ESA-listed salmonid populations in Washington. In addition to the importance of these factors, we also understand the importance of predation by birds on salmonid smolts. At the same time, however, we recognize that predation by birds is a normal component of a healthy, functioning ecosystem and that the Caspian Terns is a native species in this region. Consequently, we support efforts to reduce predation on salmonids during the period of their ongoing recovery, but we recommend a balanced approach that accomplishes a reduction in predation while retaining the Caspian Tern as part of the Columbia River ecosystem.

In a previous letter to the Corps (1 August 2012 letter to Cindy Boen), we outlined guiding principles related to predator-prey management within the Columbia River system and elsewhere. Those guiding principles were a reiteration of principles also described in the Pacific Flyway Council policy position on avian predation on fish (Pacific Flyway Council, 2011). We continue to hold those principles and will not detail them further in this letter; however, these documents are attached for your reference.

We have two primary comments for your consideration. First, we encourage the Corps to use principles of adaptive management to address Caspian Tern predation at inland areas of the Columbia River. Our review of the document indicates that there are considerable uncertainties in the outcome of management actions, and that adaptive management can be applied in other ways than those presented. Second, WDFW has management responsibility for these species, and we would appreciate having more opportunity to collaboratively help formulate the proposed actions and more formally structure the manner in which adaptive management is designed using structured, rigorous scientific methodology.

Thanks again for the opportunity to review the draft document. Please see the attached document for our specific comments on the Environmental Assessment and Management Plan documents. We hope that you find these comments helpful in your document revisions and decision-making process.

5-01 We would like an opportunity to discuss our comments with you; please contact Eric Gardner, Wildlife Diversity Division Manager, at (360) 902-2510 to arrange for a mutually agreeable meeting date and location.

Sincerely,

Nate Pamplin, Assistant Director
Wildlife Program

cc: Jim Brown, Region 2 Director
Bill Tweit, Special Assistant to the Director
Jeff Korth, Region 2 Fish Program Manager
Matt Monda, Region 2 Wildlife Program Manager
Eric Gardner, Wildlife Diversity Division Manager

Enclosures:
1) WDFW Comments on Draft Inland Avian Predation Management Plan and Environmental Assessment, 2 December 2013
2) WDFW letter to Corps, 1 August 2012
3) Pacific Council Flyway Policy Statement—Avian Predation on Fish Resources, 15 March 2011

Comments on:

Draft Inland Avian Predation Management Plan Environmental Assessment and Management Plan

(Washington Department of Fish and Wildlife – 2 December 2013)

Environmental Assessment

5-02 Page 3, second bullet ("…implement a management plan to decrease predation rates, if warranted"). The term *if warranted* is vague and should be defined to explain effective implementation of actions. Without an explanation of the mechanism that results in implementation of a management plan there is no understanding of this element of the proposal. In addition, we suggest that throughout the Environmental Assessment the focus should be on passage of ESA fish populations and this measure of benefit should be contrasted with impacts, risks, and economics.

5-03 Page 3, second paragraph, second-to-last sentence ("…expected survival benefits…"). We suggest that you report this as the "modeled survival benefits" or some other reference to the means by which those benefits were generated.

5-04 Page 3, second paragraph, final sentence ("…once alternative tern habitat can be developed"). Finding a suitable site may be a challenge, and successful use of the alternative habitat may require significant monitoring to evaluate success or unintended consequences. We recommend adding more detail to this part of the plan prior to implementing phase 1.

5-05 Page 3, fourth paragraph, third sentence ("…well over one million juvenile salmonids…"). Throughout the draft different parameters are used to describe the magnitude of fish consumed (percentages, numbers, volume of fish consumed, salmonids, or salmonid ESUs), and this may confuse readers. We suggest that statements of magnitude be standardized for consistency throughout the document, such as predation rates on specific ESA listed ESUs.

5-06 Page 3-4, fourth paragraph, last 2 sentences. These sentences – and we noticed similar language elsewhere in the document – use relative terms that are not always explained (e.g., much smaller than, more dependent on, a higher per capita impact, greater reliance on, lower diversity of, and unexpectedly high impact on). We recommend that you include data and references to substantiate these statements and allow readers the opportunity to evaluate impacts.

5-07 Page 5, first paragraph, final sentence. The population model may be overly simplistic in estimating benefits. Various mortality factors may be compensatory rather than additive. Smolts passing through dams may be disoriented, injured, impaired by nitrogen, compromised by current, or consumed by other predators. If these fish are not taken by terns, they may be taken by other predators or scavengers. Will the full "benefits" estimated by the model be achieved when considering compensatory mortality factors?

5-08 Page 5, second paragraph, final sentence. We recommend that you standardize parameters to estimate benefits.

5-09 Page 6, first paragraph, final sentence. The second half of this sentence ("supporting a suggestive positive relationship between annual predation rates on steelhead and the number of Caspian Tern breeding pairs…") is speculative.

5-10 Page 7, Table 1-1. The caption should also reference Double-crested Cormorant and gull data.

5-11 Page 8, Purpose and Need. This document focuses on reducing predation of salmonids by Caspian Terns in an ecosystem where salmonid survival and abundance are influenced by multiple factors. Given that the described activities may be controversial with segments of the public, it would be appropriate – even in general terms – to reference cumulative effects of "all-H" factors in the Purpose and Need section. It is important to acknowledge – up front – that the relationship between Caspian Terns and salmonids is largely presented out of the context of the "all-H" approach to salmon recovery; the "all-H" context should be explained, even if only briefly.

5-12 Page 8, second paragraph, third and fourth sentences. We agree that habitat enhancement measures should be used to attract terns to sites where predation on ESA fish may be reduced and that these sites should be identified prior to implementing actions on Goose Island. There may be challenges in doing this, however (e.g. if prey resources near candidate islands are inadequate or at least lower than at other locations).

5-13 Page 8, second paragraph, last two sentences. We agree that specific outcomes of management actions are uncertain and that use of an adaptive approach is warranted. However, due to the uncertainty of outcomes we think the actions could be designed differently to be more effective and efficient.

5-14 Page 9, first paragraph, final sentence. We understand that a commitment to public funding contains an element of risk. However, adopting the proposed approaches may affect other entities such as state natural resource agencies, if terns relocate to other areas where new problems then emerge. Similarly, could dissuasion of terns from the inland Columbia River influence tern population performance in British Columbia, where the species is of management concern? We recommend that consideration of such potential effects is warranted.

5-15 Page 10, first paragraph. The actions evaluated in this plan have a much larger scope than described in this section. Uncertainty about where dissuaded Caspian Terns will establish breeding colonies should be sufficient reason for more detailed analysis and discussion than is currently provided.

5-16 Page 11, first paragraph. It is not apparent that a broad range of actions has been thoroughly considered. We think the "No Action" alternative could be more thoroughly described (e.g. because current dam-based control actions have a direct link to the objective of the plan). Other alternatives, such as management of alternate foraging areas, have not been adequately studied and evaluated.

5-17 Page 11, second paragraph. Stated objectives of the plan include: 1) reducing consumption of ESA-listed salmonids in the Inland Basin by Caspian Terns; 2) dissuading Caspian Tern from nesting on Goose and Crescent islands and at-risk islands if necessary, 3) precluding the formation of incipient Caspian Tern nesting colonies on Crescent Island during Phase 1, and 4) providing conditions suitable for Caspian Tern colony establishment outside of the Inland Basin. Descriptions of predicted benefits change from general salmonids to specific ESA-ESUs of salmonids throughout the plan. Predation on non-listed

5-17 salmonids should be inconsequential or of much lesser concern. We recommend that you consistently use a metric for evaluating or comparing anticipated consequences of alternatives.

5-18 Page 11, second paragraph, final objective. Locations where Caspian Terns might establish colonies outside of the Inland Basin have not been identified. We recommend that mitigation areas should be identified prior to taking action.

5-19 Page 11, third paragraph, first sentence. We agree that this plan presents the "most robust benefits to salmonoids." However, the selected alternative should balance enhancement to salmonids with retention of a persistent breeding population of Caspian Terns within this part of their range.

5-20 Page 12, second paragraph. We suggest that the ultimate cause of this problem is alteration of the river that increased salmonid smolt vulnerability to avian predators. The "No Action" alternative includes actions that focus on the ultimate source of the problem. As background information (but perhaps not in this particular part of the document), it would be appropriate to describe on-going actions, previous actions that are not currently used, and future actions such as new smolt bypass projects at Priest Rapids Dam that will be operating this coming spring. Actions being taken to improve salmon smolt passage and survival are interrelated and should be synergistic in contributing to reducing predation.

5-21 Page 12, paragraph 3, sentence 2. We suggest that Caspian Tern predation on ESA-listed salmonids be evaluated before dissuasion occurs on any new colony sites. If a new colony does not have significant impacts to ESA listed salmonids or other fish populations of conservation concerns, then there would be no need to dissuade.

5-22 Page 25, fourth paragraph. We think the assumptions imbedded in this paragraph are uncertain enough that other outcomes are possible. Using a well-structured adaptive management process will greatly enhance our ability to improve management actions.

5-23 Page 25-26, fourth and fifth paragraphs (and extending to top of page 26). If actions may occur on "at-risk" islands, we recommend up-front communication with land management agencies or other relevant partners as part of this planning process.

5-24 Page 25-26, fourth and fifth paragraphs (and extending to top of page 26). Through a 25-year agreement with U.S. Bureau of Reclamation, WDFW has management responsibilities for wildlife resources on Bureau lands in the Columbia Basin that include parts of Potholes Reservoir and Banks Lake, including Goose, Solstice, and Twinning islands. WDFW owns Cabin Island and has specific fishing regulations to reduce human disturbance around Harper Island.

5-25 Page 26, second paragraph, final sentence ("…continued until determined unnecessary"). It is important to express that on-going Caspian Tern management will likely continue into the foreseeable future (e.g. there will be ongoing costs).

5-26 Page 26, third paragraph, first sentence. We suggest modifying this language. Text elsewhere in the document indicates that colonies will be allowed to establish on other islands in the Columbia River and that these island colonies will not be considered problematic until or unless they exceeded 40 pairs.

5-27 Page 26-27, paragraph that spans both pages. We support efforts to mitigate impacts to Caspian Terns caused by these actions. Although mitigation for impacts to terns may be warranted, mitigation for impacted habitat alone may be ineffective. Caspian Terns are somewhat generalist in their use of nesting habitat; dissuaded terns from the Columbia River Estuary used other islands, roof tops, barges, and vacant lots. Creating more tern habitat may not result in terns using a target area if other factors influence tern occurrence or abundance (e.g. prey availability, nest predators, human disturbance, interspecific competitors for nest sites). Providing habitat in locations where these other factors are operational may result in ineffective mitigation. In addition, we recommend that mitigation locations be identified (and assessed in terms of their adequacy) prior to implementation of active management.

5-28 Page 27, second paragraph, first sentence. We recommend taking a cautious approach to applying information from the Columbia River Estuary Caspian Tern management effort, as the two areas likely function under different circumstances and knowledge gained about one "system" may not apply to the other.

5-29 Page 27, second paragraph, second bullet (regarding anticipated costs and maintenance requirements). If actions are taken to alter or create Caspian Tern nesting habitat, there may be ongoing costs to manage and monitor the site. Continued funding for active management needs to be addressed and incorporated into the cost-benefit analysis of proposed actions.

5-30 Page 27, third paragraph. Unoccupied habitat will have little or no value to Caspian Terns, regardless of the ratio used to designate mitigation habitat. Mitigation should focus on subsequent use given the desired target population along the Columbia River. This should provide flexibility – with reasonable limits – in how mitigation is defined and implemented.

5-31 Page 27, fourth paragraph. We recommend that actions should not be initiated at Goose Island until mitigation is clearly identified.

5-32 Page 28, third paragraph. This paragraph describes the interconnectedness of Caspian Tern colonies and the potential geographical scope of Caspian Tern response to management under this plan. The geography is vast and underscores the need to involve other stakeholders from outside the Columbia Basin.

5-33 Page 29, final paragraph. Preliminary evaluation of enhancement sites indicates concerns that fall into 3 categories: 1) unknown impacts to other fish stocks that could become important for conservation, recreation, or commercial interests; 2) unknown short- and long-term value of such sites to Caspian Terns; and 3) establishment or enlargement of colonies, particularly in western Washington, will then engage many co-managing tribes and salmonid conservation partners that have not been engaged or fully aware of this planning effort.

5-34 Page 31, first paragraph, final sentence. On Goose, Crescent, and "at-risk" islands there may be 60,000 Ring-billed Gulls and California Gulls. Foundation and Harper islands support about 700 Double-crested Cormorants. There are additional numbers of less common birds at these islands. If Caspian Tern dissuasion efforts at these sites displace a portion of these other birds, it is possible that unintended avian predation or other issues could occur (including impacts to other species). We recommend adding more discussion of this potential problem (and possible solutions).

5-35 Page 31, second paragraph. This degree of activity will likely cause public concern and result in the public contacting WDFW and USFWS offices with questions and to voice concerns. We think there is a need for appropriate public outreach and education, and acknowledgment of the burden this action will have on local agency staff.

5-36 Page 33, fourth paragraph, second sentence. We ask that you explain why a permit for 200 Caspian Tern eggs per year is identified and the subsequent text indicates that this level of take will not be needed. Removal of this many eggs per year over several years could cause an undesirable impact to Caspian Terns, especially when combined with cumulative impacts of other management activities.

5-37 Pages 33-34, Alternative D. The preferred alternative is a composite of all other actions and results in a maximum potential cumulative impact to Caspian Tern and the most costly set of actions: Alternative A includes current actions at dams and cumulative impacts of Columbia River Estuary actions, Alternative B includes Alternative A and habitat modification, Alternative C includes Alternative B and hazing, and Alternative D includes Alternative C and egg take. We recommend using an approach that is effective (e.g. habitat modification and an allowance for egg removal as needed) while retaining Caspian Terns, and that the adopted approach can be modified as new information becomes available.

5-38 Page 34, Table 2-3. We suggest referencing the tolerance parameters of 40 pair per colony or 200 pairs total inland in the table.

5-39 Page 35, first paragraph, third sentence. A better description of the monitoring plan is needed here.

5-40 Page 35-36, Comparison of Alternatives section. We recommend that the comparison of impacts and benefits also reflect impacts to Caspian Terns. We further recommend that contingencies be developed and presented that address actions that would occur if there were to be intolerable impacts to Caspian Terns. Finally, we recommend that you explain and justify appropriateness and practicality of actions relating to: a) out-of-basin habitat enhancements, b) 40 terns per island, and c) 200 tern pairs in the inland region.

5-41 Page 41, Alternative Actions considered. Although a range of solutions was considered in this planning effort, we think that other solutions are available that should be explored. The option of using net pens was dismissed after limited discussion. We encourage the Corps to develop and assess other possible solutions.

5-42 Pages 42-44, Partial colony reduction section. We recommend that you explain what determines a "substantial" benefit and what degree of benefit is needed to select a preferred alternative. For example, why were "substantial" benefits achieved only at 100% dissuasion at Goose and Crescent islands?

5-43 Page 43, second paragraph, third sentence. We appreciate the reference to "economic efficiency." This is important in considering the relative merits of alternatives, and it should be evaluated from the perspective of state natural resource agencies as well as the federal action agencies. The costs of long-term management and effective adaptive management, including costs to involved resource management agencies and entities, will be expensive and needs to be calculated and evaluated.

5-44 Page 43, second paragraph, sixth sentence. The limited information on effectiveness of alternative food sources reflects – to an unknown extent – the dearth of investigation on this general management approach. The statement about "… potentially high operation and maintenance cost …" is conjectural, because leveraged funding sources and partnerships could create cost efficiencies. On the other hand, the cost of the identified preferred alternative has not been fully described. We suggest that there could be substantial long-term costs for adaptive management and maintenance of managed Caspian Tern nesting habitat.

5-45 Page 43, second paragraph, final sentence. WDFW appreciates recognition of the wetland cell concept for potential incorporation into the AMP. Unfortunately, because this project was not funded and therefore not implemented as required, failure to document success should not deem the concept nonviable. Information from WDFW's foraging site feasibility study will be available after data collection this spring.

5-46 Page 44, first paragraph, final sentence ("alternative food sources were eliminated due to having very limited known biological effectiveness, as well as potentially high and long-term operations and maintenance costs."). Limited knowledge does not equate to limited effectiveness. What are the estimated operations and maintenance costs?

5-47 Page 44, Section 2.4.4, last sentence ("existing transportation system has been optimized based on current knowledge to maximize survival and adult return rates with operational constraints"). This is a vague statement. Please clarify this for the general reader.

5-48 Page 44, Section 2.4.4. This section (on transporting) should be enhanced to better explain the relative value of this alternative.

5-49 Page 44, Section 2.4.5, third sentence. This implies that Caspian Terns are limited by available forage; the underlying assumption of the preferred alternative is that Caspian Terns are limited by nesting habitat. We recommend that more work is needed to describe limiting factors for Caspian Terns.

5-50 Page 45, Affected Environment. The affected environment section should discuss other sites within the range of the western metapopulation of Caspian Terns. Connectivity of Caspian Terns in western North America (e.g. Table 3.5) is such that they could move broadly across the region in response to proposed actions; there should be more discussion regarding potential risks, including reference to specific fish stocks that have state or federal listing status. Many potential habitat enhancement sites described in Table 2-2 have ESA-listed salmonid concerns. The location for mitigation actions needs to occur prior to implementing Phase 1 actions, and this would include outreach and inclusion of affected co-managers and stakeholders. In Puget Sound alone about 20 tribes (ttp://www.goia.wa.gov/Tribal-Information/Map.htm19) are engaged in salmonid conservation.

5-51 Page 51, Other Fish section. It would be beneficial to expand this section. The distance traveled by Caspian Terns from colonies for foraging locations can be substantial (see Fig. 3-8 & 3-9). Water bodies available to terns are more numerous than indicated. More information on availability and biology of other prey would provide a better understanding of predation on ESA-ESU salmonids. For Goose Island, >70% of Caspian Tern diet is fish other than salmonids and is dominated (>60%) by bass and sunfish (Figure 48 in USACE 2012 annual report).

5-52 Page 55, final sentence. The statement that Caspian Terns have increased since the 1960s was not supported by Table 3-1, which shows data only as far back as 1996.

5-53 Page 55-56, Species Range section. Framing the increase in tern numbers from relatively recent trends may not fully represent changes in tern abundance relative to other factors. Several studies have shown potentially or acknowledged adverse effects, including reproductive failure, related to environmental contaminants (Ludwig et al. 1993, Parkin 1998, Buck 2004). Such contaminants may have caused population declines at some point in time.

5-54 Page 58 and 59, reference to eBird data (also Figure 3-3). The reference to eBird data over-states the distribution and abundance of Caspian Terns outside the five regions mentioned earlier and depicted in Figure 3-2. We examined eBird information from Colorado, an area outside the five indicated regions. We noted records from 10 areas in western Colorado and found that the median number of Caspian Terns involved in that group of records was 1. There were more record locations for eastern Colorado, and we randomly selected 10 sites from that region and found that the median number of terns per record was again 1. When one visits the eBird site the "base" map figure shown in Figure 3-2 greatly exaggerates the distribution, because many of the cells on the map – which represent a large area – may have only one location under it that is represented by the cell shading. Also, records in eBird were compiled from multiple years and multiple seasons (including migrants as well as summering birds), and sometimes by multiple observers reporting the same observations. Consequently, we think the eBird summary is uninformative and may be misleading for this purpose.

5-55 Page 61, first paragraph. The dynamic nature of nesting sites adds to the uncertainty of predictions of where dissuaded terns will go and the value of nest habitat enhancement.

5-56 Page 61, second sentence in first complete paragraph. It seems fair to also say that Caspian Terns are rather nomadic due to their ability to respond to changes in food resources.

5-57 Page 61, final sentence in first complete paragraph. The statement that most of the largest colonies are located in coastal areas is not clearly supported by the map.

5-58 Page 62, second sentence in first paragraph. "… highest levels of connectivity …"

5-59 Page 62, final sentence in first paragraph. This sentence seems out of place in the metapopulation overview section.

5-60 Page 62, Table 3-2. It is important to recognize that knowledge of Caspian Tern populations and efforts to estimate numbers have improved over time. Current estimates are likely much better than earlier estimates. There is less certainty about early estimates.

5-61 Page 62, Table 3-2. In the table (and probably also in text) there should be information (or at least text) to indicate that non-breeding "floaters" occur commonly in suitable foraging areas. Every population contains non-breeders and they also have food requirements.

5-62 Page 66, Table 3-4. It might be helpful to generate another table that depicts the dissuasion objective (e.g. 0%, 50%, 100%) for each island specified.

5-63 Page 67, Habitat Requirement section. We suggest a description of the artificial nesting habitats used by Caspian Terns be added to include barges, roof tops, and vacant lots.

5-64 Page 69, third paragraph. We have poor historical breeding records of Caspian Terns in eastern Washington. We recommend that you consult Wahl et al. (The birds of Washington), Jewett et al. (The birds of Washington [1953]) and Hudson and Yocom (1954. A distribution list of the birds in southeastern Washington. WSU Research Studies Vol. 22[1]). The latter authors considered the Caspian Tern to be "…a fairly common summer resident and breeder on islands in the Columbia River near Pasco before the completion of McNary Dam …".

5-65 Page 69, fourth paragraph. We recommend that you discuss an estimate of nesting success that would maintain a stable population; this would improve understanding of the current contribution of breeding colonies along the inland Columbia River to the regional Caspian Tern population.

5-66 Page 69, final paragraph. This paragraph is not necessarily consistent with the heading for section 3.1.3.7.

5-67 Page 70, Figure 3-6. The average nesting success indicated in Figure 3-6 is based on data from 2007 and 2010-2011. Because data from 2012 are included in the figure, we recommend that you recalculate and show the new mean value in the figure. This same comment applies to Figure 3-7.

5-68 Page 72, Figure 3-8. The information on foraging trips of 3 GPS-tagged Caspian Tern s was interesting. What proportion of those Caspian Terns made multiple trips to the Columbia or Snake rivers? It might be informative to summarize a comparison of movements made by habitual river users, versus the occasional, versus those that did not use the river.

5-69 Page 75, paragraph at bottom of page. The standard use of a personal communication is to indicate the exchange of information from a specific person. References to personal communications involving an agency (i.e., "USFWS 2013a" in this and other paragraphs) is not consistent with that standard.

5-70 Page 76, Salmonid Consumption Estimates. We think it would be helpful to standardize consumption estimates to parameters related to ESA-listed ESUs. Predation on healthy ESU is of lesser or no concern.

5-71 Page 88, third paragraph in section 3.1.6. It is extremely unlikely that lynx will occur in the project area. In addition, there have been no records of Spotted Owls outside their well-documented range and it should not be included as a species that may occur within the project area.

5-72 Page 92, Figure 3-12. Potholes Reservoir attracts a large number of piscivorous waterbirds (particularly American White Pelicans) during July when irrigation demand results in drawdown that strands large numbers of fish. Allowing Potholes Reservoir to drawdown earlier could provide an alternate foraging area for Caspian Terns, if there was a reliable source of water to meet irrigation demands later in the summer.

5-73 Page 103, second sentence in third paragraph in section 4.1.1.1 (Alternative A). The sentence in question states: "Higher predation rates in 2012 coincided with increased numbers of Caspian Tern nesting at Goose Island in 2012, supporting a suggestive positive relationship between annual predation rates on steelhead and the number of Caspian Tern breeding pairs at the Goose Island, which fluctuates

5-73 from year to year." This represents a conclusion from a single year of information that is not compelling, and is highly speculative. We suggest that the statement be removed.

5-74 Page 104, second and third paragraphs in section 4.1.1.2 (Alternative B). We advise against making the claim (even cautiously) that 100% dissuasion will result in an effect (e.g. "approximate increase of 14.6% and 11.4% of in-river migrating populations…") that is equivalent with that which might occur following complete removal of the population. We know that Caspian Terns can fly substantial distances to forage at locations where prey is abundant. We also know that non-breeders can be common in environments with adequate food resources.

5-75 Page 108, second sentence in first complete paragraph. Without a caveat, we think that suitable nesting sites are not likely a limiting factor for Caspian Terns in western North America. The number of locations where they can establish colonies and breed without conflicting with human resources issues is likely very small, but without human intervention they could nest in more locations. In addition, the species often nests in high densities and in small areas; the spatial extent of a nesting patch is likely a minimal requirement.

5-76 Page 115, Geology and Soils section. We recommend adding more discussion of contaminants in soils, particularly with respect to Crescent Island. Buck (2004) found environmental pollutants in Caspian Tern eggs along the Columbia River; eggs from Crescent Island had the highest contaminant levels of all eggs sampled. Disturbance of sediments (e.g. as might result following dredging) was suspected as the cause of the contaminant levels. If contaminants are currently present in Crescent Island soils, soil disturbance should be minimized; otherwise, there may be human health concerns raised if these contaminants are re-released into the river..

5-77 Page 136, second paragraph, final sentence. The proposed habitat enhancement site(s) have not been identified, and are therefore theoretical benefits to Caspian Terns which cannot be evaluated.

Management Plan

5-78 Viii, Phase 2, second bullet. There may be other ways to create visual obstruction with added benefits of improving nesting cover for waterfowl. We recommend conducting a bioassay of existing soils to assess whether native plants would grow on the site. Basin wildrye, for example, is drought- and alkalinity-tolerant and reaches 4-6 feet at maturity.

5-79 Page 1, second sentence in first paragraph. This sentence states that avian predation may limit recovery of anadromous salmonids. An interpretation of this sentence could be that there is enough uncertainty to conclude that avian predation may not limit recovery. We recommend using less ambiguous language to indicate uncertainty.

5-80 Page 1, fifth paragraph, second sentence. What about take of other species? Canada Geese and potentially other waterfowl species will be nesting there.

5-81 Page 4, second to last sentence in bottom paragraph. This sentence states that some islands will be monitored opportunistically. We appreciate that monitoring can be costly, but we suggest a need to link monitoring to adaptive management and that monitoring intensity should be triggered by certain

5-81 actions or outcomes. Statements about opportunistic monitoring should be modified to reflect directed and intentional monitoring.

5-82 Page 5, Table 2-1. We think the description of a phased approach requires additional consideration. In particular, it seems reasonably likely that colony dynamics could differ such that management of each colony should be based on an adaptive plan.

5-83 Page 5, paragraph below Table 2-1. This paragraph is a repeat of the one the page before and can be deleted (at least this was the case with our copy of the document).

5-84 Page 7, first paragraph, first sentence. It is unclear whether there will be a buffer around the previous year's Caspian Tern colony boundary that will result in unnecessary disruption of the entire gull colony. Please clarify.

5-85 Page 7, last sentence in first paragraph. The sentence in question indicates that field staff will know when hazing activity should be terminated to avoid unpermitted take. We suspect that the most likely signal that hazing should cease is the loss of a nest, which is take. Stopping safely short of that to avoid take may be difficult to reliably ascertain. The only way to avoid take completely (with no violation) is to use very conservative thresholds. If the ability to define and reliably use such thresholds is uncertain this alternative may not be very practical.

5-86 Page 8, third sentence in second paragraph. "… 50 pairs would be allowable to remain at or below…"

5-87 Page 8, Table 2-2. Add reference to Double-crested Cormorants and gulls in the caption.

5-88 Page 9, first paragraph. Is there a specific reason to use 200 Caspian Terns to trigger consideration of other actions. If so, please specify.

5-89 Page 9, final sentence in first paragraph. This sentence indicates that the primary objective of the plan is about Caspian Tern population reduction and not necessarily salmonid survival rates.

5-90 Page 10, first sentence. Vegetation currently grows on Goose Island. Are there certain soil, precipitation, or slope conditions that might allow planting of vegetation on Goose Island? Either way, this should be explained.

5-91 Page 11, final sentence. Though additional passive hazing measures may be expected to cover no more than one acre, will you expand beyond one additional acre (>2.5 acres total) if terns continue to occupy new nesting sites on the island?

5-92 Page 12, first sentence. Please describe how the results will influence the decision to implement phase 2? What criteria and thresholds will be used to make such decisions?

5-93 Page 12, final sentence in first paragraph ("… passive hazing on Goose Island will continue until a decision is made that it is no longer needed"). How will this decision be made? The process for making this decision should be described.

5-94 Page 12, final sentence of final paragraph ("It is assumed that five consecutive years of active hazing plus egg take will discourage Caspian Terns from nesting on Goose Island."). Caspian Terns fly great distances and behavioral adaptation to changing conditions indicates well developed prospecting ability during migration and/or dispersal movements. Consequently, if nesting habitat remains at Goose Island and all the hazing devices have been removed (or are no longer functional) we assume that Caspian Terns (birds familiar with the area or "new" terns) will return because they are attracted to prey resources in the area.

5-95 Page 13, Passive Hazing Methods. Is there a specific reason why this approach (habitat modification) is not being employed earlier in the process? Effectiveness and cost should factor into decisions about methods. Habitat modification could result in a longer lasting solution that would not require ongoing efforts (e.g. to actively haze each year).

5-96 Page 17, final paragraph. Will the planted willows eventually become large enough to support nests built by fish-eating Double-crested Cormorants? Double-crested Cormorants are habitat generalist nesters and may find the planted vegetation to their liking. They build rather flimsy nests, so we suspect that some woody shrub and even fairly small tree species will eventually support nests of this species.

5-97 Page 20, first complete paragraph. Plantings of willows will likely reduce the ability of gulls to detect predators and this may increase the risk of predation activity at or near the nest.

5-98 Page 25, item 1 in second paragraph. It might be important to describe the criteria or factors used by the cited authors to conclude that enhancement should include sites capable of supporting 1000 Caspian Terns. Would several smaller sites also suffice?

5-99 Page 29, numbered list of actions. This sequence of actions could work if one assumes that Caspian Terns behave and react similarly at both colony sites. We don't recommend this approach to adaptive management because there is not a clear reason to assume both colonies will react similarly. We recommend developing and implementing adaptive management at both colonies. This should save time and may be more effective. We have additional ideas about the use of adaptive management and would like to discuss the design and implementation of adaptive management with the Corps.

STATE OF WASHINGTON

DEPARTMENT OF FISH AND WILDLIFE

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August 1, 2012

Cindy Boen, Chair of IAPWG
Environmental Analysis Section
U.S. Army Corps of Engineers
Walla Walla District
201 N 3rd Ave.
Walla Walla, WA 99362

IAPWG Chair,

The Washington Department of Fish and Wildlife (Department) recognizes that predator management can be a viable tool to achieve prey population objectives, such as salmon recovery objectives in an all-H context (hatchery, harvest, habitat and hydro). We appreciate the opportunity to be part of the development of the Inland Avian Predation Management Plan (IAPMP) to achieve regional salmon recovery goals and manage avian predation. The Department understands that the IAPMP will be developed in accordance with the 2008/2010 FCRPS BiOp. It should also be consistent with the Biological Opinions for the FERC license terms for Rocky Reach, Wanapum and Priest Rapids Dams, and with the March 2011 Avian Predation Policy adopted by the Pacific Flyway Council.

We believe that all predator-prey management actions, including the IAPMP, must be consistent with the following guiding principles:

1) Predator and prey populations must be managed to ensure the persistence of each species while attaining individual species population objectives, and ideally predator-prey management actions should be designed within an ecosystem management context.

2) Management of avian predators as a component of comprehensive salmon recovery programs will be considered when there is evidence that predation is a significant factor inhibiting the achievement of listed salmonid recovery objectives. We support a balanced, comprehensive salmon recovery program (the all-H approach) that addresses all significant sources of mortality and avoids excessive focus on any single mortality source.

3) Predation management must be strategic, based on scientific evidence, and must not be broad scale in nature. Consistent with an all-H approach to salmon recovery, management actions should be designed to reduce rather than eliminate predation pressures.

4) Predation management programs are implemented through an adaptive management plan that describes monitoring, possible actions, likely costs of actions and adquate policy decision processes to review monitoring and actions. The adaptive management plan must ensure that predation reduction objectives are being achieved without jeopardizing the long-term perpetuation of the predator population, and that unanticipated consequences can be detected in time to adaptively manage them (e.g., shifts in predation to other vulnerable fish populations, impacts to non-target avian species, and impacts to recreational fisheries).

5) Management programs cannot result in increased costs to the Department, without providing stable, long-term funding resources to cover those additional costs. Programs also cannot create a transfer of management responsibility from federal to state authorities. Active management of avian distribution may require long-term financial commitment.

6) Public education should be incorporated into any predation management programs.

7) Effective process to meet environmental compliance is critical for this IAPMP and associated actions that will have far reaching and uncertain outcomes.

We appreciate the opportunity to provide our perspective on avian predation management issues in the Columbia Basin, and are interested in collaborative development of management plans that are consistent with both Federal and State responsibilities. Our representative on the IAPWG, Matt Monda, has developed an alternative for consideration that is designed to provide long-term, durable reductions in predation rates on salmonids while perpetuating avian predator populations in the Basin. We understand that the IAPWG has had initial discussions about this concept, and we look forward to additional consideration.

Sincerely,

Dennis Beich
Regional Director

cc: Bill Tweit
Matt Monda
Jeff Korth
Stephanie Utter
Teresa Scott
Dale Bambrick

Pacific Flyway Council Policy Statement — Avian Predation on Fish Resources

I. Purpose and Scope:

This policy statement is intended to provide general guidance to member states of the Pacific Flyway (Flyway) when addressing migratory bird predation issues on fish resources in open waters. The policy establishes guiding principles developed for the Pacific Flyway Council (Council) to consistently respond to avian predation issues in an informed manner. These principles may also serve as a guide to member states responding to more localized bird-fish conflicts in the immediate future that precede Flyway planning and coordination initiated under this policy. Inherent in this policy is the recognition that management of avian predation must be implemented in a manner and at a scale consistent with the conservation of migratory bird populations and the fish populations with which they interact. This policy statement does not apply to hatchery, aquaculture facility, and/or private property concerns as these issues are currently addressed on a case-by-case basis through existing avian management practices.

II. Shared Management Authority:

Migratory birds comprise a shared international resource that provides substantial intrinsic and ecological benefits to the citizens of the U.S. and other countries. Federal authority to manage and protect migratory birds is derived from the Migratory Bird Treaty Act (MBTA) of 1918 [16 U.S.C. 503, as amended]. The Fish and Wildlife Conservation Act (1956) authorizes the coordination between the states and the U.S. Fish and Wildlife Service for wildlife conservation purposes. With specific regard to migratory bird damage control, some states within the Flyway have developed Memoranda of Understandings with the Wildlife Services Division of the U.S. Department of Agriculture's Animal and Plant Health Inspection Service. Therefore, management of migratory birds, including avian predation control throughout the Flyway, is the joint responsibility of state and federal agencies.

III. Guiding Principles:

(1) **Vision and values are clearly and objectively defined** —
- (a) Migratory fish-eating birds are intrinsically valuable components of naturally-functioning ecosystems throughout the Flyway and are protected under international treaties, and state, provincial, federal, and tribal laws.
- (b) Native fish populations subject to predation by migratory birds are also intrinsically valuable components of the same ecosystems.
- (c) Non-native fish populations have other important values (e.g., recreational and economic).
- (d) The extent to which naturally-functioning ecosystems (relative to both bird populations and fish prey populations) have been altered by artificially-created or human-modified habitats, and/or subject to habitat loss, is acknowledged.
- (e) Where avian-fish conflicts occur, management options provide opportunities to seek the greatest balance with respect to conservation of both avian and fish resources.
- (f) Science-based conservation informs issue resolution at all levels of management.

(2) **Avian predation issues are best addressed within the context of population and distribution objectives established for the Flyway** —
- (a) Coordinated inter-state management is essential.
- (b) Consultations involve all affected stakeholders within the range of the subject populations.

(c) All conservation, economic, recreational, and societal values are fully considered.

(3) **Dialogue between states, provinces, federal, and Tribal partners is critical** —
   (a) Shared and differing migratory bird management authorities and conservation objectives are considered.
   (b) Shared objectives for at-risk, candidate or species (birds and/or fish) listed as Threatened or Endangered (T&E) under the Endangered Species Act (ESA) are considered at the appropriate geographic scale.
   (c) Value of state and provincial recreational interests is considered.
   (d) Management authority is recognized and respected.

(4) **Responses to perceived avian predation issues are based on sound science** —
   (a) Magnitude and scope of predation impacts are best demonstrated through empirical evidence.
   (b) Monitoring, data sharing, data gaps, and research needs are acknowledged and addressed.
   (c) Expectations of how management actions will reduce impacts to affected fish populations are explicitly addressed.
   (d) Expected outcomes of management actions on affected avian populations are clearly understood.
   (e) Measures are implemented to assess effectiveness of management actions and inform future direction (i.e., adaptive management).

(5) **Important considerations when evaluating the need for management action in response to avian predation on fish resources** —
   (a) Assessment of population-level impacts for both migratory birds and fish.
   (b) T&E species conflicts.
   (c) Native species conflicts.
   (d) Non-native sportfish impacts.
   (e) Cost-benefit analyses for proposed management strategies.

(6) **Methods for reducing avian predation on fish resources are always implemented within existing regulatory frameworks** —
   (a) National Environmental Policy Act, ESA, MBTA, and applicable state, provincial, federal, and Tribal regulatory compliance are fully addressed in all proposed management actions.
   (b) Nonlethal control actions that result in no direct take of nongame migratory fish-eating birds should be attempted first.
   (c) If nonlethal control actions are deemed infeasible or ineffective, then lethal methods may be considered on a case-by-case basis.

IV. Pacific Flyway Policy Statement:

It is the policy of the Council that issues related to migratory bird predation on fish resources in open waters be addressed using the above guiding principles and that comprehensive management plans for migratory fish-eating birds be established by the Council.

Response to comment 5-01

The Action Agencies have developed a management plan for CATEs that strives to provide a balance of protecting ESA-listed salmonids while minimizing impacts to other sensitive species or resources. The Action Agencies also recognize that the CATE management plan should consider potential uncertainties and they have, therefore, created a comprehensive adaptive management plan based on best available science. In furtherance of collaboration for future adaptive management needs, the Action Agencies will establish an Adaptive Management Workgroup that will remain involved throughout the implementation of the IAPMP. This workgroup is an information-sharing forum, and the WDFW is encouraged to participate in this workgroup. The IAPMP has been modified to include a brief discussion about this workgroup and its connection to CATE management in the estuary and inland regions. The IAPMP includes habitat enhancement measures to attract CATEs to areas outside the basin, as well as more aggressive adaptive management dissuasion actions to limit the formation or expansion of incipient colonies within the basin. Because it is impossible to predict with certainty where incipient colonies may develop, the adaptive management dissuasion actions can be expanded, if necessary and within Action Agency authority, as new information is garnered to deal with unforeseen incipient colony development.

Response to comment 5-02

This language "if warranted" came directly for the FCRPS BiOp. The Purpose and Need for this EA does focus on increased survival benefits to ESA-listed salmonids. In addition, it includes minimizing impacts to CATEs and other species of concern. The EA, using the best available information, addresses the benefits to salmonids and the impacts, risks, and uncertainties to other species and resources.

Response to comment 5-03

This reference to "expected survival benefits" is a direct quote from the NMFS Draft FCRPS 2013 Supplement BiOp.

Response to comment 5-04

As discussed in Section 3.6.2 of the IAPMP, site-specific monitoring of habitat enhancement sites will need to be determined once sites have been identified and specific uncertainties that require monitoring are better understood. Initial thoughts on potential monitoring parameters are described in Section 3.6.1 and 3.6.2 of the IAPMP. Habitat enhancement site monitoring will be identified in the tiered NEPA analysis during Phase II, in coordination with the public and interested federal, state, and tribal agencies.

Response to comment 5-05

Best available science and information was used to develop the EA. The research used to buttress the EA comes from several disparate sources using various metrics for analysis; the EA reflects that.

Response to comment 5-06

This particular instance (pages 3-4) is meant as an introduction to the issue of impacts of avian predation on salmonids. Data on differences in CATE colony size between the Columbia River Estuary and the inner Columbia River Basin are presented in later chapters. Data are included where appropriate throughout document to buttress relative terms.

Response to comment 5-07

There is uncertainty associated with the effects related to compensatory mortality. Benefits in the EA assume no compensatory mortality. Section 1.2.2 of the EA has been revised to address and discuss compensatory mortality.

Response to comment 5-08

See comment 5-05 above regarding metric standardization. Data presented in this paragraph are meant to show the magnitude of CATE colony sizes and consumption rates of salmonids by CATE at Goose Island and Crescent Island.

Response to comment 5-09

The sentence referred to in this comment was deleted.

Response to comment 5-10

Table 1-1 caption revised.

Response to comment 5-11

Section 1.2.1 of the EA has been revised to reference the All-H approach of the FCRPS BiOp.

Response to comment 5-12

The Adaptive Management Plan detailed in Section 3.0 of the IAPMP describes issues that could be associated with potential enhancement sites and methods that may be used to address these issues. Selection criteria for enhancement sites will include many factors including food availability, the potential for ESA conflicts, predator presence, and others as detailed in Section 2.6 of the IAPMP and Section 2.2.2.4 of the EA.

Response to comment 5-13

Comment noted.

Response to comment 5-14

The Action Agencies developed an adaptive management approach to address expanding dissuasion efforts on incipient colonies that develop within the inland basin region. A comprehensive monitoring program will identify any new colony development. New dissuasion actions can be implemented, if necessary and within Action Agency authority, as new information is garnered to deal with unforeseen incipient colony development. The expansion of the actions covered under the IAPMP may require supplemental/tiered NEPA. In addition, not all CATE colonies pose a measurable impact on salmonids, and dissuasion of such colonies is not warranted. Therefore the Action Agencies are targeting dissuasion actions only on colonies that have a measurable impact on salmonids. If incipient colonies develop in areas where the Action Agencies have no authority to act, and it is determined that they are impacting salmonids or other resources, this could potentially result in an impact to others (states, PUDs, British Columbia, etc.). It is also recognized that this could occur under the No Action alternative. The Socioeconomic Impact evaluation in Section 4.4.2 of the EA has been revised to reflect this potential impact.

Response to comment 5-15

Analysis of geographic scope is already broad as described in Sections 4 and 5. Impacts to the western CATE metapopulation are analyzed in EA Section 4.1.3 and 5.1.2. Coordination with other natural resource agencies will occur as part of ongoing coordination for this project as described in Sections 6 and 7.

Response to comment 5-16

The range of actions that has been thoroughly considered is congruent with the Purpose and Need. The Purpose and Need does not address effects of low-flow years, toxicity, dam construction, over-fishing, or habitat removal. Other "causes" are outside the scope of this proposed action and are addressed in other actions/efforts by the Corps and other Action Agencies. To address the management of alternative foraging areas and similar comments, the following text was added to EA Section 2.4.2: The following biological concerns have also been raised about the use of net pens (BRNW, personal communication):

- Net pens would likely be used by non-target species.
    - Other piscivorous waterbirds (e.g., American white pelicans, cormorants, herons, night-herons, gulls) would also likely use the net pens and could increase in numbers near the pen.
    - Cooperatively foraging waterbirds (e.g., gulls, cormorants) would likely find the net pens before CATEs and would potentially interfere with the foraging of CATEs at the pens. There are far more gulls and cormorants than CATEs in the region, and both species readily take advantage of new foraging opportunities. CATEs would likely take more time to change their foraging habitat and use the pens.
    - Some birds (especially diving birds such as cormorants) could become entangled in the nets.
    - Mammals (especially river otters) would also likely be attracted to the pens.
- Net pens might not significantly shift CATE foraging locations. Recent unpublished telemetry studies (BRNW, unpublished data) indicate CATEs are somewhat site faithful with regard to foraging areas, so the majority of birds in a CATE colony might continue to forage at traditional locations.
- Net pens might attract more CATEs to an area. Instead of drawing CATEs away from an area, the presence an abundant food source in a net pen could attract more CATEs to an area and may therefore counterbalance the intended benefits of the pens.

Response to comment 5-17

The focus of the plan is on ESA-listed salmonids in the Columbia River and actions that have the greatest potential increase in lambda. Please see the response to comment 5-05. Delta lambda was used as a consistent metric.

Response to comment 5-18

Habitat enhancement sites will be identified during Phase I as described in EA Section 2.2.4. Supplemental/tiered NEPA analysis will be conducted for enhancement site(s) when they are identified. The identification of habitat enhancement sites during Phase I is part of the phased approach to implementation of this plan. EA Section 2.2.2 gives a rationale for the phased approach. Primary benefits of this approach are that it promotes adaptive management and flexible decision making. Additional benefits of the phased approach are that a major portion of the benefits to ESA-listed salmonids will be achieved in Phase 1, while at the same time resolving uncertainties and allowing for cessation or reversal of Phase 1 actions.

Response to comment 5-19

The Action Agencies have developed a management plan for CATEs that strives to provide a balance of protecting ESA-listed salmonids while minimizing impacts to CATEs or other sensitive species, as prescribed for in the Purpose and Need. This plan was determined to best meet the project Purpose and Need. It does not call for the dissuasion of all CATEs from the inland basin region, and it is anticipated that a number of small CATEs colonies will continue without having a measurable impact on ESA salmonids.

Response to comment 5-20

Additional details about past, present and reasonably foreseeable future actions have been added to Section 5 of the document (Cumulative Effects).

Response to comment 5-21

Section 2.2.2.3 of the EA indicates that actions at incipient colonies or at-risk islands will only be considered and implemented "if CATE colonies at any of these at-risk locations grow to a size of 40 nesting pairs, the predation impacts would be reevaluated and, if warranted ......implemented". Actions for the at-risk islands will only be implemented if the "reevaluation" indicates a measurable impact to ESA-listed salmonids.

Response to comment 5-22

EA Section 2.2.2.3, describes potential habitat modifications that could occur on at-risk islands. IAPMP Adaptive Management Plan Sections 3.3.1, 3.4 and 3.5 describe potential actions that could occur on at-risk islands in more detail than in the EA.

Response to comment 5-23

As described in the IAPMP in Section 2.0 (Table 2-1) and Section 2.2.2.3 of the EA, if monitoring results suggest that CATEs are colonizing on the at-risk islands and these colonies are having a significant impact on salmonids, the Actions Agencies will initiate discussion with the appropriate land management agencies. This will avoid unnecessary efforts to coordinate actions before they are warranted.

Response to comment 5-24

Section 5.1.1 mentions the WDFW management of the Columbia Basin Wildlife Area as part of the cumulative effects evaluation. This section has been revised to include the WDFW management of Cabin Island and fishing regulation around Harper Island.

Response to comment 5-25

It is uncertain how many years actions will be required for the at-risk islands. This statement reflects that, over time, conditions on these islands will change and the need for actions may not be required. The Action Agencies are committed to these actions as long as they are considered to be beneficial to ESA-listed salmonids, effective for CATE management, and required in the FCRPS BiOp.

Response to comment 5-26

Text was added to EA Section 2.2.2.4 to clarify that a colony of approximately 40 pairs on an at-risk island would initiate an investigation into the potential effects of the colony on ESA-listed salmonids.

Response to comment 5-27

As stated in Section 2.2.2, the phased approach: 1) Allows the project to be implemented in an adaptive management context that acknowledges and addresses uncertainties associated with the proposed actions; 2) Promotes flexible decision making through regular monitoring and assessment of data related to the anticipated outcomes of proposed actions and the potential to alter activities to better achieve the stated objectives; 3) Allows for a major portion of the project benefits to salmonids to be achieved in Phase 1, while Phase 2 actions are either tested or more fully defined or while uncertainties are resolved through monitoring; and 4) Allows for cessation or reversal of Phase 1 actions, if necessary, through the Adaptive Management Plan. Supplemental/tiered NEPA analysis will be conducted for enhancement site(s) when they are identified. Details of habitat enhancement sites are described in Section 2.2.2.4., subsection Habitat Enhancement Metrics.

Response to comment 5-28

Within the context of habitat enhancement, the metrics developed under the estuary plan and tailored to CATE colonies in the inner Columbia River Basin shown in Section 2.2.2.4, are directly applicable because they represent the necessary components required for successful and sustainable CATE habitat enhancement.

Response to comment 5-29

The screening and decision criteria associated with the development of new habitat for CATEs outside the basin may include a general consideration of operation and maintenance costs and capital investment costs. However, it is not anticipated that a rigorous cost-benefit (or least cost) analysis will be conducted. It should be noted that supplemental/tiered NEPA will be completed for the implementation of new habitat enhancements, and that NEPA does not require a cost-benefit analysis.

Response to comment 5-30

As discussed in Section 3.6 of the IAPMP (and 2.2.2.4 of the EA), Habitat Enhancement metrics will focus on site-specific factors related to the criteria established for productive CATE habitat. If these factors are met, it is assumed that adequate habitat will be available for nesting. Whether the habitat enhancement sites are occupied by CATEs is a function of the availability of other habitats in the region, which is something over which the Action Agencies do not have control. It should also be noted that CATE habitat enhancement is not considered mitigation in the context of the proposed plan.

Response to comment 5-31

The rationale for the phased approach to implementation of the preferred alternative is described in Section 2.2.2. The effects of implementation in this manner on CATEs are described in Sections 4 and 5 of the document. It is important to note that CATE habitat enhancement is not considered mitigation in the context of the proposed plan.

Response to comment 5-32

The geographic scope of the actions covers the entire western CATE metapopulation. As discussed in Section 2.2.2.4 of the EA, proposed actions in other areas would require additional supplemental/tiered

NEPA coverage. Coordination with stakeholders in areas where these subsequent actions are proposed would occur as part of that process.

Response to comment 5-33

New "Indian Trust Assets" section and new text in "Protection and Enhancement of Environmental Quality," "Floodplain Management," "Environmental Justice," and "Recreational Fisheries" sections were added to Section 6 of the EA. Coordination activities with co-managing tribes, landowners, and other potential salmonid conservation partners are part of the process for analysis of habitat enhancement sites.

Response to comment 5-34

EA Section 4.1.4 contains additional information on possible effects to gulls and cormorants.

Response to comment 5-35

The Action Agencies have considered the level of public notification and education that will be required for habitat modifications and hazing activities if the final decision is made to implement Alternative D. It is anticipated that observers/hazers will be on the islands as frequently as necessary to dissuade nesting and minimize the likelihood that eggs may be laid. These actions are not intended to burden local agency staff. It is anticipated that qualified and trained observers will be used to conduct this hazing and egg take. There will be some level of coordination required between observers and local agency staff, and Action Agency points of contact will be provided. This coordination is not expected to be time consuming, but where possible, the observers will try to be efficient to minimize any potential burden.

Response to comment 5-36

The 200 eggs per year is a conservative estimate that attempts to cover the maximum potential impacts to CATEs, though it is expected that many fewer or no eggs will need to be taken. More details about how this egg take may affect CATEs was added to EA Section 4.1.3.4.

Response to comment 5-37

New text was added to EA Section 4.1.1.3 to clarify that incremental impacts of hazing are assumed to be negligible and temporary. It was decided, based on expert opinion, that dissuasion would not be effective without active hazing. Impacts of hazing on CATEs are listed in EA Section 4.1.3 for each alternative.

Response to comment 5-38

These numbers are clear in the text and do not lend themselves to the table format. The inclusion of these numbers in a table without accompanying text could lead to confusion and is not necessary.

Response to comment 5-39

The monitoring plan is described in more detail in Section 2.2.4 of the EA as well as Section 4 of the IAPMP.

Response to comment 5-40

Description of impacts and benefits to CATEs are listed in Table 2-5 (comparison of alternatives). Contingencies to address potential impacts to CATEs are covered both in the phased approach, which allows Phase 1 to be reversed if needed, and in adaptive management, which promotes flexible decision making based on unanticipated situations. IAPMP Section 2.3 provides more details on the rationale for the 40 pair and 200 pair thresholds.

Response to comment 5-41

See response to comment 5-16.

Response to comment 5-42

The differences in Δλ benefits to salmonids between full and partial were identified in the referenced pages. "Substantial" benefits are identified in the Benefits Analysis as having a Δλ of 0.5% or greater as identified in Section 2.4.2 of the EA (some text has been added in the text for clarification in the EA). Sections 2.4.2 and 2.4.3 also point out that the decision to eliminate partial colony dissuasion was not based solely on the benefits to salmonids. It was also a function of cost efficiency. The colony areas at Goose and Crescent islands are already very small (approximately 0.1 acres each). The cost for partial colony dissuasion was not much less expensive than full dissuasion. This cost difference is based upon the following reasons: 1) the treatment areas are very small; 2) contract administration cost would be virtually identical for full or partial treatment; 3) mobilization and demobilization costs would likely be a large cost for construction and would be similar for full or partial; and 4) observers/hazers would have to be on site essentially the same amount of time for full or partial dissuasion. The Benefits Analysis did not analyze the reduction of 90%, but it was assumed to be roughly 10% less than a 100% benefit.

Response to comment 5-43

The implementation costs are not identified nor required for NEPA. It was not anticipated that there would be any extensive implementation costs for state or local agency staff. There will be coordination costs, however, and these costs are anticipated to be minimal.

Response to comment 5-44

Please see the response to comment 5-16 for the net pen comment. The decision criteria associated with adaptive management and the development and maintenance of new habitat for CATEs outside the basin may include a general consideration of operation and maintenance costs and capital investment costs. However, it is not anticipated that a rigorous cost-benefit (or least cost) analysis will be conducted. While supplemental/tiered NEPA will be completed for the implementation of new habitat enhancement sites, NEPA does not require a cost-benefit analysis.

Response to comment 5-45

See response to comment 5-16.

Response to comment 5-46

See response to comment 5-44.

Response to comment 5-47

Section 2.4.4 has been revised to clarify the rationale for elimination of Additional Juvenile Transport as an alternative fully considered in this EA.

Response to comment 5-48

See comment 5-47.

Response to comment 5-49

As discussed in EA Section 3.1.3, CATEs are limited by both forage and nesting sites. The creation of habitat enhancement sites is an important part of the IAPMP because of this nest site limitation. Site selection criteria are provided in Section 2.2.2.4. These five criteria include forage availability as prerequisites for site selection.

Response to comment 5-50

The affected environment here for the purpose of the EA includes the existing CATE colonies at Goose and Crescent islands, as well as at-risk islands. Supplemental/tiered NEPA, including ESA evaluations, for habitat enhancement sites will be conducted at a later date. Evaluation of potential effects associated with development of new nesting habitat outside the basin are addressed in this EA to a level possible at this time (see Chapter 4). Given potential sites where these actions may occur are wide-ranging, from southern California to Alaska, and the potential effects could differ widely depending on the site(s) that are selected, these actions will also require a subsequent supplemental/tiered NEPA analysis prior to implementation.

Response to comment 5-51

These locations were used because these waterbodies are where the existing colonies and at-risk islands are located. It is not meant to represent the only waterbodies available to CATEs throughout their entire range. This section indicates the presence of centrarchids and other non-salmonids in Potholes Reservoir. Text has been added under Section 3.1.3.8, Salmonid Consumption Estimates, clarifying that the remainder of Goose Island CATE diet comprised bass and sunfish.

Response to comment 5-52

The reference to Table 3-1 was deleted. The text now reflects the correct citation.

Response to comment 5-53

Text added to Section 3.1.3.1 to describe potential link between contaminants and increase in CATE populations. Section 3.1.3.7 gives additional detail about CATE population trends. These sources represent the best available CATE population trend information. The dates 1996 to 2011 were used in this table because they represent the most complete data set; Table 3-2 shows estimates of CATE breeding population in 1976-1982, 1997-1998, and 2011.

Response to comment 5-54

The title of this figure was changed to reduce confusion and clarify information.

Response to comment 5-55

Text was added to EA Section 3.1.3.2 to clarify that the dynamic nature of CATE nesting sites adds to the uncertainty of predictions of where dissuaded CATEs will go and to the value of nest habitat enhancement.

Response to comment 5-56

EA Section 3.1.3.2 states that "CATE nesting locations are rarely permanent. Due in large part to the unstable nature of their nesting habitat, CATEs have developed a rather nomadic approach to locating suitable nest sites (Cuthbert 1985; Roby et al. 2002)." The literature does not indicate that unstable food resources are a primary cause for nomadism in CATEs. Cuthbert and Wires (1999) state that the "primary factor limiting populations appears to be availability of high-quality nest sites," while predation is listed as another limiting factor, but food availability is not mentioned as a limiting factor.

Response to comment 5-57

The word "most" changed to "many."

Response to comment 5-58

This comment no longer applies to the document because the text referred to here was altered based on a different comment.

Response to comment 5-59

This comment refers to the fact that limited food availability is a factor affecting the distribution of CATEs in interior sites of the western metapopulation. The availability of forage fish is important to mention in the context of the western metapopulation because prey base contributes to population patterns. Predation on ESA-listed salmonids is mentioned in this sentence to illustrate that, often, little forage fish are available for ESA-listed species.

Response to comment 5-60

Text was added at the beginning of Section 3.1.3.2 to address this comment.

Response to comment 5-61

The title of Table 3-2 was altered to reflect presence of "floaters" at colonies.

Response to comment 5-62

In accordance with the goal of the IAPMP, 100% dissuasion has been agreed to be the most effective. The two additional dissuasion objectives (0 and 50%) are not relative to this goal because they dissuade a smaller portion of CATEs from the islands.

Response to comment 5-63

In Section 3.1.3.4 the sentence, "CATEs have also been known to nest on non-natural substrate such as rooftops and barges (USFWS 2005a)," was added to address this comment.

Response to comment 5-64

More detail was added to Section 3.1.3.7 from Johnsgard (1954); the other publications mentioned here are not widely available.

Response to comment 5-65

The best available information was used when preparing this document. No PVA for CATEs exists so an estimate of nesting success (or fledge ratio) that would allow this question to be answered is not available.

Response to comment 5-66

EA Section 3.1.3.7 is titled, "Colony Sizes and Growth Rates at Sites in the Inland Columbia River Basin." A discussion of fledgling success rates is included in this section because success of fledglings contributes to colony growth rates.

Response to comment 5-67

These two figures have been recalculated to show 2012 data.

Response to comment 5-68

These figures are meant to inform the reader on foraging behavior of CATEs in the region and to further reinforce the fact that they are feeding on ESA-listed salmonids. Additional information at the level of detail requested here is not available at this time and does not inform the project goals of minimization of CATE predation on ESA-listed salmonids as stated in the Purpose and Need.

Response to comment 5-69

USFWS requested that personal names not be used.

Response to comment 5-70

See response to 5-05.

Response to comment 5-71

These species were removed from the EA.

Response to comment 5-72

Text added to Section 3.2.2 to clarify that the prime objective of Potholes Reservoir is to supply irrigation water. Draw down of the reservoir is dependent upon irrigation demand of Reclamation customers. The 25-year management agreement and the Potholes Resource Management Plan supports this key purpose of the Columbia Basin Project.

Response to comment 5-73

This sentence was removed.

Response to comment 5-74

In EA Section 1.2.2, best available information was used to prepare these statements. The Benefits Analysis identified that the population growth rates (λ) may be influenced by the hypothesis that avian predators disproportionately consume smolts that are less likely to survive to adulthood, indicating that smolt mortality from avian predation is partly compensatory and not directly additive. If this is the case λ, identified above would be reduced. At this time, there are no specific studies published that help quantify the level of compensatory mortality associated with avian predation in the Columbia River Basin. Therefore, due to this uncertainty, the benefits used for comparison of alternatives in this EA assumed zero compensatory mortality. Estimated predation rates are useful as a means to compare potential benefits among sites. Sites with the highest potential benefits were chosen for actions in order to meet the Purpose and Need of this plan.

Response to comment 5-75

CATE literature puts less emphasis on forage fish availability than on other factors for site suitability. While availability of forage fish contributes to the suitability of nesting sites for CATEs, other site characteristics such as predator access are likely stronger influences in site suitability. The statement in question ("suitable nesting sites may currently be a limiting factor for the western North America metapopulation") includes the caveat "may" and is attributed to Roby et al. 2013, a current and well-respected source of information for CATE biology.

Response to comment 5-76

Information was added regarding dredge spoils and the possible presence of soil contaminants in Section 3.1.2. Also, Section 4.2.1.2 of the EA was revised to indicate that prior to implementation, soil testing would be conducted, if warranted.

Response to comment 5-77

Although the habitat enhancement site(s) have not yet been identified, assuming a decision is made to implement the IAPMP, it is the intent of the Action Agencies to successfully develop new habitat that meets the identified criteria. If that cannot be accomplished, no Phase 2 actions will be implemented and Phase 1 action may potentially be reversed. The effects associated with Alternatives B, C, and D and the cumulative effects assume that new habitat enhancement site(s) are implemented.

Response to comment 5-78

Willows will be from a local source and are anticipated to do well with the depth to water available on site. Willows are also expected to create a year-round visual and physical barrier while grasses may not provide an early season visual or physical barrier. Management of habitat for other species such as waterfowl is outside the scope of this project.

Response to comment 5-79

The word "potentially" has been removed from the referenced sentence to reduce ambiguity.

Response to comment 5-80

Impacts to other species are listed in Sections 3.1 and 4.1.4 (impacts to other birds) of the EA. Canada goose was added to the list of species that are expected to incur minimal or no take in EA Section 4.1.4.3.

Response to comment 5-81

This text was added to Section 2.1 of the IAPMP: “Information gathered by others outside the direct area of concern of the IAPMP may be useful to consider during adaptive management.”

Response to comment 5-82

The Adaptive Management Plan addresses both colonies, so it is not believed that a separate plan is needed for each.

Response to comment 5-83

The repeat paragraph was removed.

Response to comment 5-84

Text was added to note that details of each island's plan are presented in Sections 2.4 and 2.5. Section 2.2.1 does not explain actions on each island in detail.

Response to comment 5-85

Comment noted.

Response to comment 5-86

The word “allowable” was changed to “allowed.”

Response to comment 5-87

This comment was addressed as suggested.

Response to comment 5-88

The rationale for these numbers is provided in Section 2.3 of the IAPMP.

Response to comment 5-89

The text, “reduced CATE consumption on ESA-listed salmonids,” was added to clarify this point.

Response to comment 5-90

Text was added to the IAPMP to clarify that Goose Island has rocky substrate with a deep water table and in places steep slope. A description of the vegetation on Goose Island is provided in the EA Section 3.1.7.1 and Table 3-9.

Response to comment 5-91

It is anticipated that 2.5 acres of dissuasion will be sufficient to meet the stated objectives and further expansion will not be necessary.

Response to comment 5-92

Text was added to IAPMP Section 2.4.1 to clarify unintended negative consequences of Phase 1 actions that could potentially alter Phase 2 actions: “Unintended negative consequences of Phase 1 actions could include but are not limited to dissuaded CATEs relocating to areas in which they have an equal or great impact on ESA-listed salmonids."

Response to comment 5-93

Text was added to IAPMP Section 2.4.1: "e.g., CATEs nest on the island in numbers (estimated to be 40 pairs of fewer) that no longer negatively impact ESA-listed salmonids."

Response to comment 5-94

If substrate modification does not occur in Phase 2, rope and flagging will likely need to be maintained indefinitely. This is clarified in IAPMP Section 2.4.1.

Response to comment 5-95

As discussed in IAPMP Sections 2.4.1 and 2.4.2, permanent substrate modifications will not be utilized earlier in the process so that habitat modifications in Phase 1 can be reversible.

Response to comment 5-96

Text was added in IAPMP Section 2.5.1: "In addition to the ability to grow quickly in conditions at Crescent Island, coyote willows are preferred because they are shrubby and would not support cormorant nests."

Response to comment 5-97

Gulls currently nest adjacent to or within dense vegetation on the island so the presence of additional willows should not represent a change in the existing condition if they nest there. This is discussed in Section 2.5.2, Vegetation Plantings.

Response to comment 5-98

Yes, several smaller sites would also suffice. EA Section 1.2.2 lists population numbers for Goose and Crescent islands since 1996. Numbers of breeding pairs of CATEs on each island have ranged up to 530 pairs on Crescent Island in 2004. The number of pairs used for the size of the habitat enhancement site takes the average number of pairs on each island over the past few years and rounds up to reach 1,000. Text was added to Section 3.6.1 of the Plan to clarify that one or more habitat enhancement sites could be created.

Response to comment 5-99

There is no reason to believe there will be significant differences in how the two colonies react to dissuasion activities. Adaptive management will be implemented at both colonies and for habitat enhancement sites independently. This is addressed in existing text.

Public Power Council
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Portland, OR 97232
(503) 595 - 9770
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December 2, 2013

Walla Walla District, Corps of Engineers
ATTN: PM-PD-PF, IAPMP Project Manager
201 North Third Avenue
Walla Walla, WA 99362-1876

Re: Public Power Council Comments on Draft Inland Avian Predation Management Plan (IAPMP) and Environmental Assessment

Dear IAPMP Project Manager:

6-01

Thank you for the opportunity to comment on the Draft Inland Avian Predation Management Plan and associated Environmental Assessment (EA). The Public Power Council (PPC) represents over 100 consumer-owned utility customers of the Bonneville Power Administration. As the primary customers of BPA, PPC members fund regional fish and wildlife mitigation efforts totaling approximately $700 million annually and have a vested interest in ensuring these efforts are not inadvertently unwound by inaction or by a lack of addressing salmon mitigation holistically.

PPC appreciates the tremendous effort undertaken by the U.S. Army Corps of Engineers (Corps) to control animal populations that prey on juvenile salmonids in the Columbia River Basin, and we see that the regional investment for salmon and steelhead is working in many respects. While we are largely supportive of the Preferred Alternative in the IAPMP, we believe the Corps should take a more expeditious and aggressive line on avian predation.

The development of this plan is a requirement of Reasonable and Prudent Alternative Actions 47 and 68 of the NOAA-Fisheries 2008 Biological Opinion (BiOp) for the Federal Columbia River Power System (FCRPS), as updated in 2010. But, for five years since the 2008 BiOp release, 6-02 predation by piscivorous birds in the Columbia River Basin has annually increased to a point where they are now consuming almost 25 million juvenile salmonids each year. This is very alarming in light of the massive effort underway in all areas of the system to protect these fish.

The Final 2012 Annual Report prepared for the Army Corps of Engineers on Avian Predation on Salmonid Smolts in the Lower and Mid-Columbia River (Roby, et al., 2013) estimated that piscivorous birds consumed an estimated 23.8 million juvenile salmonids in the Columbus River Estuary in 2012. Of these predation values, 1 to 2 million juvenile salmonids are annually consumed in the Columbia Plateau Region which this plan addresses. A majority of these fish are from ESA-listed populations.

While nearly all other BiOp targets are being met, the Upper Columbia steelhead ESU is the only ESA-listed salmon or steelhead stock in the Columbia River Basin that is not currently improving. It is on this stock where the highest inland predation rates are being observed. It was estimated that about 730,000 juvenile salmonids were consumed by Caspian terns nesting in the Columbia Plateau Region and the predation rate was highest for upper Columbia River steelhead ESU (17.3%) (Roby, et al., 2013). Further, predation rates on Snake River steelhead ESU were estimated at 2.8% of the population and predation rates on upper Columbia River spring chinook estimated at 2.5%. In light of these facts, it is imperative that the Corps not hesitate to take quick and effective action that will reduce predation of these stocks.

The Corps' Preferred Alternative D focuses management efforts on Caspian terns nesting at Goose Island and Crescent Island and begins to address predation regarding those stocks of concern. Given the options currently being considered, PPC supports this Preferred Alternative. However, we urge the Corps to expand the scope of future actions to include other avian species found to be preying on significant portions of juvenile salmonid populations and to assert more aggressive management of Caspian terns.

6-03 We are also concerned that as proposed, Alternative D may result in Caspian terns dispersing to other nesting locations within the Columbia Plateau, thereby limiting the intended predation reduction. In the future, we believe the Corps should take action to reduce this risk.

6-04 PPC implores the Corps to expedite these already long delayed management actions. As noted above, the requirement to manage fish losses due to piscivorous birds was included in the 2008 FCRPS BiOp. Yet, it is only now in 2013 that a draft plan has been released and it is disappointing that it addresses only one of the many avian species preying on significant numbers of ESA-listed salmon and steelhead in the Columbia Plateau Region. Further delay would potentially result in the loss of millions more juvenile salmon and steelhead.

6-05 As evidenced by the latest adult salmon and steelhead returns, we have seen that regional efforts of the past two decades are generally working well. Avian predation, however, continues to jeopardize these gains. Of the alternatives under consideration, we support the expeditious implementation of Alternative D. However, we also urge the Corps to adopt an even more aggressive management regime than is being proposed in order to support the significant progress the region has made for the benefit of salmon throughout the Columbia River Basin.

Thank you for the opportunity to comment.

Sincerely,

Bo Downen
Analyst

Literature Cited:

Roby, D.D., et al., 2013. Research, Monitoring, and Evaluation of Avian Predation on Salmonid Smolts in the Lower and Mid-Columbia River, Final 2012 Annual Report. Prepared for BPA, USACE – Portland District, and USACE – Walla Walla District.

Response to comment 6-01

See response to comment 4-01.

Response to comment 6-02

See response to comment 4-01.The Purpose and Need for this EA is focused on the management of CATEs at Goose and Crescent islands. As discussed in Section 1.2.2 of the EA, this focus was driven by the best available information on predation rates and also the Benefits Analysis. However, the IAPMP is considered to be a living document throughout the period of adaptive management that will be updated and revised as necessary to effectively manage avian predators. If planned future monitoring and studies identify other colonies or species to be major contributors to ESA-listed salmonids predation, the IAPMP can be revised to address new management actions. This action would need to fall under the authority of the Action Agencies and may require supplemental/tiered NEPA.

Response to comment 6-03

See response to comment 4-01.

Response to comment 6-04

It is the intent of the Action Agencies to successfully complete the NEPA process and make a final decision on the preferred action. If the decision is to implement Alternative D, the Action Agencies will implement Phase 1 actions in an expedited manner.

Response to comment 6-05

See comment response to comment 4-01.

WILDLIFE CENTER
of the NORTH COAST

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"Promoting compassion, empathy and respect for all life through wildlife rehabilitation, ecological teachings and non-lethal / non-invasive research in wildlife and environmental health"

December 2, 2013

Subject: Inland Avian Predation Management Plan (IAPMP)
Draft Environmental Assessment, October 2013

Walla Walla District, Corps of Engineers
ATTN: PM-PD-PF, IAPMP Project Manager
201 North Third Avenue
Walla Walla, WA 99362-1876
Email: avianpredator@usace.army.mil

Ladies and Gentlemen:

7-01 Wildlife Center of the North Coast (WCNC) submits these comments in response to proposed management of Caspian Terns (CATE) as detailed in the Draft Environmental Assessment (Draft EA) for the Inland Avian Predation Management Plan (IAPMP). WCNC acknowledges and appreciates the thought and effort expended in preparing the Draft IAPMP by Action Agencies.

7-02 With respect to proposed CATE management in the Columbia Plateau, WCNC supports **Alternative A – No Action** at this time. It is premature to displace additional CATE at new locations before suitable CATE alternate habitat has been identified, prepared and is ready for use by terns **in conjunction with** hazing activity.

7-03 The Draft EA assumes that displaced Columbia Plateau CATE will make use of managed sites created by the Corps Portland District. Five years into CATE management, a number of existing managed sites have proven unusable by CATE as a result of poor judgment and deviation from selection guidelines.

7-04 It is therefore the position of WCNC that:

a) Management agencies are not in compliance with provisions of the Columbia River estuary CATE Final EIS (USFWS 2005) which calls for a 2:1 ratio of **suitable** managed habitat to offset reductions in East Sand Island (ESI) nesting habitat.

b) Adaptive management in favor of CATE should be initiated at this time with the immediate increase of ESI CATE habitat by 1.5 acres as detailed below.

7-04 c) An additional 0.5 acre of suitable alternate habitat should be created and available to CATE before Columbia Plateau management and dissuasion activities commence.

7-05 ● **CATE Alternate Habitat**

WCNC supports the USACE contracted researcher findings which recommends ample suitable alternate habitat as follows:

> *"The efficacy of any initiatives developed as part of the IAPMP would depend not only on the successful redistribution of Caspian terns from sites on the Columbia Plateau to more suitable sites elsewhere, but also on preventing Caspian terns from emigrating in large numbers to the Plateau from other managed sites (i.e., East Sand Island), as well as unmanaged sites.* ***It is likely that emigration rates to the Columbia Plateau region would lessen if ample suitable nesting habitat was available for all Caspian terns belonging to the Western North America Population at colony sites outside the Columbia Plateau region."***

> *"Should Caspian tern colonies in the Columbia Plateau region be managed to reduce their impact on ESA-listed salmonids, we anticipate that displaced terns will likely relocate to alternative nesting sites both within and outside the Columbia Plateau region. For instance, Caspian terns banded at the breeding colony on Crescent Island in the mid-Columbia River have been re-sighted at numerous other Caspian tern nesting sites throughout western North America (Suzuki 2012).* ***The potential for these sites to sustain colonies of nesting Caspian terns, however, varies greatly due to a number of biological constraints."*** **(**Collis et al 2012)

> ***"As suitable nesting sites may currently be a limiting factor for the western North America metapopulation (Roby et al. 2013), the identification and development of new nesting areas (enhancement sites) outside the basin would benefit CATEs dissuaded from Goose and Crescent Islands as well as the overall metapopulation."***
> (Draft EA 2013)

7-06 The Draft EA acknowledges that CATE *"strict habitat requirements for nesting (open areas with bare sand and minimal predator access) make them less adaptable to habitat loss than many other species of birds."* Yet under Draft EA alternatives, suitable alternate habitat is not provided **in conjunction with** initiation of hazing. Displaced CATEs are left to rely on their nomadic approach to locate suitable nest sites.

> *"It is likely that dissuaded CATEs would find other suitable nesting areas in the western metapopulation…".*

> *"This includes habitat enhancement sites created by the Corps Portland District outside the Columbia River estuary for the purposes of attracting CATE to alternative nesting sites."*

7-06 *"Ultimately, CATEs dissuaded from the Inland Columbia Basin, as part of this alternative, would be able to select from a wide range of currently available (whether natural or managed) as well as underutilized existing habitat throughout the region."*

(Draft EA 2013)

7-07 Dissuasion of Goose Island CATE is proposed with the commencement of the 2014 nesting season and "*allows for a major portion of the project benefits to salmonids to be achieved in Phase 1…*" (Draft EA 2013). Notwithstanding promises of flexible decision making and adaptive management reversals triggered by unforeseen responses, WCNC believes there are insufficient safeguards for current and proposed displaced CATE.

7-08 Under the Draft EA, the development of suitable alternate CATE habitat may not occur until year 3 of the project and is "*subject to Congressional appropriation*". In light of the nation's current political environment, federal budget cuts and government shutdowns, WCNC is strongly opposed to this timeline.

7-09 It is irresponsible to presume that dissuaded Columbia Plateau CATEs are likely to find other nesting areas or that there is a wide range of current sites available. CATEs have experienced years of heightened hazing at natural and/or man made (dredge, roof top) habitat throughout much of their western North America range. There are few locations where CATEs are welcomed. Due to human activity, ESA-listed fish are wide-spread which renders many suitable natural sites unusable by CATE.

As a result, piscivorous birds are forced to form unnatural large colonies within condensed geographic zones prompting perpetual management actions to manipulate nature while preserving the human factors that initially created the imbalance. This was brought out in public comments on USACE Portland District 2013 Draft EA to shoot ESI gulls. Despite intense predation, reproductive failure and researcher disturbance ESI CATE persist at high nesting density because there is nowhere else to go given intense hazing.

7-10

- **CATE Alternate Habitat Criteria**

The Draft IAPMP addresses criteria for success in providing conditions suitable for CATE colony establishment outside of the inland basin. The criteria also applied to selection of current managed habitat locations under the Columbia River Estuary CATE Management Plan (USFW 2005). The criteria are:

"Using Appendix G of the Columbia River Estuary CATE Impact Statement, Seto et al. (2003), and Collis et al. (2012) as a basis, criteria for habitat enhancement sites for this IAPMP are that the site:

*1. Contains sufficiently available, suitable nesting habitat to support approximately 1,000 nesting CATE pairs, does not experience frequent flooding or **drought events**, and has suitable base substrates.*
2. Has no long-term expensive operations and maintenance requirements.
*3. **Is in sufficient proximity to a relatively stable and abundant prey source for CATEs.***

7-10 *4. Is located in an area with minimal potential conflicts with ESA-listed fish (and other) species.*
*5. **Potential mammalian and avian predators and human disturbances are absent, not a limiting factor, or controllable."***
(Draft IAPMP, 2013)

NOAA acknowledges shortfalls in the management and relocation of ESI CATE:

"Predation (on eggs, chicks, and adults), lack of sufficient water, and limited food resources have plagued tern nesting success at several of these interior sites to the degree that a significant proportion of the alternative nesting habitat has not been available for nesting terns in any single year."

*… "Additional suitable nesting habitat is being sought by the Corps and USFWS to facilitate the movement of birds from East Sand Island to areas outside the Columbia River basin. **Only about one acre of suitable habitat is needed**, and current likely candidate locations include federally owned and managed areas in lower San Francisco Bay, the Salish Sea of Puget Sound, and northern Great Salt Lake."*
(NOAA Fisheries 2013 Draft BiOp)

7-11 WCNC takes exception that only one acre of suitable habitat would be required to bring the managed habitat inventory into compliance with the 2:1 ratio established in the CATE Management Plan (USFW 2005). Poor judgment in selecting and enhancing a number of alternate habitat sites for ESI CATE have failed to provide those birds with adequate opportunity to succeed outside of the Columbia River basin. Additional displaced CATE from the Columbia Plateau will only exacerbate the problem.

7-12 **● CATE Western Metapopulation**

Both the CATE Management Plan and the Draft IAPMP are heavily weighted in favor of salmonids. Over the past 16 years, thousands of CATE have been shot, harassed and manipulated in the name of salmon recovery. The only safeguard for CATE population stability is Management Plan provisions that call for suitable alternate habitat for displaced terns.

- The CATE western nesting population has declined since 2008.
- There has been declining-to-failed-to-unimpressive CATE reproduction at ESI since 2008.
- CATE reproduction at Goose and Crescent Islands has been unimpressive since 2008.
- CATE nesting attempts or success at current managed sites is non-existent or nominal.

This is acknowledged by Management Agencies:

"While an overall decline in the CATE nesting population has occurred since 2008 it is unclear if this is indicative of long term trend in the population or whether this disturbance is temporary in nature due to dissuaded CATEs continuing to seek out new nesting sites." (Draft EA 2013)

7-13 Given continued lack of productivity, the CATE western North America metapopulation will decline beginning with 4-5 years after reproductive failures and adult mortality rate.

7-13 Management Agencies appear comfortable with this reduction given CATE population levels 35 years ago. However, changes in historical environmental conditions, an increase in toxins and the pressure of conflicts with human interests make the manipulation of species populations a dangerous game. A plummeting CATE metapopulation may not be easy to reverse.

7-14 ● **Failings of Current Alternate Sites**

Five years of CATE management action reveals that a number of alternate habitat sites had serious constraints from the beginning, that unsuitable alternate habitat has reduced displaced CATE nesting success, the western CATE metapopulation has declined and presumably thousands of displaced CATE are flying about in search of new nesting locations.

Following is a summary of current managed CATE habitat compiled from data available through on-line OSU Annual Reports and Weekly Field Notes:

<u>Unsuitable Sites</u>

► **Fern Ridge Lake**: This is not a historic tern nesting site and was included in the alternate habitat inventory because the local prey base did not include fish species of concern. (Final CATE EIS 2005) There has been no CATE breeding on Fern Ridge since its construction in 2008 and USACE monitoring of the site ceased in 2012. **The one acre Fern Ridge location should be removed from the alternate habitat inventory and replaced with a suitable site prior to further CATE management actions.**

► **Orems Unit, Lower Klamath**: This site has chronic annual drought issues. There has been no CATE breeding at Orems Unit since its construction in 2009. **The one acre Orems Unit should be removed from the alternate habitat inventory and replaced with a suitable site prior to further CATE management actions.**

► **Dutchy Lake, Summer Lake**: There has been no CATE breeding at this site since its construction in 2009. **The 0.5 acre Dutchy Lake should be removed from the alternate habitat inventory and replaced with a suitable site prior to further CATE management actions.**

► **Gold Dike, Summer Lake:** This site has chronic annual drought and predation issues. Only one failed nesting attempt of 4 CATE pairs in 2012 has occurred at this site since construction in 2009. **The 0.5 acre Gold Dike should be removed from the alternate habitat inventory and replaced with a suitable site prior to further CATE management actions.**

7-15 **<u>Marginal Sites</u>**

■ **Tule Lake:** This **2 acre** site contained no water in its first two years and no CATE nesting success since its construction in 2009. Despite predation issues, it is used as a post-season roost site by CATE from other colonies.

■ **East Link, Summer Lake:** This **0.5 acre** site has supported minimal CATE nesting attempts with no nesting success since its construction in 2009.

■ **Crump Lake:** This **1.0 acre** site was constructed in 2008 with no nesting success until marginal reproduction occurred in 2011-2013. Active lethal predator removal is required and

7-15 low forage fish and drought water levels have plagued this location. For unknown reasons, resource managers have curtailed social attracting methods since 2010 which appears to have suppressed CATE attendance and compounded gull predation.

7-16 **Acceptable Sites**

- **Sheepy Lake:** A **0.8 acre** site constructed in 2010 that has supported acceptable CATE nesting attendance and success. This location also requires lethal predator removal.

- **Malheur:** A **1.0 acre** managed site that supported good CATE attendance and nesting success in its initial year of 2012.

7-17 The complexity and challenges associated with relocating CATE colonies becomes apparent through USACE contracted researcher findings, as follows:

> *"A total of 145 current, former, or potential Caspian tern colony sites were identified in western North America …"*
>
> *"Our results suggested that 41 of these sites (28%) have management potential…"*
>
> *"Of the 41 sites that were considered to have management potential, 13 were considered to have high overall suitability as alternative Caspian tern colony sites…"*
>
> *"Each of these 13 sites, however, ranked poorly in at least one suitability criterion,* ***indicating that some biological conflicts or constraints exist at even the most suitable management sites.****"* **(**Collis et al 2012)

The questionable selection of a number of current managed site locations calls for serious review and replacement actions at this time. Why Management Agencies would attempt to relocate piscivorous birds to regions of historical drought and water war conflicts is confounding. Do you see the total failure of those sites to support CATE? Do you see the immediate positive response of CATE when suitable habitat is made available?

7-18 **IAPMP and Columbia River Estuary CATE Adaptive Management**

WCNC appreciates that Management Agencies have formulated a phased approach to Columbia Plateau actions and are receptive to adaptive management that *"Allows for cessation or reversal of Phase 1 actions, if necessary, through adaptive management."* and that IAPMP monitoring programs will track *"overall populations trends of both ESA-listed salmonids and CATEs."* (Draft IAPMP 2013)

As previously stated, the Draft EA assumes that displaced Columbia Plateau CATE will make use of managed sites created by the Corps Portland District. A number of those managed sites have been unsuitable for CATE since their construction five years ago. Dissuasion of additional

7-18 CATE from the Columbia Plateau will amplify the current deficiency of suitable CATE managed habitat.

a) Adaptive management action in favor of ESI and Columbia Plateau CATE should be applied at this time with an immediate increase of 1.5 acres of nesting habitat on East Sand Island. This is equivalent to one-half of the 3 acres of current unsuitable managed habitat referenced above "►". Pursuant to the CATE Final EIS (USFW 2005), a 2:1 ratio of suitable managed habitat is required to offset reductions in ESI habitat. As new suitable sites are made available and used by CATE, ESI nesting habitat would again be reduced proportionately.

b) No further management of ESI CATE should occur until the alternate habitat provisions of the CATE Final EIS (USFW 2005) have been fully satisfied.

c) No management or dissuasion activity of Columbia Plateau CATE should occur until an additional 0.5 acre of suitable alternate habitat is created and made available to CATE **in conjunction with** hazing activities.

7-19

"Adaptive management principles allow for flexibility and maximization of efficiency and effectiveness within a project. The U.S. Department of the Interior Adaptive Management Work Group defines adaptive management as a process that"

*'…**promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood.** Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to **ecological resilience and productivity. It is not a 'trial and error' process, but rather emphasizes learning while doing** (Williams et al. 2009).' "*

(Draft IAPMP 2013)

CATE have proven their ecological resilience throughout 16 years of intense management and invasive research. Thousands of CATE have been shot, harassed and manipulated in the name of salmon recovery. Human greed destroyed historical bountiful northwest salmon runs and natural avian predators are now adversely caught up in salmon restoration rhetoric.

WCNC strongly urges Management Agencies to immediately initiate these adaptive management actions to protect CATE productivity and metapopulation stability as provided under the CATE Management Plan and the IAPMP.

Thank you for considering our comments.

Sharnelle A. Fee, Director

References:

(Collis, K. et al 2012) - Caspian Tern Colony Site Assessment: Management in Western North America. Final Report: U.S. Army Corps of Engineers – Walla Walla District,

NOAA Fisheries, FCRPS Supplemental Biological Opinion, 9/9/13 Sovereign Review Draft

OSU Annual Reports and Weekly Field Notes, www/birdresearchnw.org

(Roby et al 2013) - Research, monitoring, and evaluation of avian predation on salmonid smolts in the Lower and Mid-Columbia River; final 2012 annual report. Revised: June 26, 2013. BPA, USACE – Portland District, and USACE – Walla Walla District.

(Seto, N. et al 2003) - A review of Caspian tern (*Sterna caspia*) nesting habitat: A feasibility assessment of management opportunities in the U.S. Fish and Wildlife Service Pacific Region. U.S. Department of Interior, Fish and Wildlife Service, Portland, OR.

(Suzuki, Y. 2012) Piscivorous colonial waterbirds in the Columbia River estuary: Demography, dietary contaminants, and management. Ph.D. dissertation, Oregon State University, Corvallis, OR

US Army Corps of Engineers, Walla Walla District, DRAFT Inland Avian Predation Management Plan Environmental Assessment, October 2013

US Army Corps of Engineers, Walla Walla District, DRAFT Inland Avian Predation Management Plan, October 2013

U.S. Fish and Wildlife Service (USFWS) 2005. Caspian tern management to reduce predation of juvenile salmonids in the Columbia River Estuary, Final Environmental Impact Statement. Portland, OR.

Response to comment 7-01

Comment noted.

Response to comment 7-02

The No Action alternative did not meet the Purpose and Need. The remaining alternatives identified (to some degree) did meet the Purpose and Need. This included minimizing impacts to CATEs and other sensitive species. The preferred alternative provided measurable benefits to ESA-listed Salmonids, and did so (as documented in the EA) while minimizing impacts to other species and resources. The phased approach of the preferred alternative only identifies the removal of the colony at Goose Island until suitable new CATE habitat is developed outside the basin. Currently, there is sufficient habitat on the West Coast to support this small number of dissuaded CATEs for the near term. If new habitat is not developed as laid out in the preferred plan, no actions to dissuade the existing colony at Crescent Island will be taken, and the dissuasion efforts at Goose and the at-risk islands can be reversed.

Response to comment 7-03

It is anticipated that CATEs dissuaded from the inland Columbia River Basin region will redistribute themselves across all available nesting habitat on the West Coast, which includes some of the habitat enhancement sites created to support the Corps estuary program. This redistribution is expected to occur somewhat evenly across all sites, and not more heavily on the estuary program sites created by the Portland District - Corps. It has been documented that several of the newly created CATE habitat sites (by the Portland District) have not performed as intended. Where possible, steps are being taken to improve these sites and make them suitable for CATE colonization. In addition, the Portland District has studies underway to identify additional habitat sites to fully meet their estuary plan requirements. That said, the phased approach of the preferred alternative only identifies the removal of one colony at Goose Island in Phase 1. While this habitat enhancement is primarily intended to benefit listed salmonids by encouraging CATEs to nest outside the basin, it is also likely to have benefits to the CATE metapopulation.

Response to comment 7-04

Management actions at the estuary are a related, but separate, action from and outside the scope of this IAPMP. However, estuary actions are included in the cumulative effects analysis on the CATE metapopulation. See response to comment 7-03 for additional information on the adaptive management approach to the development of new habitat enhancement sites. The analysis within the EA indicates that the implementation of this phased approach will also minimize effects to CATEs and other species.

Response to comment 7-05

Comment noted.

Response to comment 7-06

See Section 4.1.3 for the complete evaluation of CATE impacts of the alternatives. This evaluation indicates that CATEs are long-lived and nomadic migratory birds with nesting locations that are rarely permanent. Consequently, they have tendencies for movement to new areas (e.g., newly formed sand bars) for nesting. The EA also points out that it is likely there would be a lag between the time the CATEs are dissuaded from Goose Islands and when they find new nesting areas, but it is expected to be temporary and of short duration.

In addition, it should be noted that the western North America metapopulation has experienced significant growth since the 1960s, and that the potential temporary loss of productivity in the population is not expected to result in a decline in the overall metapopulation.

Response to comment 7-07

As stated in EA Section 4.1.3.3, the project is not anticipated to have significant long-term negative effects to CATEs due in part to the use of a phased approach. Background for this assumption is provided in EA Section 3.1.3. Creation of receiving sites during Phase 2 for the purpose of drawing birds away has a secondary benefit of reducing potential effects to displaced CATEs. As described in EA Section 1.3 and in IAPMP Section 3.7, adaptive management and monitoring will inform future actions and ensure safeguards for proposed displaced CATEs.

Response to comment 7-08

The phased approach is contingent upon the development of additional habitat. No additional action would occur if this habitat is not constructed, and Phase 1 actions may be reversed if needed. While development of additional habitat may not occur until year 3 or later, since it is subject to Congressional appropriation, it is anticipated that the time frame presented in the IAPMP is reasonable given current levels of funding.

Response to comment 7-09

While temporary local impacts to CATEs may be experienced (e.g., the loss of a few years of productivity) due to loss of habitat, this loss is not presumed to be significant. It is anticipated that, in the long-term, CATEs displaced from inland basin sites will relocate to other suitable nesting sites within the western metapopulation. Section 4.1.3 of the EA cites the longevity and nomadic nature of CATEs as factors influencing the opinion that CATEs displaced from dissuasion islands will find new nesting areas.

Response to comment 7-10

Comment noted.

Response to comment 7-11

One half (not one) acre of suitable CATE nesting habitat will be created. IAPMP Section 3.6 describes the habitat enhancement site plan in detail. EA Section 2.2.2.4 also gives background for the 2:1 ratio for habitat enhancement sites. In addition, text was added to EA Section 5.1.1 to expand on reasoning for the 2:1 ratio in relation to the estuary plan. The 2:1 ratio of habitat creation was chosen to provide additional habitat for gulls that may also attempt to nest near CATEs. Creation of habitat enhancement sites for this IAPMP is a separate action from the habitat creation that occurred as a result of the estuary CATE dissuasion plan. High numbers of additional displaced CATEs from the inland plateau are not anticipated to occur due to displacement measures.

Response to comment 7-12

A balanced approach to meeting the need of both ESA-listed salmonids and CATEs as well as other piscivorous waterbirds has been taken for this IAPMP. The Ppurpose and Need of this project as stated in Section 1.3 of the EA is, "to increase survival of ESA-listed juvenile salmonids by reducing predation-related losses from CATE colonies at Crescent and Goose islands." An important component of the project is minimizing impacts to CATEs and other sensitive species. The preferred alternative provides measurable benefits to ESA-listed salmonids, and does so (as documented in the EA Sections 4.1 and 5.1) while minimizing potential effects to other species.

Response to comment 7-13

EA Section 3.1.3.7 discusses productivity of CATEs in the inland basin. Widespread productivity data for the western CATE metapopulation is not available, but local productivity data (e.g., Roby et al. annual reports) does not support the claim that the western CATE metapopulation is plummeting as discussed in EA Section 3.1.3.2. At the present time, there is no population model for CATEs, so it is not possible to predict how changes in productivity might affect the population at large. Widespread data on productivity are not available for CATEs across the western metapopulation, though ongoing monitoring will illustrate CATE population trends and CATE dissuasion actions can be changed according to the adaptive management strategy.

Response to comment 7-14

See the response to comment 7-03 above. Actions in the estuary and inland Columbia River Basin are related, but separate. Habitat enhancement actions in the estuary can be used to inform this effort. Details about out-of-basin habitat enhancement can be found in Sections 2.2.2.4 and 5.1.1 of the EA.

Response to comment 7-15

Comment noted.

Response to comment 7-16

Comment noted.

Response to comment 7-17

IAPMP Section 3.6 describes the habitat enhancement site plan in detail. EA Section 2.2.2.4 also gives information on habitat enhancement sites. Creation of habitat enhancement sites for this IAPMP is a separate action from the habitat creation that occurred as a result of the estuary CATE dissuasion plan. High numbers of additional displaced CATEs from the inland plateau are not anticipated to occur due to displacement measures. Phase 2 is contingent upon finding suitable site(s) and will undergo a supplemental/tiered NEPA analysis. The assumption of this plan is not that displaced CATEs will necessarily be the individuals that use habitat enhancement sites, instead that the creation of one or more of these sites will provide CATE nesting habitat equal to twice the size of the currently used CATE nesting habitat on the dissuasion islands. It is anticipated that CATEs displaced by the IAPMP could disperse throughout the western metapopulation.

Response to comment 7-18

See response to comment 7-17.

Response to comment 7-19

Adaptive management actions proposed in IAPMP Section 3 are dependent upon the results of monitoring and additional investigations during Phase 1 and therefore cannot be initiated at this time.

Colville Confederated Tribes
Fish and Wildlife Department

December 2, 2013

Walla Walla District
U.S. Army Corps of Engineers
ATTENTION: IAPMP Project Manager, PM-PD-PF
201 North Third Avenue
Walla Walla, WA 99362

Via email to avianpredator@usace.army.mil

Re: Confederated Tribes of the Colville Reservation's Comments on Draft Inland Avian Predation Management Plan and Environmental Assessment

Dear IAPMP Project Manager,

8-01

The Colville Confederated Tribes (CCT) appreciates the opportunity to comment on the draft Inland Avian Predation Management Plan ("Plan") and Environmental Assessment (EA) for managing avian predation by Caspian terns in the inland areas of the Columbia River Basin.

The Colville Confederated Tribes is inextricably linked with the Columbia River, which forms the boundary of the Colville Reservation in north-central Washington and since time immemorial has provided the salmon that are the foundation of our sustenance, economy, and culture. CCT possesses federally reserved fishing rights and water rights in the Upper Columbia River basin, both within the Colville Reservation and the North Half of the Colville Reservation. These rights have been confirmed by the federal courts, confer management authority on CCT, and are subject to protection by the U.S. Corps of Engineers, the U.S. Fish and Wildlife Service and other agencies and departments of the United States under the federal trust responsibility (see Antoine v. Washington, 420 U.S. 194 (1975) (federally protected fishing and hunting rights on the former North Half); Colville Confederated Tribes v. Walton, 647 F.2d 42, 48 (9th Cir. 1981) ("preservation of the tribe's access to fishing grounds was one purpose for the creation of the Colville Reservation")).

The avian predation issue is of great importance to CCT. We are deeply concerned about the impact that Caspian terns, double-crested cormorants, and other avian species throughout the Columbia Basin are having on salmon and steelhead populations that we have a federally protected right to harvest and which form a core part of Colville subsistence and ceremonies. Inland avian predation (occurring above Bonneville Dam) is having a disproportionate effect on Upper Columbia River (UCR) steelhead and UCR spring Chinook, both of which are species of particular importance to CCT. As you are probably aware, CCT has made a substantial investment, along with the Corps of Engineers and our other Fish Accord partners, in recovering

8-01 salmon and steelhead in the upper Columbia, including the recent design and construction of the Chief Joseph Hatchery and many habitat restoration projects in the Okanogan River basin which will benefit UCR steelhead and UCR spring Chinook. A management plan for inland avian predation that protects the gains in fish survival we have worked so hard to achieve is essential – for our people's well-being and for the agencies to meet their trust responsibility to uphold the Tribes' rights and interests.

8-02 Through CCT's participation in the Inland Avian Predation Working Group (IAPWG) with other regional sovereigns and federal agencies, CCT has repeatedly advocated for avian management plans in the Columbia Basin that are appropriately "fish-centered," as opposed to "bird-centered," and aggressively take on this major source of juvenile salmonid mortality. Clearly, with over 20 million juvenile salmonids being eaten each year in the Basin by Caspian terns, cormorants and other avian predators (<u>see</u> FCRPS BiOp 2011 Annual Progress Report; draft 2013 Comprehensive Evaluation at 44-46), concerted, near-term management actions are necessary to bring the system into a better balance that reflects the status of salmonids listed under the Endangered Species Act (ESA) and the United States' trust responsibility to the Tribes. We also believe an aggressive, fish-centered approach is necessary in order to meet the goals of the 2008 Federal Columbia River Power System (FCRPS) Biological Opinion (BiOp) and its Reasonable and Prudent Alternatives (RPAs) focusing on avian predation. The BiOp seeks to achieve adult escapement goals identified for ESA-listed salmonids in the Columbia Basin by, among other actions, "develop[ing] an avian management plan (for Double-Crested Cormorants, Caspian Terns, and other avian species as determined by RM&E) for Corps-owned lands and associated shallow water habitat" (FCRPS 2008 BiOp RPA 47). The Tribes are committed to making the FCRPS BiOp work, but avian predation continues to present a major obstacle. An aggressive management plan, with the immediate objective of increasing anadromous fish survival, is required.

Although the Corps' draft Plan is appropriately focused on the BiOp's mandate and protection of ESA-listed salmonids, it also needs to recognize CCT's substantial interests in non-listed salmonids in the Basin. The Colville Reservation occupies 1.4 million acres at the confluence of the Okanogan and Columbia Rivers in north-central Washington. As noted above, CCT has federally protected fishing rights on the Reservation and the North Half, and the Tribes' rights have the same legal standing and cultural and subsistence importance as tribal fishing rights in the lower Columbia. Chief Joseph Hatchery will, at full capacity, produce approximately 2 million summer/fall Chinook and 900,000 spring Chinook annually for release directly from the hatchery on the Columbia and in the Okanogan River.[1] These fish will need to run the gauntlet created by Caspian terns in the inland part of the Basin, in addition to that presented by cormorants, terns and other avian species in the estuary in order to reach the ocean and, ultimately, return to the upper Columbia both to support their wild populations and to fulfill the subsistence and ceremonial needs of the Colville people. In addition to these runs of Chinook,

[1] The hatchery's spring Chinook production will include both Carson stock, which is not ESA-listed, and Methow Composite stock, which will be released as an ESA non-essential experimental population pending federal regulatory approval.

8-02 CCT also depends on UCR sockeye. Harvest of all of these fish under the Tribes' federally protected fishing rights must be protected by the United States. Thus, all of the salmonids which may be impacted by Caspian tern predation in the inland Basin are subject to the Corps' and the U.S. Fish and Wildlife Service's (FWS) trust responsibility to protect the rights and interests of CCT.

8-03 CCT urges the Corps and other federal agencies with avian management responsibilities, such as the FWS, to view avian predation management throughout the Basin as a prime opportunity to achieve substantial gains for listed salmonids. Upon close review of the Plan, CCT supports the Corps' aggressive dissuasion at Goose Island in Year 1, and believes that, along with 100% dissuasion at Crescent Island, this is the appropriate focus, at least for now, of avian predation management in the inland part of the Basin. This Plan (and its supporting EA) is far from perfect, however, and with the goal of improving both the Plan and the Corps' environmental review, CCT offers the following specific comments, concerns and recommendations that should be addressed before the Plan is finalized and implemented.

8-04 1. <u>Permanent Dissuasion at Goose Island</u>. If the Plan's objective of 100% dissuasion of Caspian terns on both Goose Island and Crescent Island with aggressive measures to prevent these birds from recolonizing other inland Basin locations were implemented in a timely and permanent basis, it would be solidly in line with the aggressive, fish-centered approach CCT has advocated for from the beginning. Indeed, in January of this year, the Corps proposed such a plan to the Inland Avian Predation Working Group. Unfortunately, the Plan as currently proposed falls short of this ideal in several respects. In particular, the potential for "cessation or reversal of Phase 1 actions, if necessary" at Goose Island (EA at 13), raises concerns that the Plan will not achieve the necessary long-term benefits to listed salmonids. According to the Draft 2013 Supplemental BiOp prepared by NMFS, the Plan is expected to deliver survival benefits of up to 11.4 percent to UCR steelhead and up to 3.0 percent to UCR spring Chinook in 2014 (EA at 3). As the draft EA acknowledges, "it is estimated that Goose Island [Caspian terns] have had up to a 14.6 percent predation rate on Upper Columbia River steelhead" (EA at 6). Given the substantial impact of the Goose Island Caspian tern colony on UCR steelhead, a reversal of dissuasion actions at this island would be tantamount to snatching defeat from the jaws of victory, namely a highly achievable 4.2% increase in lambda for UCR steelhead. This outcome would be an affront to the hard work and accomplishments of CCT as well as federal agencies, other tribes and states in protecting steelhead and other listed species under this BiOp. Indeed, it is hard to see how such a result would be consistent with the BiOp's command to develop an inland avian <u>management</u> plan and the survival benefits described in the 2013 Draft Supplemental BiOp. CCT urges the Corps to correct this serious hole in the Plan and ensure that Phase 1 dissuasion actions at Goose Island are made permanent, <u>i.e.</u> not subject to reversal or termination based on progress toward habitat enhancement efforts or on other adaptive management considerations.

8-05 2. <u>Active Hazing in Year 1 at Crescent Island and At-Risk Islands</u>. As part of Phase 1, the Plan should provide for active hazing of Caspian terns at both at-risk islands and incipient

8-05

colonies on Crescent Island in Year 1. Currently, the Plan only provides for such hazing in Year 2 if warranted. Successful dissuasion at Goose Island in Year 1 will be nullified if Caspian terns nest in other parts of the inland Basin. The Plan provides for dissuasion activities at other potential Caspian tern colonies, but only after the first year of implementation. This is contrary to the Plan's stated objective of reducing salmonid predation from inland Caspian terns, which should logically seek to prevent such alternate colony development as soon as it could occur (not after it has occurred), especially in locations where interchange with Goose Island Caspian terns has been documented. Neither the Plan nor the EA explain the reason for this, although the Plan states that "nesting gulls may preclude Caspian terns from establishing incipient colonies on [Crescent] Island" (IAPMP at 15). The EA gives contradictory information about whether active hazing will occur at the at-risk islands in Year 1 (compare EA at 33 ("Daily active hazing would occur at any of the islands starting in Year 1, if warranted, and continue until deemed unnecessary.") with EA at 34, Table 2-3 (showing no Year 1 dissuasion actions for at-risk islands)). In light of the Plan's express provision for active hazing of both gulls and Caspian terns outside of the existing colony on Crescent Island in Year 2 (IAPMP at 15), it makes no sense to delay this action and risk the potential colony development in Year 1. If Caspian terns are present in Year 1 at incipient colonies on Crescent Island, they should be actively hazed, just as the Plan calls for in subsequent years. With respect to at-risk islands, CCT agrees with the text of the EA that Year 1 active hazing should occur if warranted i.e., if any additional Caspian terns begin nesting at these locations. If the Corps has concerns about the resources necessary to monitor and conduct active hazing activities at all ten of the identified at-risk islands in Year 1, it should prioritize the four "Highest-Risk Islands" with a recent history of Caspian tern nesting (IAPMP at 32 (identifying Twining, Badger, Blalock and Harper Islands)). By focusing Year 1 active hazing on Crescent Island and the highest risk islands, the Corps can lock-in the gains from Year 1 dissuasion at Goose Island and better protect salmonids beginning with the first year of Plan implementation.

8-06

3. Habitat Enhancement and 2:1 Ratio. A central part of the Plan is the development of alternative Caspian tern habitat outside of the Basin. CCT views this as a valid objective, but not one which should drive the implementation (or possible reversal) of dissuasion at both Goose Island and Crescent Island. In the Corps' January 2013 iteration of the Plan, habitat enhancement was to occur as a component of adaptive management and would not be a condition for implementing dissuasion actions at the two islands. This approach is more sound and is consistent with a fish-centered plan. By making key aspects of the Plan contingent on the development of alternative bird habitat, the Plan takes on a bird-centered character which distracts from and potentially undermines what should be the core objective of protecting fish.

The Plan does not provide a reason for targeting 0.5 acres of suitable nesting habitat outside the Basin for the habitat enhancement component of Phase 2 other than to state that it "represents an area twice the size of the colonies at both Goose and Crescent Islands" (IAPMP at 40). The EA contains little explanation for the selection of a 2:1 ratio for habitat creation to removal areas (EA at 27 (2:1 ratio provides room for nesting Caspian terns and gulls at the new Caspian tern colony)). There is no detailed biological, legal or other basis for the ratio. In fact, it appears to

8-06 be nothing more than a carry-over from the settlement-driven ratio selected for the Columbia River Estuary Caspian tern management plan. However, that plan, which mentions nothing about creating nesting space for both terns and gulls, was finalized nearly a decade ago. Subsequent information about Caspian tern nesting density resulting from management actions at East Sand Island undermines previous conclusions about nesting density and must be considered by the Corps. In addition, it has been suggested that the presence of large numbers of nesting gulls may have led to greater tern nesting density on Crescent Island (see Antolos, M., et al. 2004. Breeding ecology of Caspian terns at colonies on the Columbia Plateau. Northwest Science 78:303-312). The Corps should thoroughly consider and explain in the EA the basis for the 2:1 habitat enhancement ratio, including a discussion of any applicable biological, legal or other grounds for this requirement, and it should address the data from East Sand Island and other recent studies.

CCT is also concerned that challenges in identifying and implementing additional Caspian tern habitat will prevent the Plan from being fully implemented or even risk reversal of Goose Island dissuasion (EA at 13). The Tribes' concern is based on the experience of implementing the estuary management plan for terns, which requires a much larger area of habitat enhancement, and the Corps' investigations during the early phases of developing this Plan. In short, fish, not birds, should be driving implementation of this Plan. The Corps' reliance on habitat enhancement outside the Basin, while laudable, has it backwards.

8-07 4. The Plan Must Be More Fish-Centered. The three points above – each of which highlight areas where the Plan could be more aggressive and fish-centered than the current draft – underscore the largely out-of-sight, but highly influential role of the U.S. Fish and Wildlife Service. This agency, which appears to have minimal desire to improve the status of ESA-listed salmonids which terns and other avians are feasting on throughout the Basin, has expressed concern that the Caspian tern population is in decline and should not be subject to population reduction measures, i.e. "take" under the Migratory Bird Treaty Act. The FWS has never presented a full explanation of its concerns associated with the current status of the Caspian tern population and relies on a highly selective reading of the data to justify its concerns. The western metapopulation of Caspian terns has declined in abundance from its 2009 peak of 18,873 nesting pairs to a 2011 abundance of 11,660 nesting pairs (EA at 56, Table 3-1). Yet information in the EA also demonstrates that the current population on the Pacific Coast has roughly doubled since the early 1980s (EA at 62, Table 3-2). This more complete (and accurate) picture provides a better context for the Plan's effort to dissuade some 800 nesting pairs from Goose Island and Crescent Island.

Early in the development of the Plan, the Corps eliminated lethal take from consideration because it did not "minimize impacts to [Caspian terns]" and "could potentially have a significant impact on Caspian tern metapopulations" (EA at 41-42). While CCT does not support the needless killing of terns or other avian predators, other forms of lethal take besides egg removal should be included in the suite of tools available for protecting salmonids in the Plan. The Corps' effort to limit the Plan's impact on terns strays from the fish-centered approach

8-07

that is needed to immediately reduce tern consumption of listed salmonids. This critical objective has apparently acquiesced to concerns about the Pacific Coast tern population, which over a limited time frame has decreased in abundance despite maintaining more than 10,000 breeding pairs over the past 15 years. This population – for which no abundance goals or baselines have been established – is not protected under the ESA, and in fact, has grown substantially in recent decades. As with many species that have reached their carrying capacity, terns on the Pacific Coast have experienced a wide range of natural flux and remain far more abundant than they were in 1980 (EA at 55-56, 64-65).

These comments with respect to the role of FWS in developing the Plan are made with the understanding that the Corps is the author of this Plan, not FWS. Nonetheless, all federal agencies with a role in salmonid management in the Columbia River Basin (of which the FWS is one) must comply with their trust responsibility to CCT. The Plan as drafted continues to be too bird-centered, and as such, reflects limited respect for the rights and interests of the Colville Confederated Tribes, whose members depend on upper Columbia River salmon and steelhead and who are working diligently with the federal government and other regional sovereigns to protect and recover these fish.

8-08

5. The Plan and Adaptive Management Must Ensure Actual Salmonid Survival Gains. The Plan measures success in terms of colony size and extrapolated predation rates – not in terms of smolt survival (IAPMP at 13, 16 (target metric is predation rate of less than 2% per island on ESA-listed salmonids)). Under the draft Plan, up to 200 pairs of terns may be left in the Basin based on current assumptions regarding colony size and predation rates[2] (IAPMP at 31). The limitations of management objectives measured solely in terms of bird colony size are obvious. Consider that smolt consumption by Caspian terns in the Columbia River estuary is not decreasing in response to nesting habitat reduction on East Sand Island, despite the benefits predicted from a reduction in colony size. According to the 2012 Final Annual Research Monitoring & Evaluation Report, Caspian terns at East Sand Island consumed 4.9 million salmonid smolts in 2012, "similar to 2011" – despite reductions in both habitat area and colony population between 2011 and 2012.[3] Furthermore, the Caspian terns 2011 smolt consumption was "not significantly different from the smolt consumption estimates from the previous two years" (FCRPS BiOp 2011 Annual Progress Report at 20 (despite a 67% reduction in nesting area and a 30% decrease in colony population since the 2008 BiOp, "Caspian terns nesting at the East Sand Island colony consumed about 4.8 million juvenile salmonids (95 percent confidence interval = 4.0–5.6 million) in 2011 — lower but not significantly different from the smolt consumption estimates from the previous two years . . . .")).

Rather than focusing on the size of the bird colony and a predetermined predation rate, Plan objectives should be focused on actual salmonid mortality. This is the appropriately "fish-centered" perspective consistent with the BiOp and CCT's preferred approach. Because the Plan

[2] The Plan and EA should clarify whether the 200-pair threshold for adaptive management is inland Basin-wide or only includes birds on the at-risk islands (Compare IAPMP at 9, 27 and 31).
[3] http://www.birdresearchnw.org/Feature-Story/428354.aspx

8-08 does not require immediate improvement in salmonid survival rates, as CCT believes is necessary, it should include rapidly achievable adaptive management measures if improvements in salmonid survival do not meet those predicted by the 2011 Benefits Analysis.

8-09 6. Tribal Involvement in Plan Implementation, Coordination and Adaptive Management. Consistent with the Corps' trust responsibility to CCT and the Tribes' significant stake in the recovery of UCR salmonids affected by inland avian predation, we expect to be involved in the implementation of this Plan, adaptive management analysis and decisions, and the ongoing effort to minimize mortality of listed salmonids, especially from avian and other predators. Wherever the Plan provides for coordinated implementation, CCT and other tribes with federally protected rights and management authorities should be specifically referenced (IAPMP at viii referencing coordination with stakeholders and resources agencies, but not tribes). In particular, CCT should be specifically referenced as part of the discussion of the Adaptive Management Plan Work Group (IAPMP at 41, (referencing Action Agencies, resource agencies, and other interested parties, but not tribes)). As an active participant in the Inland Avian Predation Working Group, CCT proposes that this group form the basis for adaptive management under the Plan. The IAPWG should continue to meet regularly, particularly during tern nesting and breeding season, to review the results of research and monitoring at Goose, Crescent and the at-risk islands including progress reports on dissuasion efforts and any relocation within the inland Basin of dissuaded birds. These meetings provide co-managers with real-time information necessary to fully consider potential adaptive management actions as this Plan is implemented.

8-10 7. The Plan and EA Must Recognize CCT's Federally Protected Fishing Rights. Although the EA acknowledges fishing by the Colville Tribes "above Priest Rapids Dam" (EA at 102), it should include more detail about the Tribes' federally protected rights in the subsequent sections regarding Tribal Management Authority and Importance of Fisheries. As noted above, CCT's fishing rights on the Reservation portions of the Okanogan and Columbia Rivers are protected by an executive order and a congressionally approved agreement with the United States.[4] They have the same legal standing, reflect equally vital subsistence, cultural, and spiritual importance and confer the equivalent management authorities as the treaties of the Lower Columbia River tribes. As with tribal fisheries in the lower Columbia, CCT's upper Columbia fisheries are managed in coordination with the State of Washington (2012 Joint Status Report at 29).[5] A significant difference that should be noted when correcting this oversight is that CCT has chosen to manage its fisheries strictly for ceremonial and subsistence purposes in an effort to perpetuate and increase the runs of upper Columbia River salmonids, including summer/fall Chinook, steelhead and sockeye.

* * *

[4] To accurately characterize tribal fisheries on the Columbia River, the first sentence under the heading Importance of Fisheries should be changed from "Treaty fisheries" to "The exercise of federally protected fishing rights".
[5] http://wdfw.wa.gov/publications/01353/wdfw01353.pdf.

8-11 The Colville Confederated Tribes appreciates the opportunity to comment on the draft Inland Avian Predation Management Plan and EA, and urges the Corps to make the improvements in the Plan recommended above so that it can provide both near-term and permanent benefits for fish. Please do not hesitate to contact me with any questions.

Sincerely yours,

12/2/13

Randall Friedlander
Interim Program Director
CCT Fish & Wildlife Department

cc: Sondra Ruckwardt, Portland District, U.S. Corps of Engineers

Response to comment 8-01

Comment noted.

Response to comment 8-02

A balanced approach to meeting the need of both ESA-listed salmonids and CATEs as well as other piscivorous waterbirds has been taken for this IAPMP. The Purpose and Need of this project, as stated in Section 1.3 of the EA, is "to increase survival of ESA-listed juvenile salmonids by reducing predation-related losses from CATE colonies at Crescent and Goose islands." An important component of the project is minimizing impacts to CATEs and other sensitive species. The preferred alternative provides measurable benefits to ESA-listed salmonids, and does so (as documented in the EA Sections 4.1 and 5.1) without significant impacts to other species.

Response to comment 8-03

Comment noted.

Response to comment 8-04

The Purpose and Need as stated in Section 1.3 of the EA includes the statement, "In addition to providing substantial and achievable benefits to ESA-listed salmonids, the IAPMP actions should minimize impacts to CATEs, which are protected under the Migratory Bird Treaty Act (MBTA), as well as other resources and species of concern, in compliance with all applicable laws." The preferred alternative provides measurable benefits to ESA-listed salmonids, and does so (as documented in the EA Sections 4.1 and 5.1) while minimizing potential effects to other species. EA Section 2.2.2 gives a rationale for the phased approach. Primary benefits of this approach are that it promotes adaptive management and flexible decision making. Additional benefits of the phased approach are that a major portion of the benefits to ESA-listed salmonids will be achieved in Phase 1, while at the same time resolving uncertainties and allowing for cessation or reversal of Phase I actions.

Response to comment 8-05

Active hazing may not be warranted during year 1, and it will not be known if it will be warranted until after gulls begin to nest. Therefore, active hazing would begin at earliest in year 2 as discussed in EA Section 2.2.2.

Response to comment 8-06

Text was added to Section 5.1.2 to clarify the rationale for the 2:1 ratio. EA Section 2.2.2.4 states the purpose of habitat enhancement sites: "To provide adequate nesting habitat for the number of CATEs dissuaded from Goose and Crescent Islands as well as room for nesting gulls that may nest around the periphery of a new CATE colony." The development of enhancement sites is not directly tied to the continuation into Phase 2, but is an important component of the decision whether to move forward or reverse previous actions.

Response to comment 8-07

The Purpose and Need as stated in Section 1.3 of the EA includes the statement, "In addition to providing substantial and achievable benefits to ESA-listed salmonids, the IAPMP actions should minimize impacts to CATEs, which are protected under the Migratory Bird Treaty Act (MBTA), as well as other resources and species of concern, in compliance with all applicable laws." The preferred alternative provides measurable benefits to ESA-listed salmonids, and does so (as documented in the EA Sections 4.1 and 5.1) while minimizing potential effects to other species. Additionally, habitat enhancement sites help reduce predation by encouraging nesting outside the basin.

Response to comment 8-08

Using number of birds as a proxy, and validating as necessary, allows the Action Agencies to directly measure the success of actions outside of the effects of other projects and environmental factors. If CATE colony size on at-risk islands reaches 40 pairs, measurement of fish consumption rates may be employed as part of adaptive management, if deemed necessary.

Response to comment 8-09

Text was added to Section 7.1: "The IAPWG will likely form the basis of an Adaptive Management Working Group that will include tribes."

Response to comment 8-10

Language regarding "Treaties with Native American Tribes" has been added to Section 6, which states:

Treaties with Native American Tribes

Treaties between the United States and regional tribes document agreements reached between the Federal government and the tribes. In exchange for ceding much of their ancestral land, the government established reservation lands and guaranteed that the government would respect the treaty right, including fishing and hunting rights. These treaties, as well as statutes, regulations, and national policy statements originating from the Executive Branch of the Federal Government provide direction to Federal agencies on how to formulate relations with Native American tribes and people. Treaties with area tribes explicitly reserved unto the Tribes certain rights, including the exclusive right to take fish in streams running through or bordering Reservations, the right to take fish at all usual and accustomed places in common with citizens of the Territory, and the right of erecting temporary buildings for curing, together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed lands. These reserved rights include the right to fish within the project area identified in the IAPMP/EA.

Response to comment 8-11

Comment noted.

IDAHO DEPARTMENT OF FISH AND GAME
600 S Walnut / P.O. Box 25
Boise, Idaho 83707

C.L. "Butch" Otter / Governor
Virgil Moore / Director

November 29, 2013

Walla Walla District, Corps of Engineers
ATTN: PM-PD-PF, IAPMP Project Manager
201 North Third Avenue
Walla Walla, WA 99362-1876

9-01

The Idaho Department of Fish and Game (IDFG) appreciates the opportunity to review and comment on the draft Environmental Assessment (EA) and draft Finding of No Significant Impact related to proposed activities by the U.S. Army Corps of Engineers (Corps) to manage avian predators in the Columbia and Snake rivers. Idaho believes the Corps has conducted appropriate research to document predation impacts by Caspian terns in the upper Columbia and Snake Rivers and that the proposed actions to manage abundance of these birds are consistent with well-documented and successful actions in other locations. We also conclude that the impacts and environmental effects of the proposed actions are minor and small in scope, and support the draft finding of No Significant Impact.

Per direction in the 2008 FCRPS Biological Opinion, the Corps has developed an Inland Avian Predation Management Plan (IAPMP) which includes assessments of migratory bird predation impacts to Endangered Species Act (ESA)-listed fish species in the Columbia and Snake rivers. Data referenced in the draft EA indicate that Caspian terns were found to be the most significant avian predator on ESA listed fish stocks in the Upper Columbia and lower Snake rivers, and that reducing predation rates will result in measurable improvement of survival for emigrating steelhead and Chinook salmon smolts. Management actions that reduce avian predation in the Columbia and Snake rivers will work collectively with other conservation and recovery actions that are being implemented to the benefit of ESA listed fish stocks. Managing avian predation will provide direct benefits that result in improved in-river fish migration conditions and fish survival.

The Corps' proposal focuses on use of various non-lethal dissuasion techniques (hazing, flagging, fencing, vegetation plantings, and physical alteration) on two Caspian tern nesting islands (Goose Island in Potholes Reservoir, WA and Crescent Island in McNary Reservoir on the Columbia River) to reduce occupancy and production by terns. Our understanding is that physical alteration of nesting islands will occur outside of the nesting season and that active hazing and some level of egg removal may occur during the nesting season in support of non-lethal methods. Any lethal take of Caspian terns or their eggs will occur under depredation permit authority of the U.S. Fish and Wildlife Service (FWS).

9-02

IDFG recognizes the Corps' obligation and commitment to identify and manage a broad range of factors related to construction and operation of Corps facilities that can directly or indirectly affect ESA-listed fish. We agree that under some circumstances predation by piscivorous migratory birds is an important factor in overall mortality of ecologically or economically important fish stocks. Furthermore, habitats

9-02 created as a result of construction or maintenance of federal projects and associated river channels and impoundments, including the islands identified in this proposal, often serve as artificial nesting and loafing habitat that enhance predator abundance above natural background levels. Where data indicate that predation impacts are significant, management of avian predators should be included in the suite of federal actions directed towards recovery of ESA-listed fish, especially where federal actions are responsible for creation or enhancement of habitat that supports predator populations above historic natural levels.

Questions related to this correspondence may be directed to Jeff Dillon of my staff ((208) 334-3791, jeff.dillon@idfg.idaho.gov).

Sincerely,

Ed Schriever, Chief
Bureau of Fisheries
Idaho Department of Fish and Game

Response to comment 9-01

Comment noted.

Response to comment 9-02

Comment noted.

COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION
700 NE Multnomah Street, Suite 1200
Portland, Oregon 97232
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December 4, 2013

Lieutenant Colonel Andrew D. Kelly
District Commander, Walla Walla District
Army Corps of Engineers
201 N. 3rd Avenue
Walla Walla, WA 99362-1876

RE: Draft Inland Avian Predation Management Plan and Environmental Assessment

Dear Lt. Colonel Kelly:

10-01 The Columbia River Inter-Tribal Fish Commission (CRITFC) appreciates the opportunity to provide comments on the draft Inland Avian Predation Management Plan and Environmental Assessment (EA) to manage avian predation by Caspian terns (terns) in the inland region of the Columbia River Basin. Avian predation on anadromous fish throughout the Columbia River Basin is a significant barrier to restoration of these fish which are fundamental First Foods for the Columbia River tribes. Thus, the CRITFC tribes are very concerned about the future management of avian predators.

10-02 CRITFC has worked for years with the federal and state agencies, and university researchers, to craft a solution to reduce the relentless losses from terns on out-migrating juvenile salmonids. Tern predation of steelhead and spring chinook in the Upper Columbia River has been reported at 14.6% and 3.0% respectively (Lyons et al. 2011). Additionally, Evans et al. (2013) estimated that terns nesting on Goose Island at Potholes Reservoir consumed between 12.8% and 20.8% of all PIT-tagged juvenile steelhead migrating between Rock Island and McNary dams in years 2008-2010.

10-03 Efforts by CRITFC member tribes to restore anadromous salmonids have spanned decades and cost the region hundreds of millions of dollars, yet the presence of even a few hundred pairs of terns limit recovery efforts. The currently preferred alternative in the EA, Alternative D, would not remove any terns from the inland region, but would merely haze them from their nesting habitat at Goose and Crescent islands. While some egg take is allowed, this alternative still falls significantly short of what is needed to curb predation rates.

10-04 Alternative D, at best, is a stop-gap approach to a problem that begs for a permanent solution. The alternative would provide temporary relief from predation through hazing and habitat modification, but if out-of-basin habitat is not developed, habitat alterations would be reversed. So in theory, a multi-year effort that could be successful in reducing predation on listed stocks of Upper Columbia River steelhead and spring chinook could be undermined without a suitable replacement strategy.

10-05 Secondly, the alternative does not permit intentional hazing at Goose and Crescent islands, as well as the at-risk colony sites, during the first year. Instead, the alternative calls for hazing in the second year only, after the initial program is unsuccessful. This course of action does not protect ESA-listed fish and may exacerbate avian predation rates. Instead, the agencies should incorporate a more aggressive campaign of hazing at all potential nesting sites during the first year to ensure that the program is successful; i.e., to reduce losses of juvenile salmonids from Caspian terns.

10-06 Alternative D does not require regular communication network with the Inland Avian Predation Working Group (IAPWG) members to ensure progress of the selected alternative. Without regular updates, the tribes, who are co-managers of the fisheries resource, are left out of management processes. This impedes the tribes in exercising their co-management duties. In addition, the Corps owes a duty of Trust to protect the tribes' treaties and their treaty resources. To date, management of avian predation has been strongly biased in favor of protecting the birds to the detriment of the fish. While tribes and public utility districts were proponents of more aggressive and permanent solutions, the wildlife agencies, especially USFWS have advocated on behalf of birds, and the Corps has not stepped up to protect the trust resources.

10-07 Salmon and steelhead are treaty resources with financial value and intangible ceremonial significance. Predation of out-migrating juvenile steelhead from the Upper Columbia River has become a particular concern to our member tribes because the number of adult steelhead harvested in the Zone 6 fishery often limits the number of the more abundant fall chinook that can be harvested. In effect, if more juvenile steelhead are eaten by terns in the Upper Columbia River, fewer adult steelhead and consequently fewer adult fall chinook may be harvested in the Zone 6 fishery by tribal members.

10-08 In closing, we would like to emphasize that avian predation management should not be handled separately and in isolation as a Walla Walla District-specific issue, but needs to be part of a regional Division approach to actively manage avian predation on fisheries, both inland and in the Columbia River estuary.

Thank you for your time and consideration. If you have any questions, please contact CRITFC staff, Blaine Parker, at 503-238-0667.

Sincerely,

Babtist Paul Lumley
Executive Director

Cc: Tim Fleger, IAPMP Project Manager

Literature Cited

Evans, A.F., N.J. Hostetter, and K. Collins. 2013. Caspian Tern Predation on Upper Columbia River Steelhead in the Priest Rapids Project: A Retrospective Analysis of Data from 2008 – 2010.

Lyons, D.E., D.D. Roby, J.Y. Adkins, P.J. Loschl, L.R. Kerr, and T.K. Marcella. 2011b. Impacts of piscivorous birds on native anadromous fishes in the Mid-Columbia River. Pages 38 – 63 in Roby, D.D. (ed.). Impacts of avian predation on salmonids smolts from the Columbia and Snake Rivers: A synthesis report to the U.S. Army Corps of Engineers Walla Walla District. Bird Research Northwest.

Response to comment 10-01

Comment noted.

Response to comment 10-02

Comment noted.

Response to comment 10-03

The current preferred alternative would allow for dissuasion of CATEs from nesting islands from which there are negative impacts on ESA-listed salmonids. Habitat enhancement sites will be created outside the inland basin and in areas where ESA-listed salmonid conflicts are not a significant issue. The Adaptive Management Plan discusses the process for dealing with unforeseen circumstances such as the movement of dissuaded CATEs to other sites within the inland basin. Several of the potential CATE relocation sites within the inland basin are discussed in Section 2.7, The At-Risk Islands Plan.

Response to comment 10-04

As described in EA Sections 1.2.1 and 1.2.2, long-term positive effects to ESA-listed salmonids are anticipated with implementation of the preferred alternative using a phased approach.

Response to comment 10-05

Hazing is permitted on Goose Island in the first year and Crescent Island starting the second year. A rationale for this phased approach is given in EA Section 2.2.2.

Response to comment 10-06

As noted in IAPMP Section 3.7, semi-regular updates will be provided to the Adaptive Management Working Group as part of the adaptive management process.

Response to comment 10-07

Comment noted.

Response to comment 10-08

The adaptive management coordination process is described in IAPMP Section 3.7. Tribes were added to the list of those likely to be involved in the working group. The description of the process of adaptive management coordination is expanded in Section 3.7.

November 27, 2013

Walla Walla District, Corps of Engineers
ATTN: PM-PD-PF, IAPMP Project Manager
201 North Third Avenue
Walla Walla, WA 99362-1876

Dear IAPMP Project Manager:

11-01 The Public Utility District No. 2 of Grant County, Public Utility District No. 1 of Douglas County, Public Utility District No. 1 of Chelan County and the Yakama Nation, thank you for the opportunity to review and comment on the recently released Inland Avian Predation Management Plan (IAPMP) and associated draft Environmental Assessment. We appreciate the U.S. Army Corps of Engineers (ACOE) efforts in developing a plan that attempts to address the very complex issue of avian predation and its detrimental effects on juvenile salmonid survival.

11-02 As you are aware, the magnitude of avian predation on juvenile salmonids in the Columbia River Basin is significant. The Final 2012 Annual Report prepared for the ACOE on Avian Predation on Salmonid Smolts in the Lower and Mid-Columbia River (Roby et al. 2013) highlights the seriousness of the issue. The report indicates piscivorous birds consumed nearly 24 million juvenile salmonids in the Columbia River estuary in 2012, with similar estimates for 2011. An additional 1 to 2 million juvenile salmonids are estimated to be consumed annually in the Columbia Plateau region. We understand it is avian predation on the Columbia Plateau, or inland portion of the Columbia Basin, that the IAPMP is intended to address.

11-03 While the IAPMP addresses avian predation more broadly, of specific concern to us is the impact of Caspian terns on the survival of juvenile Upper Columbia River (UCR) steelhead and spring Chinook, both of which are listed under the federal Endangered Species Act (ESA). The effects of Caspian tern predation on these species are well documented. As noted in the IAPMP, annual estimates of tern predation on UCR steelhead and spring Chinook have been reported at 14.6% and 3.0%, respectively (Lyons et al. 2011). Additionally, Evans et al. (2013) estimated that Caspian terns nesting on Goose Island at Potholes Reservoir consumed between 12.8% and 20.8% of all PIT-tagged juvenile UCR steelhead migrating between Rock Island and McNary dams in 2008-2010. More recently, research funded through the Priest Rapids Coordinating Committee[1] shows that in 2013, 14.9% of PIT-tagged juvenile UCR steelhead released below Rock Island Dam were consumed by Caspian terns nesting on Goose Island (PRCC Meeting Minutes 10/30/2013).

11-04 In light of the aforementioned studies, we feel swift and decisive action must be taken to reduce the level of Caspian tern predation on ESA listed juvenile UCR steelhead and spring Chinook. We understand that the IAPMP's Preferred Alternative (D) includes habitat modification and hazing combined with limited egg removal at both Goose and Crescent Islands, however, we do not believe these measures will lead to the type of reduction in the size of the Caspian tern population that is needed to substantially reduce

[1] The Priest Rapids Coordinating Committee (PRCC) is comprised of NOAA-Fisheries, US Fish and Wildlife Service, Washington Department of Fish and Wildlife, Yakama Nation, Colville Confederated Tribes and Grant PUD representatives who oversee implementation of the Priest Rapids Salmon and Steelhead Settlement Agreement and implementation of 2008 NOAA-Fisheries Biological Opinion for the Priest Rapids Project (FERC 2114).

11-04 predation on juvenile salmonids in the inland portion of the Columbia Basin. We are concerned that Alternative D will simply result in Caspian terns dispersing to other nesting locations within the Columbia Plateau with little, if any, measurable reduction in either tern numbers or juvenile salmonid predation rates.

11-05 We suggest that the federal action agencies implement a more aggressive approach to mitigating the negative impacts of the federal dredging and irrigation programs on juvenile salmon and steelhead populations by reducing the population of Caspian terns nesting on the Interior Columbia Basin. Such an approach should involve six main elements: 1) more significant reductions in available nesting habitat at all potential nesting locations in the Interior Columbia Basin, 2) immediately planting native vegetation on all new or existing dredge spoil islands to deter nesting, 3) measures that substantially reduce nest success in areas where terns are found to be nesting including egg removal, addling eggs and hazing terns away from nesting sites, 4) measures to relocate terns outside the Interior Columbia Basin, 5) an expedited schedule for implementing the aforementioned measures at Crescent Island, and 6) monitoring and adapting the plan as necessary to ensure the salmon and steelhead consumption by terns is significantly reduced to acceptable levels. We feel these measures are needed to reduce Caspian tern numbers and associated predation rates and will result in a more appropriate balance between terns and ESA-listed UCR steelhead and spring Chinook.

11-06 Like the federal action agencies, we have invested considerable time, effort, and financial resources in recovering Columbia Basin salmon and steelhead populations in recent years. While we have made considerable progress, we believe avian predation remains a serious threat to achieving a full and sustained recovery for species such as UCR steelhead and spring Chinook. The Caspian tern population in the Interior Columbia Basin has grown significantly as irrigation development and the creation of dredge spoil islands by the federal action agencies have increased the available nesting habitat. Because of the large number of terns in the interior Columbia Basin, the predator-prey relationship is out of balance and needs to be shifted to more appropriately reflect the state of ESA-listed salmonid populations. We urge the ACOE and the other federal action agencies to mitigate the unintended impact of their irrigation and dredging operations on salmon and steelhead populations through the expedited reduction in tern predation throughout the interior Columbia Basin.

Sincerely,

Tom Dresser
Fish, Wildlife & Water Quality Manager
Public Utility District No. 2 of Grant County, Washington

Shane Bickford
Natural Resources Supervisor
Public Utility District No 1 of Douglas County, Washington

Keith Truscott
Natural Resources Director
Public Utility District No 1 of Chelan County, Washington

Paul Ward
Manager of Yakama Fisheries
Yakama Nation

cc: Priest Rapids Coordinating Committee
Randy Friedlander – Interim Fish and Wildlife Program Director – Colville Confederated Tribe
Kirk Truscott –Fisheries Biologist - Colville Confederated Tribe
Stephanie Utter – Field Office Manager - USBOR – Ephrata
Mike Beckwith – Resource Manager – USBOR – Ephrata
Mike Lesky – Natural Resource Specialist – USBOR – Ephrata
Jim Brown – Region 2 Director – Washington Department of Fish and Wildlife
Jeff Korth – Regional Fisheries Manager - Washington Department of Fish and Wildlife
Matt Monda – Regional Manager - Washington Department of Fish and Wildlife
NR – Records – Grant PUD

Literature Cited.

Evans, A.F., N.J. Hostetter, and K. Collins. 2013. Caspian Tern Predation on Upper Columbia River Steelhead in the Priest Rapids Project: A Retrospective Analysis of Data from 2008 – 2010.

Lyons, D.E., D.D. Roby, J.Y. Adkins, P.J. Loschl, L.R. Kerr, and T.K. Marcella. 2011b. Impacts of piscivorous birds on native anadromous fishes in the Mid-Columbia River. Pages 38 – 63 in Roby, D.D. (ed.). Impacts of avian predation on salmonids smolts from the Columbia and Snake Rivers: A synthesis report to the U.S. Army Corps of Engineers Walla Walla District. Bird Research Northwest.

Priest Rapids Coordinating Committee Meeting Minutes. October 30, 2013. PowerPoint presentation by Oregon State University, Real Time Research and USGS to the Priest Rapids Coordinating Committee.

Roby, D.D. , K. Collis, D.E. Lyons, J.Y. Adkins, Y. Suzuki, P. Loschl, T. Lawes, K. Bixler, A. Peck-Richardson, A. Patterson, S. Collar, N. Banet, K. ickson, G. Gasper, L. Kreiensieck, K. Atkins, L. Drizd, J. Tennyson, A. Mohoric, A. Evans, B. Cramer, M. Hawbecker, N. Hostetter, J. Zamon, and D. Kuligowski. 2013. Research, monitoring, and evaluation of avian predation on salmonid smolts in the lower and mid-Columbia River. Final 2012 Annual Report. Revised: June 26, 2013. Bonneville Power Administration, Army Corps of Engineers – Portland District, and Army Corps of Engineers – Walla Walla District. 239 pp.

Response to comment 11-01

Comment noted.

Response to comment 11-02

Comment noted.

Response to comment 11-03

Comment noted.

Response to comment 11-04

The current preferred alternative allows for dissuasion of CATEs from nesting islands from which there are negative impacts on ESA-listed salmonids, including at-risk islands (see IAPMP Section 2.7). It is anticipated that dissuaded CATEs will disperse to locations outside the Columbia River Basin. However, it is impossible to accurately predict where dissuaded CATEs will relocate. Monitoring of inland basin sites will assess CATE movements and, if necessary, predation rates on ESA-listed salmonids. If dissuaded CATEs relocate within the basin, adaptive management actions will be taken depending on the circumstances (e.g., ESA-listed salmonid predation at the new site, landowner coordination).

Response to comment 11-05

The six elements suggested in this comment are addressed as follows. For comments 1 and 2: All potential nesting areas in the interior Columbia River Basin need not be addressed to achieve a significant reduction in predation rates on ESA-listed salmonids. The Benefits Analysis (Lyons et al. 2011) showed that the greatest reduction to ESA-listed salmonid predation would be gained by management of CATE predation. EA Section 1.2.2 (Research and Studies) describes results of the Benefits Analysis. Suggestions given in comment 3 (egg removal and hazing CATEs away from nesting sites) are already part of the proposed actions while addling eggs is not as effective at dissuading birds as egg removal. Comment 4 (measures to relocate CATEs outside the Interior Basin) is not covered in the Purpose and Need of this project (EA Section 1.3) "to increase survival of ESA-listed juvenile salmonids by reducing predation-related losses from CATE colonies at Crescent and Goose islands," though measures such as social attraction will be employed in an attempt to attract terns to habitat enhancement sites. Comment 5 (expedite the Crescent Island schedule) is not preferred because the current alternatives allow for the reversal of Phase 1 actions based on progress. An expedited Crescent Island schedule would not allow for reversal of Phase 1 actions because some of the actions (e.g., tree planting) are difficult to reverse. Comment 5 (monitoring and adapting the plan as needed to ensure acceptable predation levels) is described in the Adaptive Management Plan.

Response to comment 11-06

The preferred alternative provides measurable benefits to ESA-listed salmonids, and does so (as documented in the EA Sections 4.1 and 5.1) without significant impacts to other species. The phased approach of the preferred alternative only identifies the removal of one colony at Goose Island until suitable new CATE habitat is developed outside the basin. An expedited schedule would not allow for reversal of Phase 1 actions, a critical part of this plan.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
911 NE 11th Avenue
Portland, Oregon 97232-4181

In Reply Refer to:
FWS/R1/MBHP

NOV 27 2013

Walla Walla District, Corps of Engineers
ATTN: IAPMP Project Manager, PM-PD-PF
201 North Third Avenue
Walla Walla, Washington 99362-1876

Dear Project Manager:

12-01 Thank you for the opportunity to review and provide comments on your draft Finding of No Significant Impact (FONSI) and Environmental Assessment (EA) prepared for the Inland Avian Predation Management Plan (IAPMP).

Let me first commend the U.S. Army Corps of Engineers' (Corps) involvement with stakeholders and commitment to science during the development of the IAPMP and draft EA. It is clear that science is a key foundation in your planning efforts, focusing on specific species and sites in which actions to lower predation rates would likely improve recovery of Endangered Species Act (ESA)-listed salmonids. The U.S. Fish and Wildlife Service (Service) appreciates the opportunity to have had several representatives involved with the Inland Avian Predation Working Group, working closely with you and numerous representatives from other Federal, Tribal, State, and County agencies, and researchers. The public outreach conducted by the Corps is impressive. The Service urges you to continue this close coordination and communication as you move forward into implementation.

We have compiled comments from our Migratory Birds, Ecological Services, Refuges, and Fisheries programs below.

Overall Comments

12-02

1. All action alternatives include adaptive management actions to limit Caspian terns (CATE) from forming new colonies and/or expanding existing colonies in the Columbia River Basin as well as habitat enhancement to attract CATEs to areas outside the basin. These habitat management actions for attraction or dissuasion may fulfill the Purpose and Need of your proposed action, but may have indirect effects to other endangered, threatened, and sensitive species across multiple ownerships (e.g., National Wildlife Refuges and Tribal lands). The Service appreciates the Corps' acknowledgement of coordination needs on Service-owned lands. This coordination is important to ensure that proposed management actions would not be in conflict with the established purpose of a National Wildlife Refuge (NWR) System unit or its Comprehensive Conservation Plan. For example, Refuge System lands administered by Umatilla NWR have been identified as at-risk of incipient colonies and San Juan NWR (Smith and Minor islands) and San Diego NWR have been identified as possible habitat enhancement sites.

12-02 Although a phased approach for habitat enhancement and at-risk islands habitat modification is indicated, a "programmatic" analysis should be completed in this EA to further identify the range of potential actions (public closure/signage, fencing, predator control, hazing, habitat creation, substrate modification, etc.) that could occur in the future. The Service affirms the need for the Corps' commitment to supplement National Environmental Policy Act and Endangered Species Act compliance prior to implementation of habitat enhancement or at-risk islands habitat modification actions by thoroughly analyzing potential impacts.

12-03 2. The draft EA states the Corps expects the effects of the action to result in a "may affect, not likely to adversely affect" determination for designated critical habitat for the bull trout. However, there was little detail on the rationale behind this determination. The Service suggests that the Corps evaluate the effects of the proposed action to designated critical habitat for the bull trout by each primary constituent element (see October 18th 2010 final rule designating critical habitat, page 63931, <http://www.fws.gov/pacific/bulltrout/pdf/BTCHFR101810.pdf>).

12-04 3. The Service is engaged with Chelan, Douglas, and Grant Counties Public Utility Districts' (PUDs) hydroelectric dams operations on issues associated with implementation of flows and power generation, hatchery supplementation, fish passage, and other activities. These are governed through a number of agreements, conservation initiatives, a habitat conservation plan, ESA Section 7 consultation on the relicensing of these dams, anadromous fish agreements, and other settlement agreements. The Service recommends that the Corps coordinates with the PUDs to carefully review these other agreements or consultations to ensure that there are no conflicts with the proposed IAPMP. Please continue this coordination as you move into implementation of the IAPMP.

Specific Comments

12-05 1. Section 2.2.2.4, Out-of-Basin Habitat Enhancement, Page 26. The Service suggests specifically mentioning known CATE breeding sites that will not be considered for habitat enhancement due to known high ESA-listed salmonid predation rates, e.g. islands in the Columbia River Estuary.

12-06 2. Section 4.1.4, Other Birds, Page 109. Nine islands are designated critical habitat for streaked horned larks in the lower Columbia River (below Bonneville Dam); specifically Miller Sands, Rice Island, Sandy Island, and Pillar Rock are mentioned in Table 3-4. Efforts to eliminate or move CATE colonies may be in conflict with needs to protect habitat for the lark. Please describe the coordination between the Corps' Portland District's current and foreseen avian predation management program on these islands with this IAPMP and ESA Section 7 consultation. Habitat enhancement at other identified locations (Grays Harbor and several of the locations in California) may have adverse impacts on other ESA-listed species such as the western snowy plover and the California least tern. The Corps should fully describe the actions and impacts anticipated to these species in the supplemental analysis.

12-07 3. Section 4.1.6, Mammals, Page 113. Mammalian predator control, another aspect of habitat enhancement, is briefly mentioned as a potential action but few details are provided. Depending on the techniques employed and the non-target species potentially exposed, the Service may not agree that the impacts to mammals and other taxa "would have no significant impact." To the contrary, adverse effects to listed species, including mortality, may occur. The Service strongly recommends that the Corps explicitly describe the type of predator control actions that may be used, especially those involving the use of traps, snares, or poisons.

12-08 4. Section 5.1.2, Caspian Terns, Page 135. Change the stated objective of the East Sand Island breeding population from between 3,200 and 4,000 pairs to the modified preferred objective of 3,125 to 4,375 pairs in the Service's and Corps' Records of Decision for Caspian Tern Management to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary. Additionally, we recommend against comparing impacts between the actions in the Columbia River Estuary and the inland Columbia River Basin in the cumulative impact analysis section. The cumulative impacts section should analyze the combined effects of all past, current and foreseeable actions impacting CATE rather than comparing whether one action has more impact over another.

Sincerely,

Acting

Regional Director

Response to comment 12-01

The USFWS will be included in future communication on this subject

Response to comment 12-02

There is a programmatic component to this EA (future sites, etc.) that will require supplemental/tiered NEPA in the future, but a programmatic review as requested in this comment is not necessary or warranted, given the proposed project and stated Purpose and Need. The EA Section 2.2 specifies that site-specific NEPA analysis will be conducted once the enhancement sites have been identified. The EA (Section 5.1) includes the appropriate programmatic analysis of possible effects associated with enhancement sites. These likely (general) effects will be identified at the programmatic level. Other types of actions (e.g., inclusion of fencing or any other structures) would require additional site specific analyses.

Response to comment 12-03

Detailed analysis of effects on individual bull trout and critical habitat PCEs is presented in the BA, which received concurrence by USFWS on January 6, 2014. Additional detail on the BA and the consultation process has been included in this section.

Response to comment 12-04

The PUDs have been part of the Inland Avian Predation Working Group, and the Action Agencies will continue to work with them throughout the implementation of the IAPMP. The cumulative effects (Section 5) has been revised to include the PUD's conservation efforts.

Response to comment 12-05

In Section 2.2.2.4, Table 2-2 and text were added stating that future studies for habitat enhancement will evaluate effects on ESA-listed species.

Response to comment 12-06

The following text was added to Section 4.1.4.2 of the EA: “No actions are anticipated to occur in areas designated as critical habitat or with other potential conflicts with ESA-listed birds such as the western snowy plover and the California least tern. Action Agencies will coordinate with the USFWS to ensure that these species and others (e.g., streaked horned lark) are not subject to adverse effects as part of habitat enhancement actions. The Corps will further coordinate actions with other Corps districts including NWP, NWS and San Francisco as appropriate.”

Response to comment 12-07

Section 4.1.5.4 has been revised to reflect that, as part of the habitat enhancement site selection, the presence of listed species will be fully evaluated. Also, future supplemental/tiered NEPA will address all site-specific effects associated with the development of new habitat enhancement. Any potential mammalian predator control activities will be analyzed and disclosed, and efforts to minimize impacts will be taken. ESA analysis will be included in the supplemental/tiered NEPA.

Response to comment 12-08

Changes were made to reflect this comment. The section was edited to mention the cumulative impacts of actions impacting CATEs from the inland basin rather than comparing whether one action has more impact over another.

NORTH FORK
COMPOSITES
P.O. BOX 2223
WOODLAND, WA 98674
P: 360.225.2211 • F: 360.225.2215
northforkcomposites.com

December 3, 2013

Walla Walla District, Corps of Engineers
ATTN: PM-PD-PF, IAPMP Project Manager
201 North Third Avenue
Walla Walla, WA 99362-1876

Dear IAPMP Project Manager:

13-01 This letter is being sent in response to the request for comments regarding the Inland Avian Predation Management Plan (IAPMP) and associated Environmental Assessment, dated October, 2013. Accordingly, we support the actions outlined in the IAPMP, Preferred Alternative D, to reduce avian predation-related losses to juvenile salmonids in the Columbia Plateau region.

13-02 Moreover, we are aware the IAPMP is directed at avian predation activities in the Columbia Plateau region. However, avian predation continues to have a detrimental effect on juvenile salmonid survival throughout the entire Columbia River Basin as well. Therefore, we encourage and support a more aggressive mitigation program to be implemented, along with the IAPMP, throughout the entire Columbia River Basin by the USACE and the other federal Action Agencies.

13-03 The magnitude of avian predation on juvenile salmonids throughout the Columbia River Basin is significant and well documented. The Final 2012 Annual Report prepared for the USACE on Avian Predation on Salmonid Smolts in the Lower and Mid-Columbia River (Roby, et al. 2013) clearly provides documentation of this significant impact. The Report states that nearly 24 million juvenile salmonids in the Columbia River estuary are being lost due to avian predation. Additionally, in the Columbia Plateau area, reports from studies conducted by Evans, et al. (2013) on Caspian terns nesting on Goose Island in the Potholes Reservoir estimates juvenile salmonid consumption of PIT-tagged juvenile steelhead migrating between Rock Island and McNary Dams in 2008 – 2010 at between 12.8% and 20.8%.

13-04 The time to take action is now. Many millions of dollars are spent annually in an effort to protect juvenile salmonids throughout the Columbia River Basin, and yet a significant number of juvenile salmonids continue to be lost due to avian predation. Aggressive mitigation programs aimed at reducing avian predation in the Columbia Plateau and throughout the Columbia River Basin would be a cost effective and appropriate use of existing mitigation funds. We are not opposed to tern and other avian colonies, but we are opposed to their continued predation on juvenile salmonids in the Columbia River Basin. Therefore, it is essential to implement an aggressive mitigation program now, including relocating terns and other avian predators outside the Basin and away from the migrating juvenile salmonids.

13-05 The IAPMP, Preferred Alternative D, plus a more aggressive mitigation plan throughout the entire Columbia River Basin will help to address the problem. Alternative D in the IAPMP contains appropriate actions to address the avian predation issue, but more needs to be done now. Mitigation actions need to include significant reductions in available nesting habitat, planting of native vegetation to deter nesting, removal of eggs and hazing of nesting areas, immediate initiation of measures to cause a relocation of terns outside the Basin, and a monitoring program to ensure that avian predation is being significantly reduced. We recognize that avian predation is a complex issue. However, the detrimental effect that avian predation is having on juvenile salmonids requires that aggressive action be taken now.

Sincerely,

Gary Loomis

Gary Loomis

P.O. BOX 2223 • WOODLAND, WA 98674 • P: 360.225.2211 • F: 360.225.2215 • northforkcomposites.com

Response to comment 13-01

Comment noted.

Response to comment 13-02

Additional CATE dissuasion outside of the inland basin is beyond scope of this document.

Response to comment 13-03

Comment noted.

Response to comment 13-04

Comment noted.

Response to comment 13-05

EA Section 1.4.1 lists the project responsibility for the Corps (per the 2008 NMFS FCRPS BiOp RPA Action 47) as “The FCRPS Action Agencies will develop an avian management plan (for double-crested cormorants, Caspian terns, and other avian species as determined by research, monitoring, and evaluation) for Corps-owned lands and associated shallow water habitat.” The Purpose and Need of the project (EA Section 1.3) is “to increase survival of ESA-listed juvenile salmonids by reducing predation-related losses from CATE colonies at Crescent and Goose Islands.” Other locations (e.g., the Columbia River Estuary) are outside the scope of this proposed action.

14-01

To whom

In view of the increase growth of the flocks of predator birds on the salmonids over the past few years. I would suggest a modification to section six of the control plan and a change to the treaty to allow for the removal of some of the birds by lethal take as a control method. As seen the fire works used as a control measure are becoming less effective of a control method as the birds learn to live with it. As did the control wires over the waters at the dams those are no longer working. lethal take is the only permanent control the birds can not control by change.

Response to comment 14-01

Lethal take was fully considered and eliminated for reasons given in the EA in Section 2.4.1.

APPENDIX D

Fish Species List

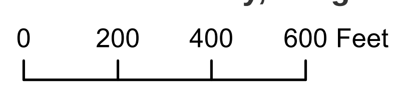
Appendix Table D-1. Threatened and Endangered Salmonid Species List

Evolutionarily Significant Unit (ESU)/ Distinct Population Segment (DPS)	Federal Status	Critical Habitat Present
Chinook Salmon (*Oncorhynchus tshawytscha*)		
• Snake River Fall Chinook ESU	Threatened	Yes
• Snake River Spring/Summer Chinook ESU	Threatened	Yes
• Upper Columbia River Spring Chinook ESU	Endangered	Yes
• Lower Columbia River Chinook ESU	Threatened	Yes
Steelhead (O. mykiss)		
• Snake River Steelhead DPS	Threatened	Yes
• Upper Columbia River Steelhead DPS	Threatened	Yes
• Middle Columbia River Steelhead DPS	Threatened	Yes
• Lower Columbia River Steelhead DPS	Threatened	Yes
Coho Salmon (*O. kisutch*)		
• Lower Columbia River Coho ESU	Threatened	Proposed
Sockeye Salmon (O. nerka)		
• Snake River Sockeye ESU	Endangered	Yes
Bull Trout (*Salvelinus confluentus*)		
• Columbia River Bull Trout DPS	Threatened	Yes

APPENDIX E

At-Risk Island Aerial Imagery

At-risk Island
Three-mile Canyon Island, Columbia River
Morrow County, Oregon



Data Source: Washington Dept. of Natural Resources
Disclaimer: This map is for planning purposes only.
Created On: August 30, 2013

At-risk Island
Badger Island, Columbia River
Walla Walla County, Washington

N
W E
S

0 390 780 1,170 Feet

Data Source: Washington Dept. of Natural Resources
Disclaimer: This map is for planning purposes only.
Created On: August 30, 2013

At-risk Island
Blalock Islands, Columbia River
Benton County, Washington

N W E S

0 580 1,160 1,740 Feet

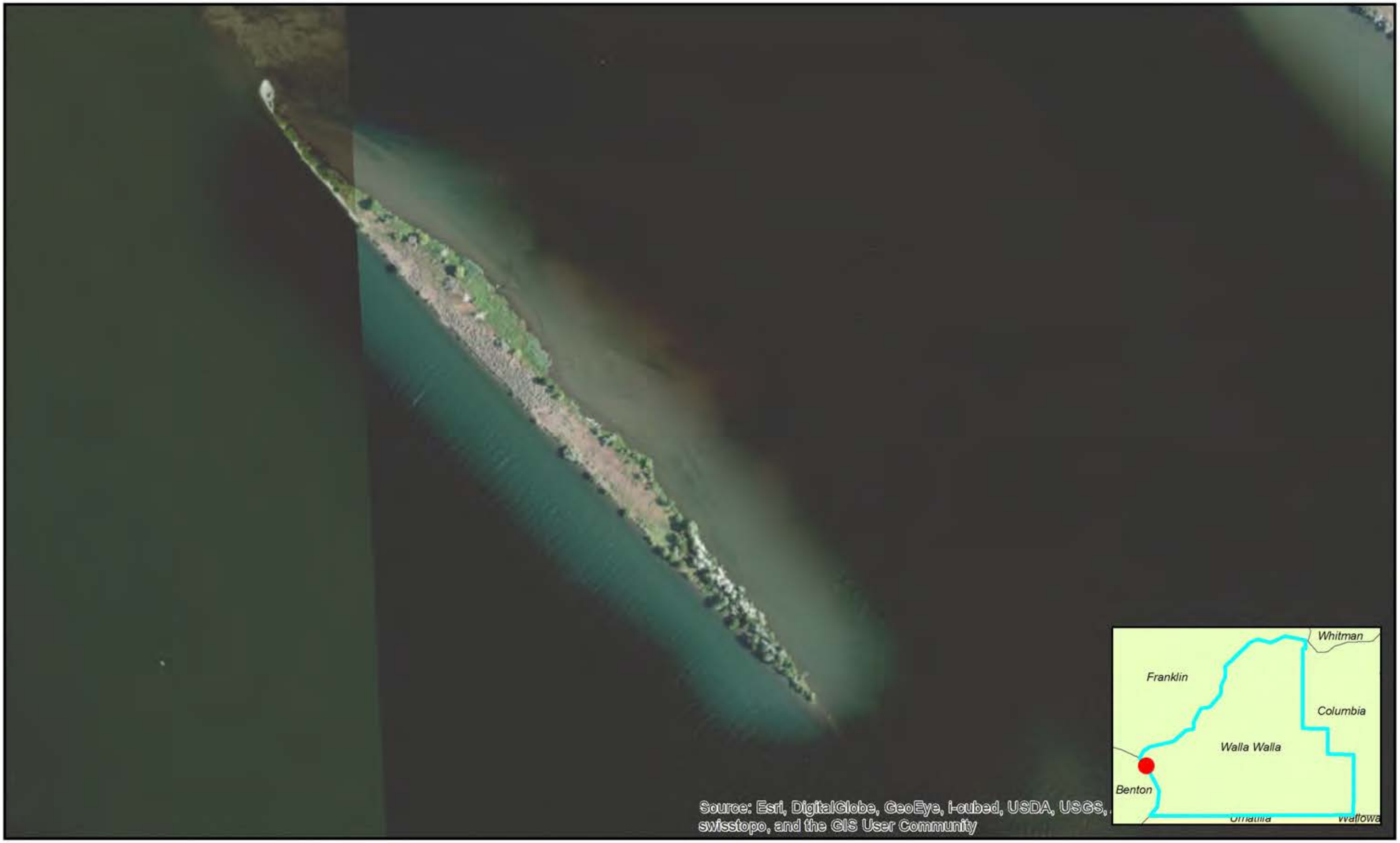
Data Source: Washington Dept. of Natural Resources
Disclaimer: This map is for planning purposes only.
Created On: August 30, 2013

At-risk Island
Cabin Island, Columbia River
Grant County, Washington

0 260 520 780 Feet

N W E S

Data Source: Washington Dept. of Natural Resources
Disclaimer: This map is for planning purposes only.
Created On: August 30, 2013



At-risk Island
Foundation Island, Columbia River
Walla Walla County, Washington

0 320 640 960 Feet

N W E S

Data Source: Washington Dept. of Natural Resources
Disclaimer: This map is for planning purposes only.
Created On: August 30, 2013

At-risk Island
Island 18, Columbia River
Franklin County, Washington

0 675 1,350 2,025 Feet

N
W E
S

Data Source: Washington Dept. of Natural Resources
Disclaimer: This map is for planning purposes only.
Created On: August 30, 2013

At-risk Island
Island 20, Columbia River
Benton County, Washington

0 340 680 1,020 Feet

Data Source: Washington Dept. of Natural Resources
Disclaimer: This map is for planning purposes only.
Created On: August 30, 2013

At-risk Island
Miller Rocks, Columbia River
Klickitat County, Washington

N
W E
S

0 80 160 240 Feet

Data Source: Washington Dept. of Natural Resources
Disclaimer: This map is for planning purposes only.
Created On: August 30, 2013

At-risk Island
Solstice Island, Potholes Reservoir
Grant County, Washington

Data Source: Washington Dept. of Natural Resources
Disclaimer: This map is for planning purposes only.
Created On: August 30, 2013

At-risk Island
Twining Island (Est.), Banks Lake
Grant County, Washington

Data Source: Washington Dept. of Natural Resources
Disclaimer: This map is for planning purposes only.
Created On: August 30, 2013

APPENDIX F

Scoping Meeting Summary and Responses

INLAND AVIAN PREDATION MANAGEMENT PLAN & ENVIRONMENTAL ASSESSMENT

Public Scoping Meeting
Wednesday, March 14, 2012
5:30-8:30 p.m.
Three Rivers Convention Center, Meeting Room 'C'
7016 W. Grandridge Blvd., Kennewick, WA 99336

Agency Representatives:

Gina Baltrusch, U.S. Army Corps of Engineers (Corps)
Cindy Boen, Corps
Lt. Col. David Caldwell, Corps
Ken Fone, Corps
Lamont Glass, U.S. Fish & Wildlife Service McNary National Wildlife Refuge
Ritchie Graves, National Marine Fisheries Service (NMFS)
Rebecca Kalamasz, Corps
Mike Lesky, Bureau of Reclamation
Terri Rorke, Corps
Jeff Jackson, Corps
Joe Saxon, Corps
Ben Tice, Corps
David Trachtenbarg, Corps

Consultant Representatives:

Kyle Brown, Normandeau Associates
Greg Graham, Parametrix
Bill Hall, Parametrix
Kent Snyder, Normandeau Associates

Public Attendees:

Rich Armstrong
Annette Cary
John Cox
Budd Eggeas
Linda Eggeas
Gwen Hudson
Rich Hudson
Barb Lisk for Congressman Doc Hastings
Michael Luzzo
Brian Nice
Matthew James Nice
Charlie Stenvall
Ron Vocht

OVERVIEW

The U.S. Army Corps of Engineers (Corps) hosted a public scoping meeting for the Inland Avian Predation Management Plan (IAPMP) at the Three Rivers Convention Center in Kennewick, Washington, from 5:30–8:30 p.m., on Wednesday, March 14, 2012. Fifteen attendees signed in at the meeting (Attachment A: List of Attendees) and forms were made available to attendees for recording their comments. Two written comments were received (Attachment B: Comments). Additional comments received prior to the close of the comment period will be considered as part of the draft Environmental Assessment (EA).

The purpose of the scoping meeting was for citizens and other interested parties to share their ideas and concerns for consideration in the Draft IAPMP. Attendees were encouraged to share their comments in writing at the scoping meeting and/or submit them on or before the end of the 30-day comment period on April 14, 2012. The meeting format consisted of an informal open house from 5:30 to 6:30 p.m., where attendees reviewed information boards (Attachment C: Information Boards) and discussed the project with agency and consultant staff. At 6:30 p.m., Cindy Boen provided a presentation (Attachment D: Presentation), which was followed by a question and answer session.

The scoping meeting was promoted via a formal invitation letter, press release, and newspaper ads. The formal invitation letter was distributed via U.S. mail on March 5, 2012, (Attachment E: Invitation Letter & Recipient List) to approximately 66 recipients. A press release announcing the scoping meeting was distributed to various Idaho, Oregon, Utah, and Washington media outlets on March 12, 2012 (Attachment F: Press Release & Recipient List).

An advertisement announcing the scoping meeting was published in the following newspapers on the following dates (Attachment G: Advertisement):

Publication	Date(s)
The Dalles Chronicle	March 9 and 11, 2012
Lewiston Tribune	March 9 and 11, 2012
Walla Walla Union Bulletin	March 8 and 11, 2012
Columbia Basin Herald	March 9 and 11, 2012
Hood River News	March 10, 2012
Tri-City Herald	March 7, 11, and 13, 2012

QUESTION & ANSWER

Pelicans

An attendee stated that they live on the Columbia River near the confluence with the Snake River and have seen a large influx of terns, cormorants, and white pelicans in the last 12 years. Specifically, they have observed approximately 33 pelicans in the area near their home. They have also observed that terns and cormorants in the area consume large quantities of fish. Cindy Boen responded that the Corps has been monitoring those populations and the terns are enough of an issue to warrant action, while the cormorants at Foundation Island are less so. She added that Oregon State University continues to monitor the situation using both PIT-tags and field observations.

Ritchie Graves noted that the benefits analysis shows that pelicans have a relatively low impact on salmonids in the area, relative to terns and cormorants. Cindy added that research shows that pelicans typically consume more carp, sunfish, and bass than salmon. An attendee commented that pelicans may consume those non-native fish at times when salmonids are less prevalent in the Columbia and Snake rivers.

An attendee noted that they now see pelicans all year and they feed on fish in clever ways. Cindy responded that agency staff has noticed that pelicans now overwinter in the area when they haven't done so in the past. She added that pelicans are new to Washington State and are a protected species. Lt. Col. David Caldwell noted that the Corps is working on an adaptive management plan that will help address problem species. He added that the legal protection of pelicans and other migratory birds complicates the issue.

Mitigation Rates & Relocation

An attendee asked about the 2:1 ratio for tern mitigation. Cindy responded that if, for example, tern habitat was completely removed from Goose Island, then twice the amount of suitable habitat would need to be provided elsewhere. She noted that presently the colony area under this inland plan (only approximately .3 acres) is much smaller than in the estuary. Ritchie added that the goal is to relocate, not eliminate, birds. Lt. Col. Caldwell added that habitat mitigation is similar to vegetation mitigation—more vegetation is typically constructed to ensure success. Cindy also noted that the idea is to relocate birds to areas where they could consume fewer salmonids.

An attendee asked how birds are relocated. Ritchie responded that terns can be enticed to a new area by creating nesting grounds in flyways, using decoys, etc. Cormorants are more difficult to move, however, due to their nesting characteristics.

An attendee asked if alternative habitat areas have been created. Ritchie responded that alternative habitat has been created elsewhere, such as at Malheur Lake.

An attendee asked if the birds in question are native to the United States. Cindy responded that they are native.

Lethal Take & Predators

Gina Baltrusch asked if egg oiling is considered lethal take. Cindy responded that it is considered lethal take by the U.S. Fish and Wildlife Service (USFW). Gina also asked if tern and cormorant population numbers are at risk. Cindy responded that, while population numbers were at risk in the past due to DDT, numbers are currently stable.

An attendee asked what animals prey on the birds. Cindy responded that the birds have an array of predators, including birds of prey, dogs, coyotes, etc. Ritchie noted that gulls will eat tern eggs when terns are hazed by birds of prey. Due to their larger size, cormorants are more difficult for birds of prey to effect than terns.

An attendee asked if legal variances exist for lethal take of pelicans and whether the Corps has considered exercising those variances. Cindy responded that the Corps is considering an array of actions which would be followed by monitoring. USFW would be the federal agency that would issue a permit for lethal take and the Corps would only consider that as a last resort.

Dam Removal

An attendee asked if dam removal is a viable option. Cindy responded that the Corps is not considering that option as part of this study.

An attendee asked if the current avian predation issue would exist without dams. Lt. Col. Caldwell responded that dams have an impact, but so do other elements of the environment. Ritchie noted that birds will eat fish regardless of whether a dam exists, though it may be easier for birds to consume fish near the dams.

Mike Lesky noted that Elwha Dam will soon be removed, and it will be a good test case regarding how habitat is affected above and below a dam.

Benefits Analysis

Mike asked how the benefits to hatchery vs. wild fish could be determined if wild fish are not PIT-tagged. Richie responded that wild fish are PIT-tagged, and there are additional methods for determining effects.

Additional Fish Species

An attendee asked if lamprey and sturgeon are a component of the project scope. Lt. Col. Caldwell responded that they are not.

Additional Comments

An attendee stated that humans have had little success managing the natural environment. Management programs fail over the long haul and the natural environment will adjust accordingly.

SUBMITTED COMMENTS

The following comments were submitted in writing at the scoping meeting. Scanned copies can also be found in Attachment B: Comments.

Ron Vocht

[redacted]

My residence is downstream from Ice Harbor Dam, on the Walla Walla County side of the Snake River, across from the northern tip of Strawberry Island. During periods of spring high water runoff, and at times when salmon smolts are being flushed downstream, I have for many years observed clouds of hundreds of sea gulls circling, then diving down to prey on the disoriented salmon smolts, just off the tip of Strawberry Island. As a resident, I have observed also, the efforts of the Corps at Ice Harbor Dam to discourage salmon smolt predation by the use of wire looms and use of hazing explosives, which I'm sure is beneficial. But, I feel that hazing efforts should also be implemented on the Strawberry Island tip. These clouds of hundreds of sea gulls persist every day, from sunrise to sunset, and multitudes of salmon smolts are taken. From my personal observations, sea gulls are the worst and most prevalent predator, followed by Caspian terns, mergansers, and pelicans. Have there been any scientific studies done on sterilization techniques? Perhaps selected lethal actions should be implemented in the worst predatory areas, by suspending the Protected Avian Species Act to insure higher rates of survival of smolts. I support and encourage the downstream barging of smolts.

Michael Luzzo

[redacted]

The American white pelican needs to be considered in any Bird Management Plan. I was told as a species of concern it might not be considered for control. But as a bird that is possibly breeding in the Tri City area, it can be considered a lake bird. The Columbia River needs to be sped up, maybe as a engineering control. That is, put flumes (such at Wanupum Dam) on McNary and Ice Harbor dams. Pikeminnows and small mouth bass are prevalent, when they shouldn't be. Estuaries, small creeks and silting are also problems in the Wallula, Snake River Mouth, Yakima River Mouth areas. Find a balance in the local riparian water system. Chinook salmon, sockeye salmon et. al. need habitat. There are *possible problems with fertilizers (nitrogen, phosphorus) and maybe sulfur in these rivers. This is an area of study. Maybe the New Yakima River Water Plan addresses this. But the lake effects also need to be considered. Breeding salmon are around. But wading shorebirds and predatory birds such as the American white pelican should be looked at also. Talk to Dr. John Strand at WSUTC or his counterpart about doing a bird study and fish studies. The experts are here, use them.*

Attachment A: List of Attendees

INLAND AVIAN PREDATION MANAGEMENT PLAN

US Army Corps of Engineers®

Public Scoping Meeting

March 14, 2012, 5:30-8:30 PM

Three Rivers Convention Center • Meeting Room 'C'
7016 W. Grandridge Blvd., Kennewick, WA 99336

Name	Mailing Address Include City and Zip Code	Telephone	E-mail Address
PLEASE PRINT Brian L Nice	[redacted]	[redacted]	[redacted]
PLEASE PRINT Charlie Stenvall	[redacted]	[redacted]	[redacted]
PLEASE PRINT John Cox	[redacted]	[redacted]	[redacted]
PLEASE PRINT Barb Lisk (for Congressman Doc Hastings)	[redacted]	[redacted]	[redacted]
PLEASE PRINT Annette Cary (Tri-City Herald)	[redacted]	[redacted]	[redacted]
PLEASE PRINT Rick Armstrong	[redacted]	[redacted]	[redacted]
PLEASE PRINT			

INLAND AVIAN PREDATION MANAGEMENT PLAN

US Army Corps of Engineers®

Public Scoping Meeting

March 14, 2012, 5:30-8:30 PM

Three Rivers Convention Center • Meeting Room 'C'
7016 W. Grandridge Blvd., Kennewick, WA 99336

Name	Mailing Address Include City and Zip Code	Telephone	E-mail Address
PLEASE PRINT Michael Cuzzo	[redacted]		
PLEASE PRINT Rich & Gwen Hudson			
PLEASE PRINT Ron Vocht			
PLEASE PRINT Budd Eggers			
PLEASE PRINT Linda Eggers			
PLEASE PRINT			
PLEASE PRINT			

INLAND AVIAN PREDATION MANAGEMENT PLAN

US Army Corps of Engineers®


Public Scoping Meeting

March 14, 2012, 5:30-8:30 PM

Three Rivers Convention Center • Meeting Room 'C'
7016 W. Grandridge Blvd., Kennewick, WA 99336

Name	Mailing Address Include City and Zip Code	Telephone	E-mail Address
PLEASE PRINT Ritchie Graves, NMFS	[redacted]	[redacted]	[redacted]
PLEASE PRINT Matthew James Nice	[redacted]	[redacted]	[redacted]
PLEASE PRINT Lamont Glass	[redacted]	[redacted]	[redacted]
PLEASE PRINT			
PLEASE PRINT			
PLEASE PRINT			
PLEASE PRINT			

Attachment B: Comments

INLAND AVIAN PREDATION MANAGEMENT PLAN

US Army Corps of Engineers ®

Public Scoping Meeting
March 14, 2012
Comment Form

My residence is downstream from Ice Harbor dam, on the Walla Walla County side of the Snake River, across from the northern tip of Strawberry Island. During periods of spring high water runoff, and at times when salmon smolts are being flushed downriver, I have for many years, observed clouds of <u>hundreds</u> of seagulls circling, then diving down to prey on the disoriented salmon smolts, just off the tip of Strawberry Island. As a resident, I have observed also, the efforts of the Corps at Ice Harbor dam to discourage salmon smolt predation, by the use of wire looms and use of hazing explosives, which I'm sure is beneficial. But, I feel that hazing efforts should <u>also</u> be implemented on the Strawberry Island tip. These clouds of hundreds of seagulls persist every day, from sunrise to sunset, and multitudes of salmon smolts are taken. From my personal observations, seagulls are the <u>worst</u> and most prevalent predator, followed by Caspian Terns, Mergansers, and Pelicans. Have there been any scientific studies done on sterilization techniques? Perhaps <u>selected</u> lethal actions <u>should</u> be implemented in the <u>worst</u> predatory areas, by suspending the protected avian species act to insure higher rates of survival of smolts. (Continue on back if needed.)
I support and encourage the downstream barging of smolts.

Name: Ron Vecht

Address [redacted]

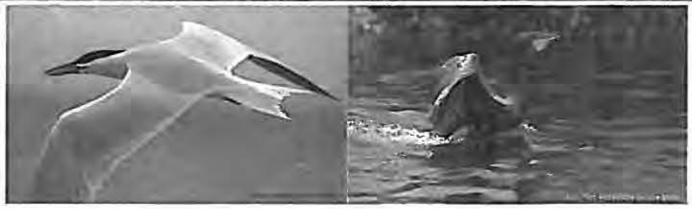
Phone

Comments on information presented at the March 14, 2012, public scoping meeting may also be submitted in writing by mail or e-mail by April 14, 2012

U.S. Army Corps of Engineers - Walla Walla District
ATTN: Avian Predation Management Plan
201 N. 3rd Ave.
Walla Walla, WA 99362
509-527-7246
avianpredator@usace.army.mil

INLAND AVIAN PREDATION MANAGEMENT PLAN

US Army Corps of Engineers ®



Public Scoping Meeting
March 14, 2012
Comment Form

The american white Pelican needs to be considered in any Bird Management Plan. I was told as a species of concern it might not be considered for control. But as a bird that is possible breeding in the Tri city area, it can be considered a lake Bird. The columbia River needs to be sped up, may be as a engineering control. That is, put flumes (such at Wanupum Dam) on McNary and Ice Harbor Dams. Pike minnows and small mouth Bass are prevelent when they shouldnt be. Estuaries small creeks and silting are also problems in the Wallula, Snake River Mouth Yakima River Mouth areas. Find a balance in the local ripperien water system. (Continue on back if needed.)

Name: Michael Lozzo

Address: [redacted]

Phone (o

Comments on information presented at the March 14, 2012, public scoping meeting may also be submitted in writing by mail or e-mail by April 14, 2012

U.S. Army Corps of Engineers - Walla Walla District
ATTN: Avian Predation Management Plan
201 N. 3rd Ave.
Walla Walla, WA 99362
509-527-7246
avianpredator@usace.army.mil

Chinook Salmon, Sockeye Salmon et al. need habitat. There are possible problems with the fertizers (nitrogen, phosphorous) and maybe sulfur in these rivers. This is one area of study. Maybe the New Yakima River Water Plan addresses this. But the lake effects also need to be considered. Breeding ~~Salmonoids~~ Salmon are around. But wading shorebirds and predatory birds such as the American white Pelican should be looked at also. Talk to Dr. John Strand at WSUTC or his counterpart about doing a bird study & fish studies. The experts are here, use them.

Attachment C: Information Boards

INLAND AVIAN PREDATION MANAGEMENT PLAN

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BIOP OVERVIEW AND RPA ACTIONS

In May 2008, National Oceanic and Atmospheric Administration (NOAA) Fisheries issued a Biological Opinion (BiOp) on the operation of 14 of the dams that make up the Federal Columbia River Power System (FCRPS). The FCRPS BiOp considered a suite of Reasonable and Prudent Alternative (RPA) actions proposed by the Bonneville Power Administration, Bureau of Reclamation and U.S. Army Corps of Engineers (Corps), together referred to as the Action Agencies. These actions, developed through a collaborative process with regional states and tribes to protect salmon and steelhead across their life cycle, were supported by a biological analysis that NOAA Fisheries concluded would avoid jeopardy to the fish and would not adversely modify their critical habitat. The following RPAs are relevant to the Inland Avian Predation Management Plan:

RPA No. 47: Prepare Inland Avian Predation Management Plan

The FCRPS Action Agencies will develop an avian management plan (for double-crested cormorants, Caspian terns and other avian species as determined by research, monitoring and evaluation) for Corps-owned lands and associated shallow water habitat.

RPA Action 48: Other Avian Deterrent Actions

The Corps will continue to implement and improve avian deterrent programs at all lower Snake and Columbia river dams. This program will be coordinated through the Fish Passage Operations and Maintenance Team and included in the Fish Passage Plan.

RPA Action 68: Monitor and Evaluate Inland Avian Predators

The Action Agencies will monitor avian predator populations in the mid-Columbia River and evaluate their impacts on outmigrating juvenile salmonids and develop and implement a management plan to decrease predations rates, if warranted.

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BENEFITS ANALYSIS

OVERVIEW

In 2011, the Corps received the final report[1] of a study to assess potential management actions to reduce avian predation on anadromous salmonids from the Columbia and Snake rivers. The goal of this analysis was to estimate potential benefits to salmonid populations from potential reductions in avian predation associated with five colonies of piscivorous (fish-eating) waterbirds in the Columbia Plateau region.

METHOD

The study used predation rate data (for years 2004-2010) based on recoveries of smolt passive integrated transponder (PIT) tags at bird colonies and the framework of a simple deterministic, age-structured, matrix population growth model. Researchers translated potential changes in smolt survival due to reductions in avian predation into increases in the average annual population growth rate.

FINDINGS SUMMARY

Baseline predation rates varied from nearly undetectable up to 11-15 percent for some bird colony/Evolutionary Significant Unit (ESU) combinations. Predation rates on steelhead smolts by Caspian terns were the most significant.

Analysis indicates that, at current bird colony sizes, actions to reduce avian predation on juvenile salmonids in the Columbia Plateau region will not by themselves recover any Endangered Species Act-listed population of anadromous salmonids. Reductions in avian predation in this region could, however, result in increases in salmonid population growth rates comparable to some other salmonid recovery efforts in the Columbia Basin, particularly for upper Columbia River and Snake River steelhead populations.

---

[1] Benefits to Columbia River Anadromous Salmonids from Potential Reductions in Avian Predation on the Columbia Plateau

INLAND AVIAN PREDATION MANAGEMENT PLAN

US Army Corps of Engineers®

RANGE OF POTENTIAL ACTIONS

Goose Island (Caspian Terns)
Modify Habitat to Remove Entire Colony (Passive)
Modify Habitat to Remove Partial Colony (Passive)
Active Management to Discourage All Nesting
Active Management to Discourage Partial Nesting
Predator Introduction (e.g. Terrestrial Predators)
Predator Encouragement (Avian Predator Structures)
Lethal Take
Alternative Food Source (e.g. Net Pen)

Crescent Island (Caspian Terns)
Modify Habitat to Remove Entire Colony (Passive)
Modify Habitat to Remove Partial Colony (Passive)
Active Management to Discourage All Nesting
Active Management to Discourage Partial Nesting
Predator Introduction (e.g. Terrestrial Predators)
Predator Encouragement (Avian Predator Structures)
Lethal Take
Alternative Food Source (e.g. Net Pen)

Foundation Island (Double-Crested Cormorants)
Modify Habitat to Remove Entire Colony (Passive)
Modify Habitat to Remove Partial Colony (Passive)
Active Management to Discourage All Nesting
Active Management to Discourage Partial Nesting
Predator Introduction (e.g. Terrestrial Predators)
Predator Encouragement (Avian Predator Structures)
Lethal Take (Egg Oiling, Nest Destruction)
Alternative Food Source (e.g. Net Pen)

Miller Rocks (Gulls)
Modify Habitat to Remove Entire Colony (Passive)
Modify Habitat to Remove Partial Colony (Passive)
Active Management to Discourage All Nesting
Active Management to Discourage Partial Nesting
Predator Introduction (e.g. Terrestrial Predators)
Predator Encouragement (Avian Predator Structures)
Lethal Take (Any Method)
Alternative Food Source (e.g. Surplus Pikeminnow from Sport-Reward Program)
Add Land Bridge to Allow for Natural Predation

Badger Island (American White Pelicans)
Modify Habitat to Remove Entire Colony
Modify Habitat to Remove Partial Colony
Active Management to Discourage All Nesting
Predator Introduction (e.g. Predator Nesting Platforms)
Alternative Food Source (e.g. Net Pen)

Modify Habitat to Remove Entire Colony (Passive)
Modify Habitat to Remove Partial Colony (Passive)
Active Management to Discourage All Nesting
Active Management to Discourage Partial Nesting
Predator Introduction (e.g. Terrestrial Predators)
Predator Encouragement (Avian Predator Structures)
Lethal Take
Alternative Food Source (e.g. Net Pen)

Develop New Tern Habitat
Washington (Marine or Puget Sound)
Idaho
Malheur Lake
Other Location (TBD) – Washington Coast, Idaho, Oregon, California Coast

Develop New Cormorant Habitat
Potholes Reservoir
Sprague Lake
Other Location (TBD)

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ESTUARY PROJECT OVERVIEW

Populations of Caspian terns and double-crested cormorants have increased over the last two decades in the Columbia River Estuary. Efforts to address this issue have focused primarily on the two main nesting areas on Rice and East Sand islands.

CASPIAN TERNS

Caspian terns nesting on East Sand Island are a significant predator of juvenile salmonids in the lower Columbia River. In 2005, the U.S. Army Corps of Engineers (Corps) began implementing a plan to redistribute a portion of the East Sand Island tern colony to alternative colony sites in Oregon and California by 2015.

DOUBLE-CRESTED CORMORANTS

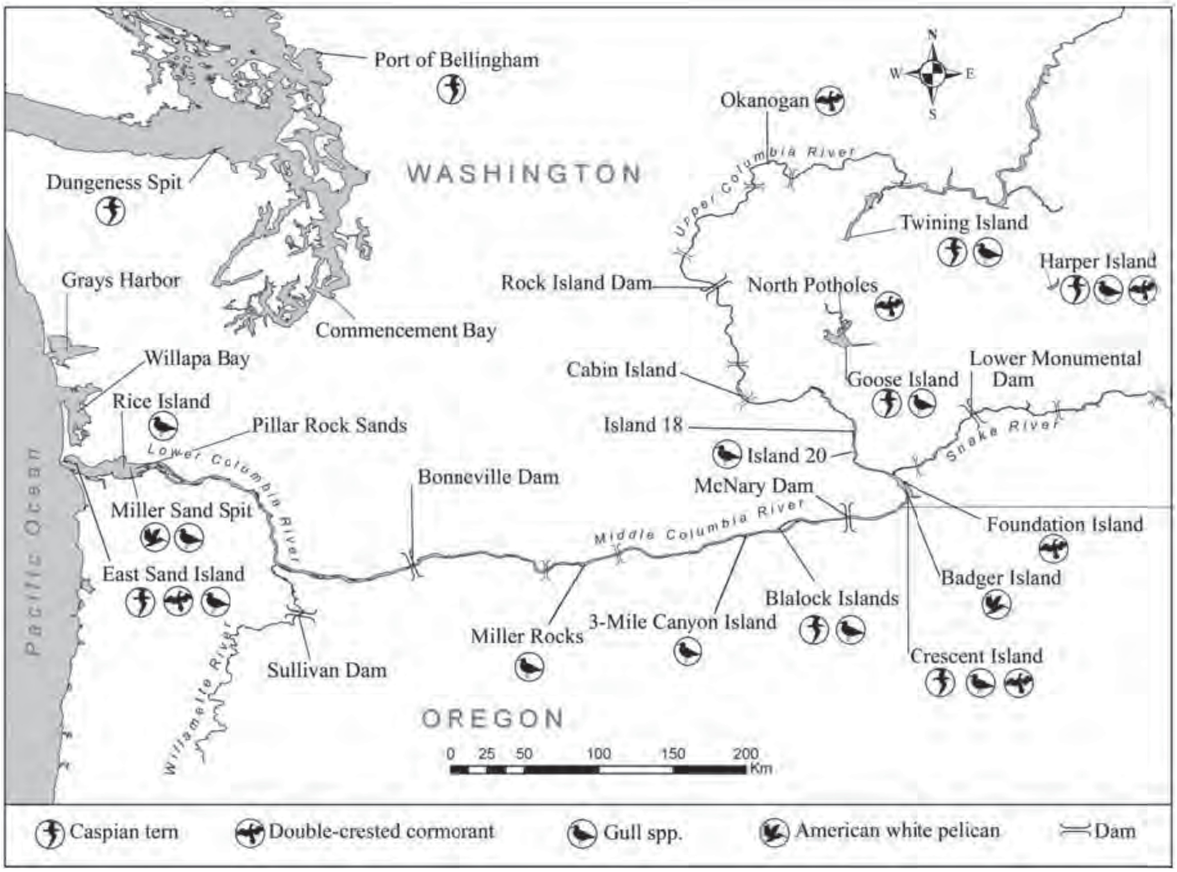
In recent years, estimated smolt consumption by cormorants nesting on East Sand Island has equaled or surpassed consumption by Caspian terns nesting in the estuary. An inter-agency working group is developing an Estuary Management Plan and Draft Environmental Impact Statement to be released for public review in August 2012. A final plan is expected at the end of 2012 in preparation for implementation in spring 2013.

Management actions dictated by the preferred alternative will focus on the nesting colony at East Sand Island. The proposed alternatives considered various degrees of lethal and non-lethal colony reduction techniques. As of fall 2011, researchers were assessing the potential benefit of predation reduction for the population growth rates of salmonids, particularly three distinct population segments of steelhead.

INLAND AVIAN PREDATION MANAGEMENT PLAN

US Army Corps of Engineers ®

LOCATIONS OF ACTIVE AND FORMER BREEDING COLONIES OF PISCIVOROUS COLONIAL WATERBIRDS



INLAND AVIAN PREDATION MANAGEMENT PLAN

US Army Corps of Engineers ®

INPUT WE NEED FROM YOU TONIGHT

1. **Have we correctly framed the issues of avian predation in the inland areas?**

2. **Are there other actions the study team should be considering?**

3. **Do you have information on potential impacts?**

INLAND AVIAN PREDATION MANAGEMENT PLAN

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ONGOING ACTIONS AT COLUMBIA & SNAKE RIVER DAMS

Dam	Generating Capacity (Mw)	City, State	River	Mile	Turbine Screens	Perch Deterrents	Bird Wire Arrays		Hazing Measures							Hazing Effort 2011	
							Tailrace		Hydrocannon	Boat-Based	Lethal Take	Propane Cannon	Distress Call	Pyrotechnics	Other	Seasonal	Daily (hours)
							Powerhouse	Spillway									
Bonneville	1050	Bonneville, Oregon	Columbia	146.1	✓		Present	Present	✓			✓		✓		4/1-7/30 (121 days)	8
The Dalles	1780	The Dalles, Oregon	Columbia	191.5			Present	Present		✓		✓		✓		5/1-7/30 (91 days)	16
John Day	2160	Rufus, Oregon	Columbia	215.6	✓		Present	Present	✓	✓		✓		✓		4/12-7/30 (110 days)	16
McNary	980	Umaltilla, Oregon	Columbia	292	✓	✓	Present	Absent	✓			✓		✓		4/1-7/16 (107 days)	8
Ice Harbor	603	Pasco, Washington	Snake	9.7	✓	✓	Present	Present	✓	✓		✓	✓	✓	Laser	4/1-6/30 (91 days)	16 on week days, 8 on weekends
Lower Monumental	810	Kaholotus, Washington	Snake	41.6	✓	✓	Present	Absent	✓					✓	Starter Pistol	4/1-6/17 (78 days)	8
Little Goose	810	Almota, Washington	Snake	70.3	✓	✓	Present	Absent	✓			✓		✓	Water Streamers	4/10-6/18 (70 days)	8
Lower Granite	810	Almota, Washington	Snake	107.5	✓	✓	Present	Present				✓		✓		4/1-6/30 (91 days)	16 (peak), 8 remainder

INLAND AVIAN PREDATION MANAGEMENT PLAN

US Army Corps of Engineers®

PROJECT SCHEDULE

<table>
<tr><th>2011</th><th colspan="5">2012</th></tr>
<tr><th>October/ December</th><th>March</th><th>April-August</th><th>September</th><th>October</th><th>December</th></tr>
<tr><td>Draft Purpose & Need</td><td rowspan="4">Scoping Meeting</td><td rowspan="4">Work continues on Draft EA & IAPMP</td><td rowspan="4">Notice of Availability (EA)</td><td rowspan="2">USACE/NOAA Review of Revised Draft IAPMP</td><td rowspan="2">Final IAPMP</td></tr>
<tr><td>Initial Array of Alternatives</td></tr>
<tr><td>Preliminary Draft IAPMP</td><td rowspan="2">USACE/NOAA Review of Revised Draft EA</td><td rowspan="2">Final EA & Draft FONSI</td></tr>
<tr><td>Preliminary Draft EA</td></tr>
</table>

INLAND AVIAN PREDATION MANAGEMENT PLAN

US Army Corps of Engineers®

		Chinook			Sockeye	Steelhead	
		Snake River (spring/summer run)	Snake River (fall run)	Upper Columbia River (spring run)	Snake River	Snake River	Upper Columbia River
Caspian Terns	Goose Island	-	-	3.0%	-	-	14.6% (H) 11.4% (W)
	Crescent Island	0.6%	0.6%	0.4%	0.6%	2.8%	2.7% (H) 2.3% (W)
	Blalock Island Complex	0.1%	< 0.1%	0.1%	≤ 0.1%	0.4%	0.7%
Double-crested Cormorants	Foundation Island	0.8%	0.4%	< 0.1%	1.1%	1.6% (H) 1.4% (W)	0.1%
California and Ring-billed Gulls	Miller Rocks	0.3%	0.3%	0.4%	0.6%	1.2%	1.6%

- Predation rates have been adjusted to account for the portion of the respective evolutionarily significant unit (ESU) being transported around Columbia Plateau waterbird colonies.
- In instances where avian predation rates on smolts reared in hatcheries (H) significantly exceeded those on smolts reared in the wild (W), both predations rates have been provided.
- Table adapted from *Lyons, D.E., D.D. Roby, A.F. Evans, N.J. Hostetter, and K. Collis. 2011. Benefits to Columbia River anadromous salmonids from potential reductions in avian predation on the Columbia Plateau. Report submitted to the U.S. Army Corps of Engineers - Walla Walla District.*

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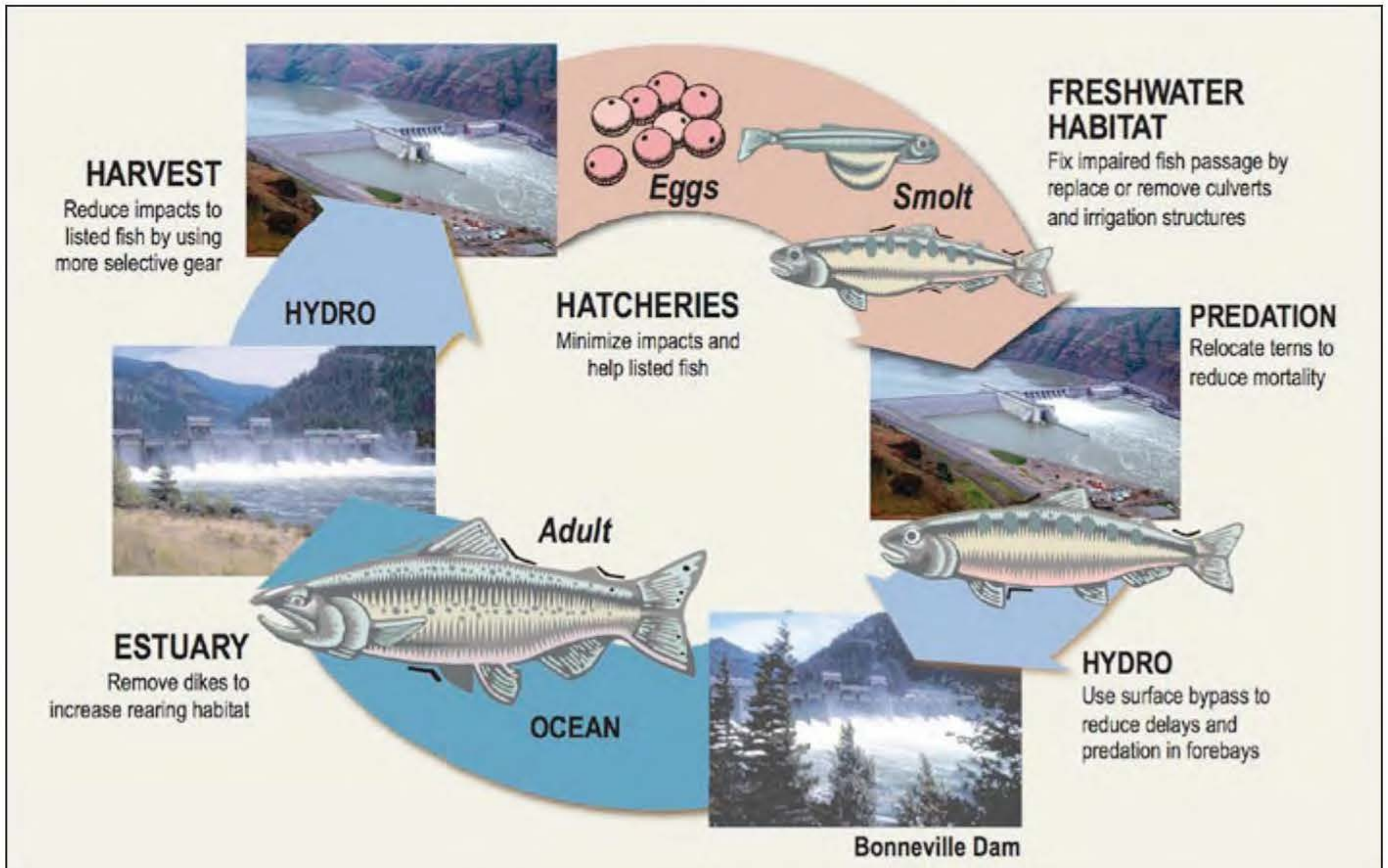


Attachment D: Presentation

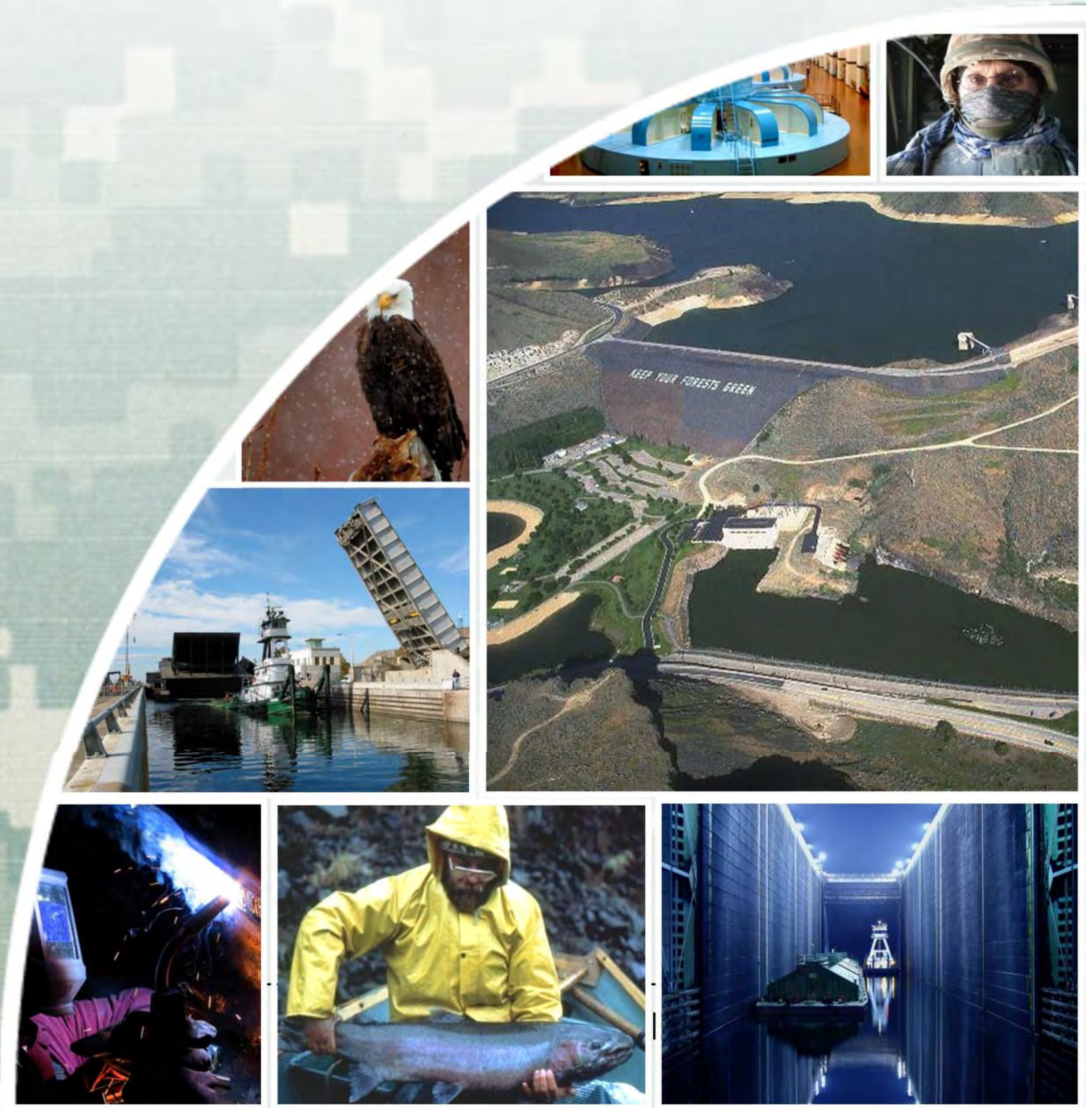
INLAND AVIAN PREDATION MANAGEMENT PLAN

SCOPING MEETING

March 14, 2012

Three Rivers Convention Center

Kennewick, Washington



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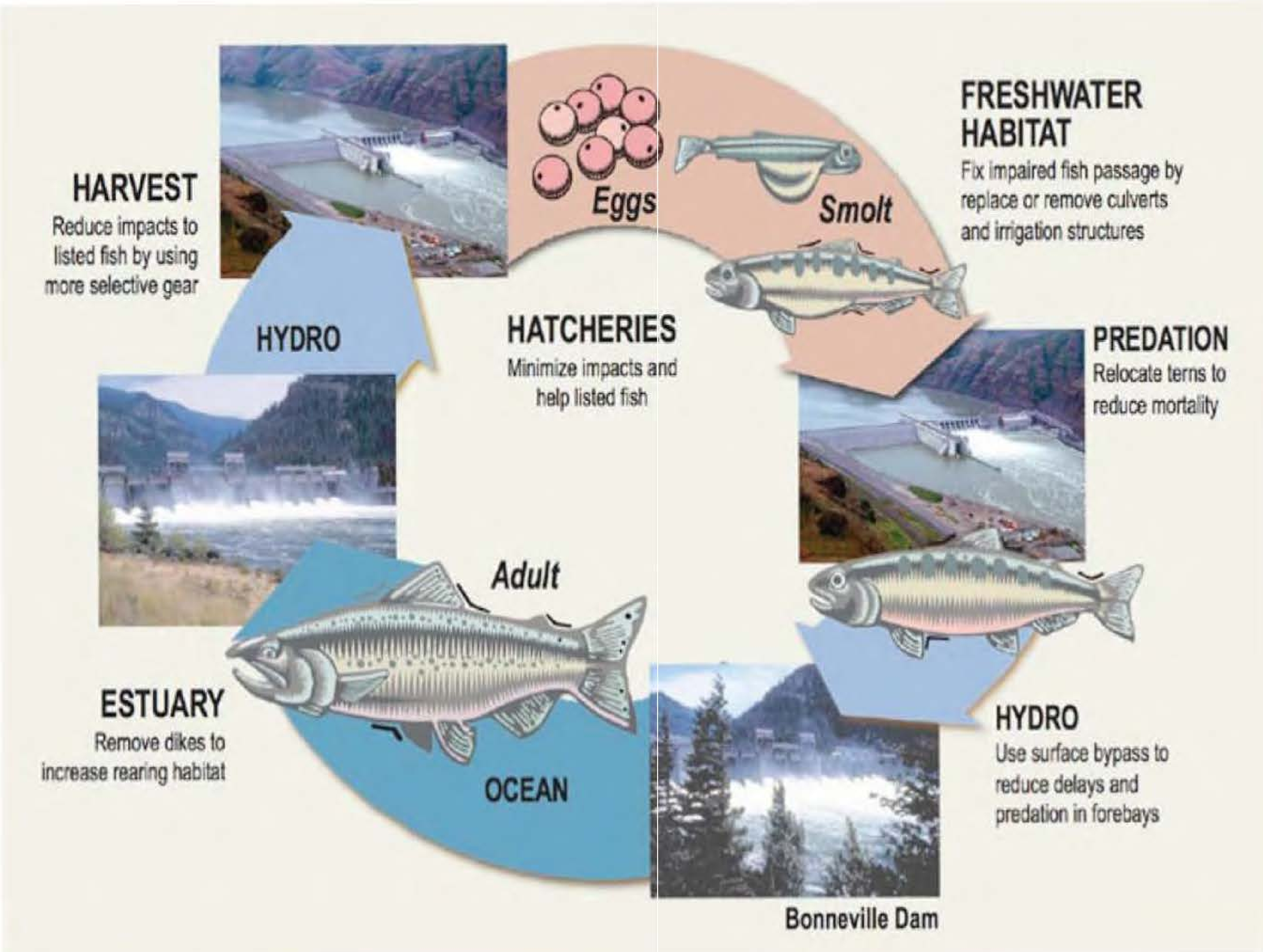
INLAND AVIAN PREDATION MANAGEMENT PLAN

Presentation Summary

- Goals of this meeting
- Geographic scope
- Purpose and need
- Previous research
- Q & A and Comments


Chum Salmon
Columbia River (threatened)
Chinook Salmon
Snake River Fall (threatened)
Snake River Spring/Summer (threatened)
Lower Columbia River (threatened)
Upper Columbia River Spring (endangered)
Upper Willamette River (threatened)
Steelhead
Snake River Basin (threatened)
Lower Columbia River (threatened)
Middle Columbia River (threatened)
Upper Columbia River (endangered)
Upper Willamette River (threatened)
Sockeye Salmon
Snake River (endangered)
Coho
Lower Columbia River (threatened)
White Sturgeon
Kootenai River (endangered)
Bull Trout
Various (threatened)
Canadian Dams
Federal Dams
Non-Federal Dams
Blocked Passage
Canada
U.S.
Kootenai
Columbia
Clark Fork
Puget Sound
MT
N
WA
Snake
PACIFIC OCEAN
Columbia
Snake
OR
Willamette
ID
Snake
NV
CA
Columbia River Basin


HARVEST
Reduce impacts to listed fish by using more selective gear
Eggs
Smolt
FRESHWATER HABITAT
Fix impaired fish passage by replace or remove culverts and irrigation structures
HYDRO
HATCHERIES
Minimize impacts and help listed fish
PREDATION
Relocate terns to reduce mortality
Adult
ESTUARY
Remove dikes to increase rearing habitat
OCEAN
HYDRO
Use surface bypass to reduce delays and predation in forebays
Bonneville Dam

INLAND AVIAN PREDATION MANAGEMENT PLAN

BiOp RPA Actions

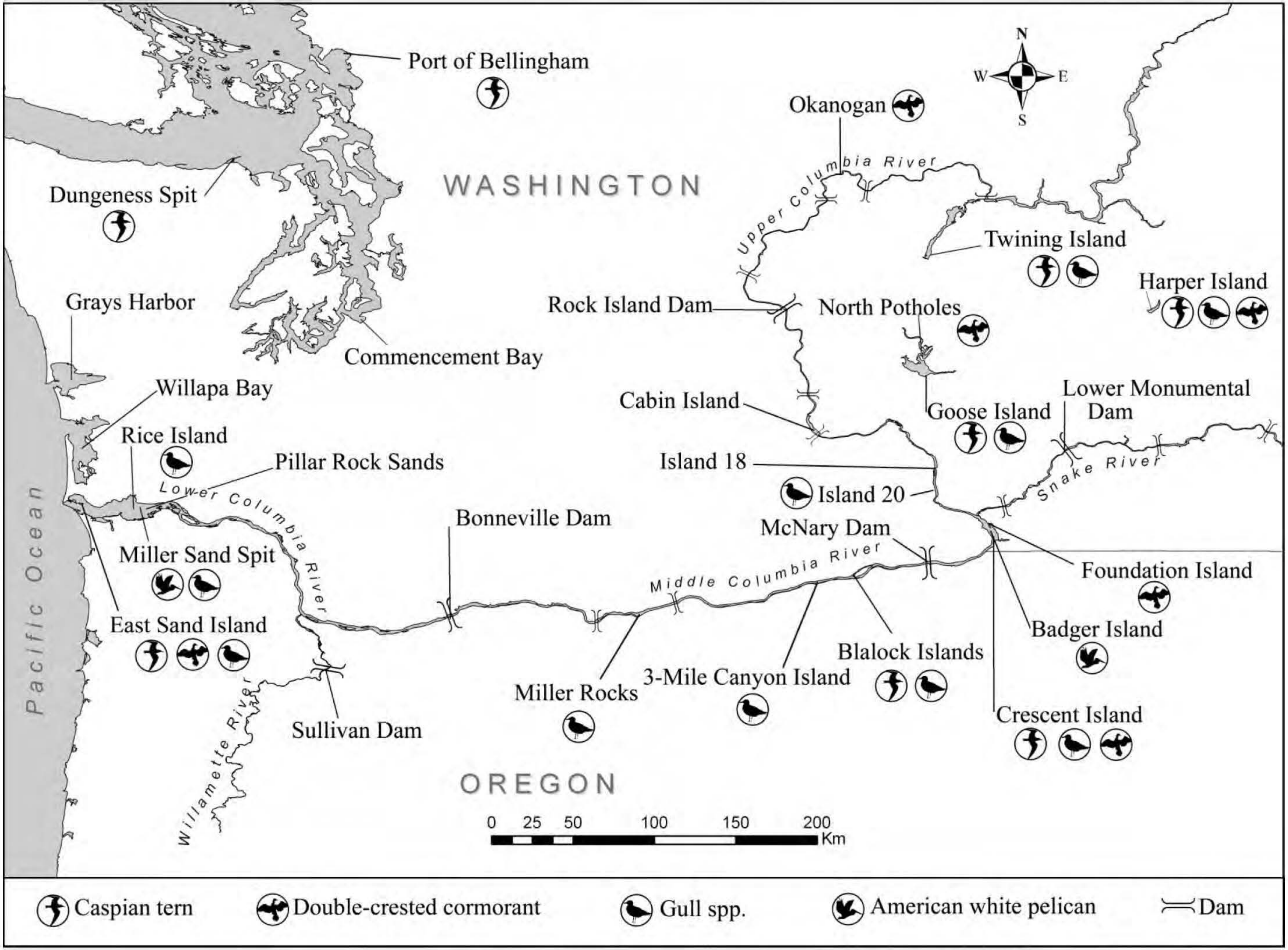
Three RPA Actions Address Inland Avian Predation

- RPA No. 47: Prepare Inland Avian Predation Management Plan (IAPMP)
- RPA No. 48: Other Avian Deterrent Actions
- RPA No. 68: Monitor and Evaluate Inland Avian Predators

INLAND AVIAN PREDATION MANAGEMENT PLAN

Purpose & Need

- Purpose is to comply with BiOp
- Currently developing Inland Avian Predation Management Plan (IAPMP)
- NEPA process is to address environmental implications of IAPMP


Port of Bellingham
Okanogan
WASHINGTON
Dungeness Spit
Upper Columbia River
Twining Island
Harper Island
Grays Harbor
Rock Island Dam
North Potholes
Commencement Bay
Willapa Bay
Cabin Island
Goose Island
Lower Monumental Dam
Rice Island
Pillar Rock Sands
Island 18
Lower Columbia River
Island 20
Snake River
Bonneville Dam
McNary Dam
Miller Sand Spit
Middle Columbia River
Foundation Island
Pacific Ocean
East Sand Island
Badger Island
Blalock Islands
3-Mile Canyon Island
Miller Rocks
Sullivan Dam
Willamette River
Crescent Island
OREGON
0 25 50 100 150 200 Km
N
S
E
W
Caspian tern
Double-crested cormorant
Gull spp.
American white pelican
Dam

INLAND AVIAN PREDATION MANAGEMENT PLAN

Avian Predation in the Columbia Basin

- Predation on juvenile salmonids is potentially limiting the recovery of anadromous salmonid populations from the Columbia River basin.
- Over 100,000 piscivorous (fish-eating) colonial birds, representing five different species nesting at 18 different colonies, were documented in the Columbia Plateau region during 2004-2009.

INLAND AVIAN PREDATION MANAGEMENT PLAN

Scope

- Focused on colony-based actions
- Salmonid habitat in the Columbia River at Bonneville Dam and eight mainstem Columbia and Snake rivers dams and adjacent inland areas in OR and WA. Also includes areas where potential habitat for bird relocation may occur.
- Currently conducting an EA. Does not preclude future EIS
- Other actions are occurring in the estuary. This management plan complements those efforts.

INLAND AVIAN PREDATION MANAGEMENT PLAN

Wire array

Shore hazing

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INLAND AVIAN PREDATION MANAGEMENT PLAN

Benefits Analysis

Findings

- There is no “silver bullet” for recovery of ESA-listed salmonids. Addressing avian predation is just one piece of the puzzle.
- Some benefits can be expected at Goose Island and Crescent Island.
- Actions at other islands only provide minor benefits.
- These findings inform the biological basis for decision making in the IAPMP.

POTENTIAL CHANGES IN Λ (%) FOR 100% REDUCTION IN COLONY SIZE, 0% COMPENSATION

		Chinook			Sockeye	Steelhead	
		$SR_{S/S}$	SR_F	UCR_{Sp}	SR	SR	UCR
CATE	GI			0.7			**4.2** **3.2**
CATE	CI	0.1	0.2	0.1	0.2	0.5	0.7 0.6
CATE	BIC	<0.1	<0.1	<0.1	<0.1	0.1	0.2
DCCO	FI	0.2	0.1	<0.1	0.4	0.3 0.2	<0.1
Gulls	MR	0.1	0.1	0.1	0.2	0.2	0.4

INLAND AVIAN PREDATION MANAGEMENT PLAN

General Range of Actions

- Modify Habitat to Remove Entire Colony (Passive)
- Modify Habitat to Remove Partial Colony (Passive)
- Active Management to Discourage All Nesting
- Active Management to Discourage Partial Nesting
- New Tern Habitat
- Predator Introduction
- Predator Encouragement
- Lethal Take
- Alternative Food Source

INLAND AVIAN PREDATION MANAGEMENT PLAN

Next Steps in Process

2011	2012				
October/ December	**March**	**April-August**	**September**	**October**	**December**
Draft Purpose & Need	Scoping Meeting	Work continues on Draft EA & IAPMP	Notice of Availability (EA)	USACE/NOAA Review of Revised Draft IAPMP	Final IAPMP
Initial Array of Alternatives					
Preliminary Draft IAPMP				USACE/NOAA Review of Revised Draft EA	Final EA & Draft FONSI
Preliminary Draft EA					

INLAND AVIAN PREDATION MANAGEMENT PLAN

Input We Need From You Tonight

The Project Team Is Seeking

- Have we correctly framed the issues of avian predation in the inland areas?
- Are there other actions the study team should be considering?
- Do you have information on potential impacts?

Ways to Provide Your Input

- Q&A
- One-on-one conversations at this meeting
- Comment Cards
- Mail
- E-mail (avianpredator@usace.army.mil)

Thank You!

Questions?

Attachment E: Invitation Letter & Recipient List

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA, WA 99362-1876

March 5, 2012

Programs, Planning, and
Project Management

Dear Interested Parties:

The U.S. Army Corps of Engineers (Corps) has begun development of an Inland Avian Predation Management Plan, hereafter referred to as the "Plan." The Plan is a joint effort between the Federal action agencies (the Corps, Bureau of Reclamation, and Bonneville Power Administration). The intent of the Plan is to limit predation on juvenile salmonids by birds within the Columbia Plateau. The Plan is a requirement of the 2008 Biological Opinion on the Federal Columbia River Power System issued by National Marine Fisheries Service.

For a number of years, the Corps has conducted research throughout the Columbia River Basin regarding the effects of avian predation on salmonid species listed under the Endangered Species Act. This research will be the foundation for any recommendations contained in the final Plan.

In support of the Plan, the Corps will conduct a public scoping meeting on March 14, 2012, in Kennewick, Washington. The meeting will be at Three Rivers Convention Center, 7016 West Grandridge Boulevard. The meeting will include an open house from 5:30 to 8:30 p.m. There will be a short presentation at 6:30 pm, followed by a question and answer session.

I encourage you to participate in the scoping meeting on March 14. If you are unable to attend the meeting but would like additional information about the Inland Avian Predation Management Plan, please contact the project manager, Ms. Cindy Boen at 509-527-7246.

Sincerely,

Rebecca Kalamasz
Chief, Planning Branch

Organization	Name	Address
Admiralty Audubon Society	Rosemary Sikes	P.O. Box 666 Port Townsend, WA 98368
Audubon Society of Corvallis	Will Wright	P.O. Box 148 Corvallis, OR 97339
Audubon Society of Lincoln City	Jack Doyle	P.O. Box 38 Lincoln City, OR 97367
Audubon Society of Portland	Meryl Redisch	5151 Northwest Cornell Road, Portland, Or 97210
Black Hills Audubon Society		P.O. Box 2524 Olympia, WA 98507
Blue Mountain Audubon Society		P.O. Box 1106 Walla Walla, WA 99362
Cape Arago Audubon Society	Eric Clough	P.O. Box 381 North Bend, OR 97459
Central Basin Audubon Society	Jim Herrin	P.O. Box 86 Moses Lake, WA 98837
Coeur d'Alene Audubon Society	Carrie Hugo	P.O. Box 361 Coeur D'Alene, ID 83816
Discovery Coast Audubon Society	Patricia Cruse	P.O. Box 724 Long Beach, WA 98631
Earthjustice	Todd D. True	705 Second Avenue, Suite 203, Seattle, WA 98104
East Cascades Audubon Society	Damian Fagan	P.O. Box 565 Bend, OR 97709
Eastside Audubon Society	Zoe Allen	P.O. Box 3115 Kirkland, WA 98083
Golden Eagle Audubon Society	Pam Conley	P.O. Box 8261 Boise, ID 83707
Grays Harbor Audubon Society		P.O. Box 470 Montesano, WA 98563
Idaho Rivers United	Bill Sedivy	PO Box 633, Boise, ID 83701
Idaho Wildlife Federation	Rob Fraser	PO Box 6426, Boise, ID 83707
Kalmiopsis Audubon Society	Ann Vileisis	P.O. Box 1265 Port Oxford, OR 97465
Kitsap Audubon Society	Jim Ullrich	P.O. Box 961 Poulsbo, WA 98370
Kittitas Audubon Society	Gloria Baldi	P.O. Box 1443 Ellensburg, WA 98826
Klamath Basin Audubon Society		P.O. Box 354 Klamath Falls, OR 97601
Lane County Audubon Society	Maeve Sowles	P.O. Box 5086 Eugene, OR 97405
Lower Columbia Basin Audubon Society	Robin Priddy	P.O. Box 1900 Richland, WA 99352
National Wildlife Federation	Jan E. Hasselman	6 Nickerson Street, Suite 200, Seattle, WA 98109
National Wildlife Federation, Northern Rockies and Prairies Regional Center	Tom France	240 North Higgins, Suite 2, Missoula, MT 59802
National Wildlife Foundation, Pacific Regional Center	Jim Adams	6 Nickerson Street, Suite 200, Seattle, WA 98109
North Cascades Audubon Society	Joe Meche	P.O. Box 5805 Bellingham, WA 98227
North Central Washington Audubon Society	Mark Oswood	P.O. Box 2934 Wenatchee, WA 98807
Olympic Peninsula Audubon Society	Tom Montgomery	P.O. Box 502 Sequim, WA 98382
Pacific Coast Federation of Fisherman's Associations and Institute for Fisheries Resources	Glenn Spain	PO Box 1170, Eugene, OR 97440
Pacific Northwest Waterways Association	Kristin Meira	9115 SW Oleson Road, Suite 101, Portland, OR 97223
Palouse Audubon Society	Tom Weber	P.O. Box 3606 Moscow, ID 83844
Pilchuck Audubon Society	Mike Blackbird	1429 Ave D, PMB 198 Snohnomish, WA 98290
Portneuf Valley Audubon Society	Chuck Trost	225 N. Lincoln Ave. Pocatello, ID 83204
Prairie Falcon Audubon Society	Sarah J. Harris	Twin Falls, ID 83301
Rainier Audubon Society	Stephen Feldmand	P.O. Box 778 Auburn, WA 98071
Rogue Valley Audubon Society	Alex Maksymowicz	P.O. Box 8597 Medford, OR 97501
Salem Audubon Society	Kathleen Cody	189 Liberty Street Northeast Ste. 210 Salem, OR 97301
San Juan Islands Audubon Society	Barbara Jensen	P.O. Box 595 Eastsound, WA 98245
Seattle Audubon Society	Shaun Cantrell	8050 35th. Ave NE Seattle, WA 98115
Siskiyou Audubon Society	Fran Taylor	P.O. Box 2223 Grants Pass, OR 97526

Organization	Name	Address
Skagit Audubon Society	Tim Manns	P.O. Box 1101 Mt. Vernon, WA 98273
Snake River Audubon Society	Mark Delwiche	P.O. Box 2992 Idaho Falls, ID 83403
Spokane Audubon Society	Kim Thorburn	P.O. Box 9820 Spokane, WA 99209
Stoel Rivers, LLP	Beth Ginsberg	600 University Street, Suite 3600, Seattle, WA 98101
Tahoma Audubon Society	Krystal Kyer	2917 Morrison Rd. W. University Place, WA 98466
Umpqua Valley Audubon Society	Diana Wales	P.O. Box 381 Roseburg, OR 97480
Vancouver Audubon Society	Eric Bjorkman	P.O. Box1966 Vancouver, WA 98668
Vashon-Maury Island Audubon Society	Randy Smith	P.O. Box 838 Vashon, WA 98070
Washington Wildlife Federation	Ronni McGlenn	PO Box 1656, Bellevue, WA 98009
Whidbey Audubon Society	Steve Ellis	P.O. Box 1012 Oak Harbor, WA 98277
Willapa Hills Audubon Society	Steve Glucoft	P.O. Box 399 Longview, WA 98632
Yakima Valley Audubon Society	Bill Drenguis	P.O. Box 2832 Yakima, WA 95907

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
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March 5, 2012

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Sincerely,

David A. Caldwell
Lieutenant Colonel, Corps of Engineers
District Commander

TRIBAL/CONGRESSIONAL LETTER SIGNED BY LTC CALDWELL

Recipients: Rep. Hastings
Rep McMorris-Rodgers
Rep. Walden

Senator Murray
Senator Cantwell
Senators Wyden

Senator Merkley

Tribal Chairs:
Colville; Nez Perce; CTUIR; Yakama; Wanapum; Warm Springs

Original letters sent to Congressional DC offices

Honorable Maria Cantwell
311 Hart Senate Office Building
Washington, DC 20510

Honorable Richard (Doc) Hastings
1203 Longworth House Office Building
Washington, DC 20515

Honorable Cathy McMorris Rodgers
2421 Rayburn House Office Building
Washington, DC 20515

Honorable Jeff Merkley
313 Hart Senate Office Building
Washington, DC 20510

Honorable Patty Murray
448 Russell Senate Office Building
Washington, DC 20510

Honorable Greg Walden
2182 Rayburn House Office Building
Washington, DC 20515

Honorable Ron Wyden
223 Dirksen Senate Office Building
Washington, DC 20510

Copies of letter sent to Congressional Local Offices:

HONORABLE RICHARD (DOC) HASTINGS
2715 SAINT ANDREWS LOOP SUITE D
PASCO WA 99301

HONORABLE CATHY McMORRIS-RODGERS
29 SOUTH PALOUSE STREET
WALLA WALLA WA 99362

HONORABLE PATTY MURRAY
402 E YAKIMA AVENUE SUITE 390
YAKIMA WA 98901

HONORABLE MARIA CANTWELL
825 JADWIN AVENUE SUITE 205
RICHLAND WA 99352

HONORABLE GREG WALDEN
1211 WASHINGTON AVENUE
LAGRANDE OR 97850

HONORABLE JEFF MERKLEY
310 SE SECOND STREET
PENDLETON OR 97801

HONORABLE RON WYDEN
SAC ANNEX BLDG
105 FIR STREET SUITE 201
LA GRANDE OR 97850

LETTERS SENT TO TRIBAL CHAIRS AT THESE ADDRESSES

Mr. Brooklyn Baptiste
PO Box 305
Lapwai, ID 83540

Mr. Rex Buck
15655 Wanapum
Village Lane Southwest
Beverly, WA 99321

Mr. Michael O. Finley
PO Box 150
Nespelem, WA 99155-0150

Mr. Les Minthorn
46411 Timíne Way
Pendleton, OR 97801

Mr. Harry Smiskin
PO Box 151
Toppenish, WA 98948-0151

Mr. Stanley "Buck" Smith, Jr.
Confederated Tribes of Warm Springs
1233 Veterans Street
Warm Springs, Oregon 97761

Attachment F: Press Release & Recipient List

NEWS RELEASE

U.S. ARMY CORPS OF ENGINEERS **BUILDING STRONG®**

For Immediate Release:
March 12, 2012
Release No. 12-17

Contact:
Public Affairs Office
509-527-7020

Corps seeks public input for Inland Avian Predation Management Plan; Scoping meeting set for March 14 in Kennewick

KENNEWICK, Wash. – The U.S. Army Corps of Engineers (Corps) invites the public to a public scoping meeting about avian predation issues from 5:30-8:30 p.m. on Wednesday, March 14, in Kennewick, Wash.

Meeting attendees will be encouraged to share their ideas and concerns for consideration in the Corps' 2012 Draft Inland Avian Predation Management Plan. Once finalized, the plan will affect actions undertaken for management of avian predation on juvenile salmonids in the vicinity of the Columbia and Snake rivers, from Bonneville Lock and Dam near Cascade Locks, Ore., to Lower Granite Lock and Dam, near Pomeroy, Wash.

The meeting will begin with an informal open house at 5:30 p.m. at the Three Rivers Convention Center located at 7016 W. Grandridge Boulevard in Kennewick. At 6:30 p.m., Corps staff will provide an overview of the issues related to avian predation on juvenile salmonids and discuss potential actions being considered. After the presentation, attendees will be invited to ask questions, and discuss concerns and ideas.

The meeting facilities are physically accessible to people with disabilities. If you need other accommodations or auxiliary aids, please contact Corps Project Manager Cindy Boen at avianpredator@usace.army.mil or 509-527-7246.

For information about the Inland Avian Predation Management Plan can be found on the Web at www.nww.usace.army.mil/planning/Avian/default.asp. To learn more about the Corps of Engineers and its mission in the Walla Walla District, go to www.nww.usace.army.mil.

-30-

NOTE TO MEDIA: media representatives who wish to schedule interview opportunities with Inland Avian Predation Management Plan project team members should call Public Affairs Specialist Gina Baltrusch at 509-527-7018 not later than noon on Wednesday, March 14.

Media Outlet
Aberdeen Times
Adams County Record
AG Weekly
Agri-Times Northwest
Associated Press
Baker City Herald
Blackfoot Morning News
Boise Weekly
Bonner County Daily Bee
Box Elder News Journal
Buhl Herald
Capital Press
Capps Broadcast Group
Clearwater Progress
Clearwater Tribune
Coeur d' Alene Press
Columbian Basin Bulletin
Confederated Tribes Of The Umatilla Indian Reservation
Daily Inter Lake
Dworshak Reservoir Association
East Oregonian
Eastern Oregon Telecom
Hermiston Herald
High Country News
Idaho Bureau of Homeland Security
Idaho County Free Press
Idaho Farm Bureau
Idaho Magazine
Idaho Mountain Express
Idaho Outdoor Journal
Idaho Press Tribune
Idaho Public Broadcasting Network/KISU-TV
Idaho State Journal
Idaho Statesman
Inland Radio
KACH-AM & FM
KACI-AM
KATU
KAWO-FM/KIDO-AM/KXLT-FM - Boise, ID
KBGN-AM
KBOI Radio
KBOI-Radio
KBXL-FM/KSPD-AM
KCID-AM/KGEM-AM
KCIX-FM
KECH-95

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KIFI
KIPT-TV
KIVI-TV
KIZN
KLCE
KLER-Radio
KLEW-TV
KMGI-FM
KMHI-AM
KMVT-TV
KNIN-TV
KOZE-FM & AM
KPBX-FM
KPVI News 6
KQFC-FM
KQXR-FM
KRLC Radio
KRVB-FM
KSAS-FM
KSKI-FM
KSRV-AM
KSRV-FM
KTRV-TV
KTSY
KTVB-News
Kuna Melba News
KWEI-FM
KWYD-FM
KYZK-FM
KZBG-FM
Lewiston Tribune
Long Valley Advocate
Messenger Index
Milton Freewater Valley Herald
Oregon Public Broadcasting
The Argus Observer
The Dalles Chronicle
The Observer
The Oregonian
The Salt Lake Tribune
Wallowa County Chieftain

Attachment G: Advertisement

US Army Corps of Engineers ®
Walla Walla District

Public Scoping Meeting

Inland Avian Predation Management Plan

The Walla Walla District of the U.S. Army Corps of Engineers invites the public to a scoping meeting about the 2012 Draft Inland Avian Predation Management Plan. This plan will affect actions undertaken for management of avian predation on juvenile salmonids in the vicinity of the Columbia and Snake Rivers, from Bonneville Dam to the Lower Granite Dam.

Corps and contractor representatives will present issues related to avian predation on juvenile salmonids, discuss potential actions, and take comments and ideas from the public. The public will have an opportunity to ask questions, and discuss concerns and ideas.

For information regarding this meeting or the Inland Avian Predation Management Plan, contact Cindy Boen, Project Manager, at (509) 527-7246.

Date:	**Wednesday, March 14, 2012**
Location:	**Three Rivers Convention Center** **7016 W. Grandridge Blvd.** **Kennewick, Washington**
Time:	**5:30 –8:30 Open House** **6:30 Informational Presentation**

APPENDIX G

USFWS ESA Section 7 Biological Assessment and Concurrence Letter

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
Eastern Washington Field Office
11103 East Montgomery Drive
Spokane Valley, Washington 99206

In Reply Refer To:
01EWFW00-2014-I-0089

JAN 6 2014

Michael Francis
Chief, Environmental Compliance Section
Walla Walla District, US Army Corps of Engineers
201 North Third Ave
Walla Walla, Washington 99362-1876
Attn: Ben Tice

Dear Mr. Francis:

Subject: Inland Avian Predation Management Plan (PM-EC-2011-0076),

This letter is in response to your request for informal consultation on the proposed Inland Avian Predation Management Plan (IAPMP) for the Mid-Columbia River at Goose and Crescent Islands in Grant and Walla Walla Counties. On December 12, 2013, our office received your request for consultation and Biological Assessment. The IAPMP was developed in response to Reasonable and Prudent Alternatives defined in the National Marine Fisheries Service (NMFS) Biological Opinion for the Federal Columbia River Power System (FCRPS). During development of the IAPMP, the US Fish and Wildlife Service (Service) has provided comments on species impacts, minimization measures, and other concerns about the plan. This document does not supersede or negate any comments previously submitted by the Service.

The Army Corps of Engineers (Corps) has requested concurrence on a "may affect, not likely to adversely affect" determination for bull trout *(Salvelinus confluentus)* and designated critical habitat for the bull trout. The Corps letter also included "no effect" determinations for Canada lynx, Ute ladies tresses, gray wolf, pygmy rabbit, northern spotted owl, streaked horned lark, yellow-billed cuckoo, wolverine, white bluffs bladderpod, Umtanum desert buckwheat, and Oregon spotted frog. The Service is not required to concur with "no effect" determinations. Therefore, the determinations made rest with the action agency. This informal consultation has been conducted in accordance with section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act).

The Corps proposes to implement an Inland Avian Predation Management Plan as part of requirements defined in the 2008/2010 NMFS FCRPS Biological Opinion and 2013 Draft

Supplement. The plan consists of passive and active methods to dissuade Caspian tern nesting on two inland islands, Goose Island and Crescent Island. In the event Caspian tern nesting occurs, some egg removal and nest destruction will be conducted. Other elements of the plan include modification of island habitat such as berm construction and willow planting, adaptive management, and monitoring of other islands for Caspian tern nesting. The goal of the program is to reduce juvenile salmonid predation as a result of nearby tern nesting. The Biological Assessment describes that plan elements will potentially increase population growth rates by up to 4% for listed Chinook salmon and steelhead. No in-water work is proposed under the plan. The Corps also plans to monitor and dissuade Caspian terns from relocating to other nearby islands as a result of the IAPMP activities.

The Service concurs that the proposed project is "not likely to adversely affect" the bull trout or designated critical habitat for the bull trout. Our concurrence is based on the Biological Assessment, successful implementation of the proposed best management practices and minimization measures, and the rationale described in the following paragraphs.

Bull Trout

The proposed project occurs in the Middle Columbia River watershed, at two islands. Goose Island is located in Potholes Reservoir near Moses Lake, Washington. Bull trout are not found in the Potholes Reservoir or near Goose Island. Crescent Island is located in the Mid-Columbia River near Wallula, Washington. There are no known spawning gravels or complex habitat features found in the project area. The Mid-Columbia River is utilized by adult, sub-adult and juvenile bull trout as a foraging, migratory, and overwintering area for populations located in the Walla Walla, Umatilla, Snake, and Yakima Rivers. Individual bull trout from other source populations may be present in the area as a result of entrainment from upstream hydropower facilities in the Snake and Upper Columbia Rivers. Habitat elements that support bull trout are rare in this stretch of the Columbia River and known bull trout use is very limited.

The proposed project is expected to have minimal, if any, effect on bull trout individuals or their populations. All construction related project activities will occur outside of the water and not affect habitat elements necessary for bull trout foraging in the Mid-Columbia River. Some incidental beneficial effects of the project may result, but are not expected to be measurable or noticeable to bull trout individuals. These beneficial effects could occur from reduced predation, increase populations of a food source (juvenile salmon and steelhead), and from small increases in terrestrial invertebrate and organic material sources due to vegetation plantings. Therefore, due to the lack of measureable effects, all project impacts are insignificant.

Bull Trout Critical Habitat

The entire mainstem of the Columbia River is designated critical habitat for bull trout including the project area. Habitat quality and availability is limited for bull trout in the project area. Primary constituent elements #2 (migratory habitats), #3 (abundant food base), #5 (water temperatures), #8 (sufficient water quality), and #9 (non-native species) are all present in the project area. Of these, #2 (migratory habitats), #5 (water temperatures), #8 (sufficient water quality), and #9 (non-native species) will experience no effects from the project.

Impacts to PCE #3 (abundant food base) in the project area are expected to be minimally beneficial. The addition of willow plantings to Crescent Island may result in insignificant increases in invertebrate and organic material sources. This positive benefit is not expected to be measurable over background conditions.

No long-term impacts to PCEs are expected. Effects from construction activities will be outside of the water and will not permanently modify existing functional primary constituent elements associated with water quality, food base, or migration. Therefore, we believe the proposed project will have no measureable effect on designated critical habitat and will be insignificant.

The project should be reanalyzed if new information reveals effects of the action that may affect listed species or critical habitat in a manner, or to an extent, not considered in this consultation and/or a new species is listed or critical habitat is designated that may be affected by the actions.

If you have any questions about this letter or your responsibilities under the Act, please contact Erin Kuttel at (509) 893-8029 or erin_brittonkuttel@fws.gov.

Sincerely,

Michelle Eames

for Ken S. Berg, Manager
Washington Fish and Wildlife Office

Cc: Jeff Krupka, CWFO

Biological Assessment for the Inland Avian Predation Management Plan

Prepared for

U.S. Army Corps of Engineers

November 2013

Prepared by

Parametrix

Biological Assessment for the Inland Avian Predation Management Plan

Prepared for

U.S. Army Corps of Engineers
Walla Walla District
201 North 3rd Avenue
Walla Walla, Washington 99362

Prepared by

Parametrix
700 NE Multnomah, Suite 1000
Portland, OR 97232-4110
T. 503.233.2400 T. 360.694.5020 F. 503.233.4825
www.parametrix.com

November 2013 | 273-3070-006

CITATION

Parametrix. 2013.
Biological Assessment for the Inland Avian
Predation Management Plan.
Prepared by Parametrix, Portland, Oregon.
November 2013.

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APPENDICES

ACRONYMS

AMIP	Adaptive Management Implementation Plan
AMP	FCRPS Adaptive Management Plan
AWPE	American white pelican
BA	Biological Assessment
BiOp	FCRPS 2008 Biological Opinion and 2010 Supplement
BMP	Best Management Practice
BPA	Bonneville Power Administration
CATE	Caspian tern
CBP	Columbia Basin Project
CHU	Critical Habitat Unit
Corps	United States (U.S.) Army Corps of Engineers
DCCO	Double-crested cormorant
DPS	Distinct Population Segment
EA	Environmental Assessment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FCRPS	Federal Columbia River Power System
IAPMP	Inland Avian Predation Management Plan
IAPWG	Inland Avian Predation Work Group
Lambda (λ)	A symbol representing geometric population growth rate, which is calculated as the population size at a later time divided by the population size at an earlier time. An increase in lambda for a declining population indicates that the population is declining less rapidly and moving closer to a stable population.
LCR	Lower Columbia River
NEPA	National Environmental Policy Act
NMFS	NOAA's National Marine Fisheries Service
PCE	Primary constituent element
PUD	Public Utility District

Reclamation	U.S. Bureau of Reclamation
RM	River Mile
RPA	Reasonable and Prudent Alternative
USDA-WS	U.S. Department of Agriculture Wildlife Services
USFWS	U.S. Fish and Wildlife Service
WDFW	Washington Department of Fish and Wildlife

1. INTRODUCTION

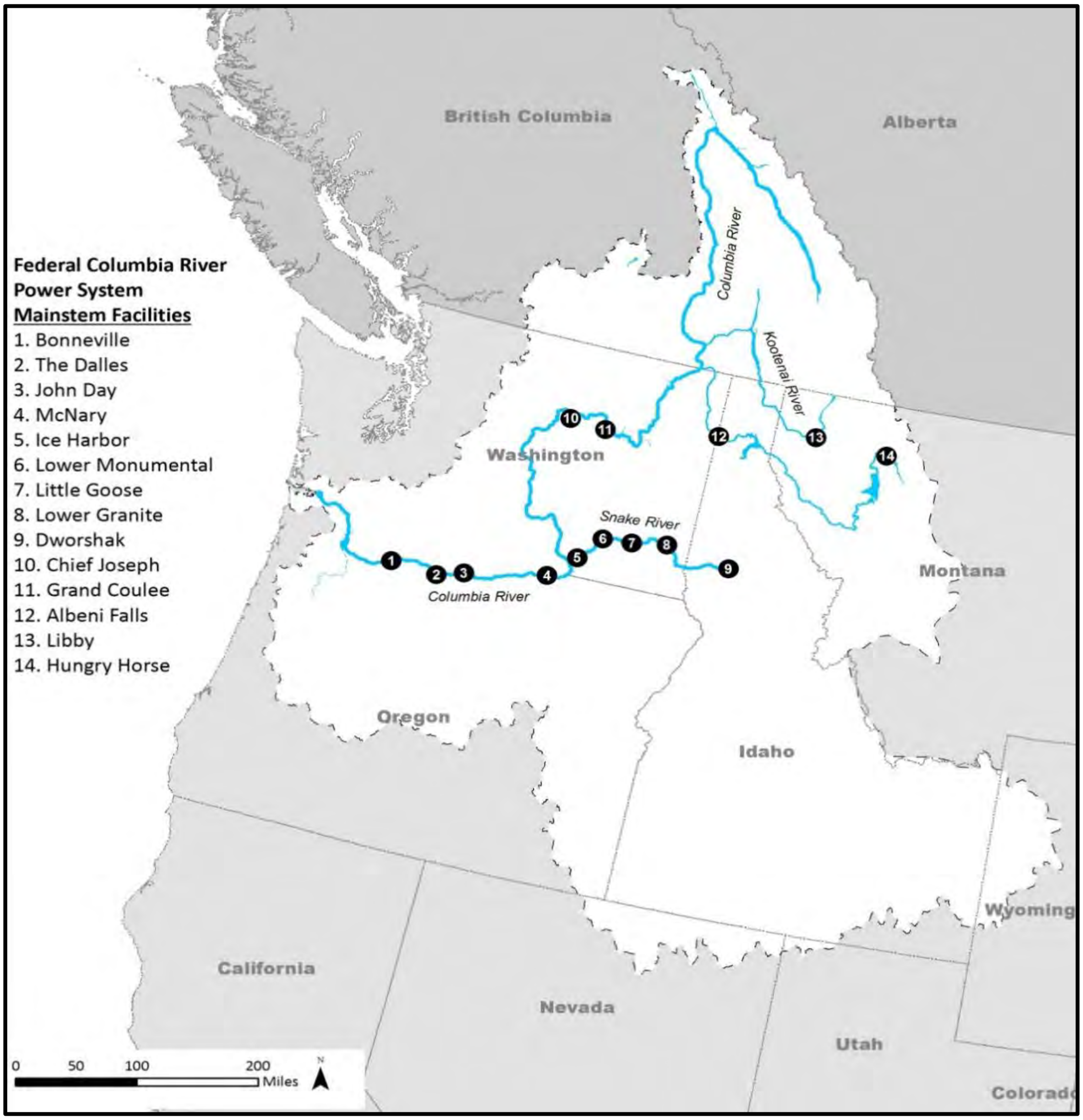
1.1 BACKGROUND

The following Biological Assessment (BA) focuses on an Inland Avian Predation Management Plan (IAPMP) developed for protection of salmonid species occurring within the inland Columbia River Basin. The IAPMP was recommended by NOAA Fisheries (NMFS) in the 2008/2010 Federal Columbia River Power System (FCRPS) Biological Opinion (BiOp). Because adoption and implementation of the IAPMP constitutes a federal action and because salmonid species under the jurisdiction of NMFS have been addressed in the 2008/2010 BiOp, this BA was prepared to address the effects of the IAPMP on bull trout (*Salvelinus confluentus*), federally listed as threatened by the U.S. Fish and Wildlife Service (USFWS), per Section 7 of the Endangered Species Act (ESA).

1.1.1 Regulatory Background

The FCRPS comprises 14 federal multipurpose hydropower projects (Figure 1-1). The 12 projects operated and maintained by the U.S. Army Corps of Engineers (Corps) are Bonneville, The Dalles, John Day, McNary, Chief Joseph, Albeni Falls, Libby, Ice Harbor, Lower Monumental, Little Goose, Lower Granite, and Dworshak Dams. The Bureau of Reclamation (Reclamation) operates and maintains the following FCRPS projects: Hungry Horse Project and the Columbia Basin Project, which includes Grand Coulee Dam. Congress authorized the construction of the FCRPS projects and directed the Corps and Reclamation to operate and maintain these projects for multiple purposes including flood control throughout the Columbia River Basin, navigation in the Columbia and Snake Rivers, hydropower generation, irrigation, fish and wildlife, water quality, municipal and industrial water supply, and recreation.

In 2008, NMFS issued a 10-year BiOp for the FCRPS. This BiOp recommended a Reasonable and Prudent Alternative (RPA) to avoid jeopardizing the continued existence of the species and adverse modification of designated critical habitat for 13 species of salmon and steelhead affected by FCRPS operation including efforts to reduce juvenile and adult salmonid losses from predation by birds, other fish, and marine mammals. In 2009, an Adaptive Management Implementation Plan (AMIP) was developed that specified additional measures, research, and monitoring to buttress the actions of the 2008 BiOp. The BiOp requires the three Action Agencies (the Corps, Reclamation, and Bonneville Power Administration [BPA]) to ensure that their actions meet certain standards when the actions affect "endangered" or "threatened" species as defined by the ESA. The overall predation management objective for all affected salmonid evolutionarily significant units (ESUs) and distinct population segments (DPSs) is to improve the survival of juvenile and adult fish as they pass through the FCRPS.



Source: Adapted from FCRPS Biological Assessment, August 2007.

Figure 1-1. Federal Columbia River Power System Mainstem Facilities.

The RPA in the 2008 BiOp included specific actions to address inland avian predation including:

- RPA Action 47: Inland Avian Predation; the Action Agencies will develop an avian management plan for Corps-owned lands and associated shallow-water habitat.
- RPA Action 68: Monitor and Evaluate Inland Avian Predators; the Action Agencies will monitor avian predator populations in the mid-Columbia River, evaluate their impacts on outmigrating juvenile salmonids, and develop and implement a management plan to decrease predation rates, if warranted.

In accordance with the August 2, 2011 U.S. District Court for the District of Oregon Order, the 2010 FCRPS Supplemental BiOp was remanded to NMFS. In response, NMFS prepared the Draft 2013 Supplemental BiOp, which was released for public comment. This draft contains the following reference to the IAPMP:

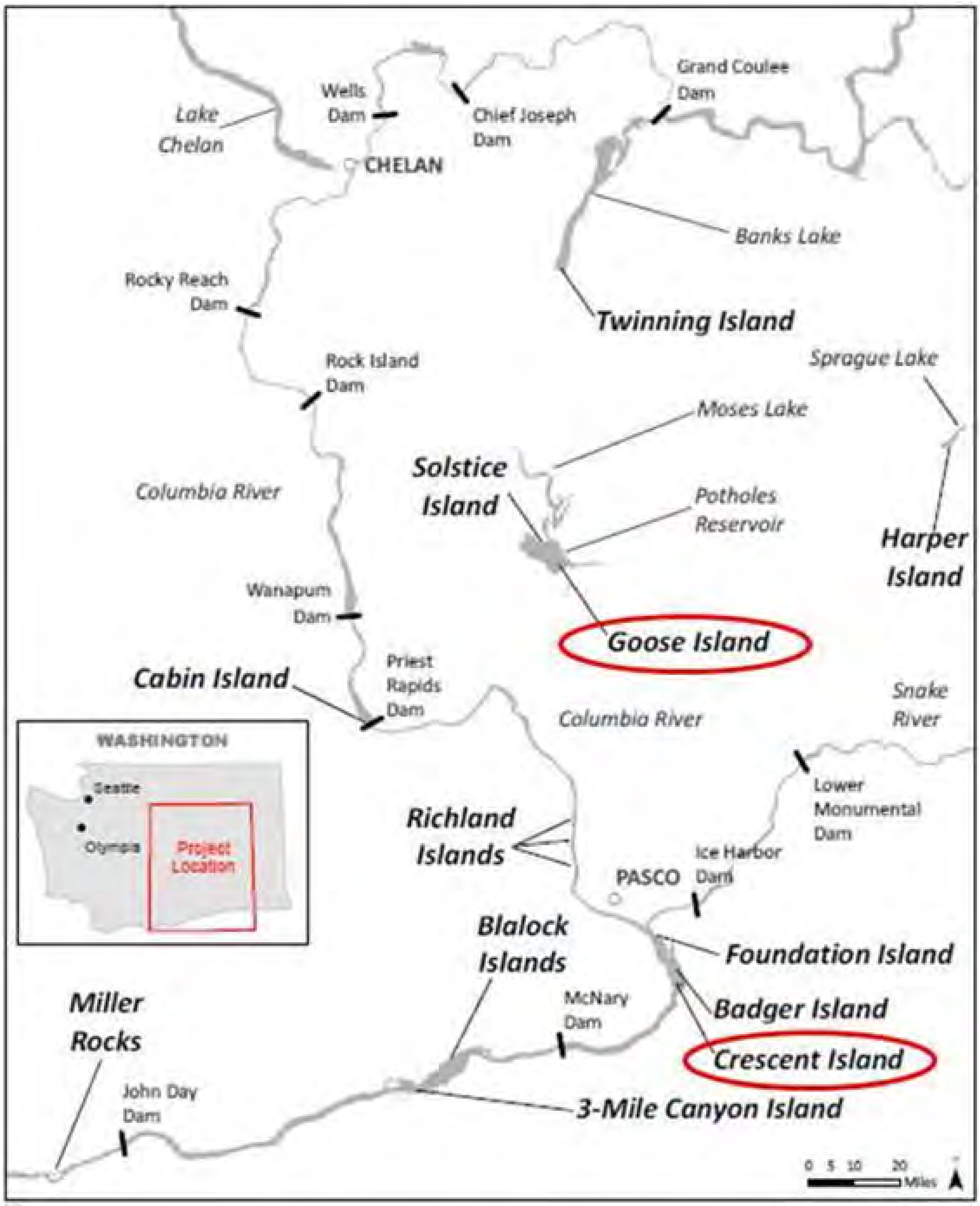
- The 2008 BiOp (RPA Action 47) also required the Action Agencies to develop an inland avian predator management plan. This plan and an associated Environmental Assessment are expected in early 2014, which will be in time for limited implementation prior to the 2014 nesting season. At this time, only Caspian terns nesting on Goose Island in Potholes Reservoir and Crescent Island in the Columbia River are slated for management action (e.g., reductions in nesting habitat). If successful, the expected survival benefits to Upper Columbia River steelhead and spring Chinook (up to 11.4 percent and 3.0 percent, respectively) would be realized in 2014. Additional benefits to Upper Columbia and Snake River ESUs/DPSs may follow in subsequent years once alternative tern habitat can be developed.

This statement is consistent with the proposed phased approach outlined in this document and the benefits described are consistent with those assumed for actions at Goose Island described in this document.

1.1.2 Research and Studies

Between 2004 and 2009, up to 93,000 colonial waterbirds from five different species were documented to be nesting each year in the inland Columbia River Basin region (Lyons et al. 2011a). These species include Caspian terns (CATE), double crested cormorants (DCCO), American white pelicans (AWPE), California gulls, and ring-billed gulls (RBGU), nesting at 18 different colonies at 12 geographic locations (Figure1-2). Recent research found that these waterbirds together consumed well over one million juvenile salmonids annually during that same time period (Lyons et al. 2011b). These studies stated that although inland colonies are much smaller than their Columbia

River estuary counterparts, inland colonies can be much more dependent on salmonids for food and have a higher per capita impact on salmonids. The greater reliance on salmonids, in tandem with a lower diversity of salmonid stocks in comparison to the estuary, is responsible for the unexpectedly high impact on salmonids.

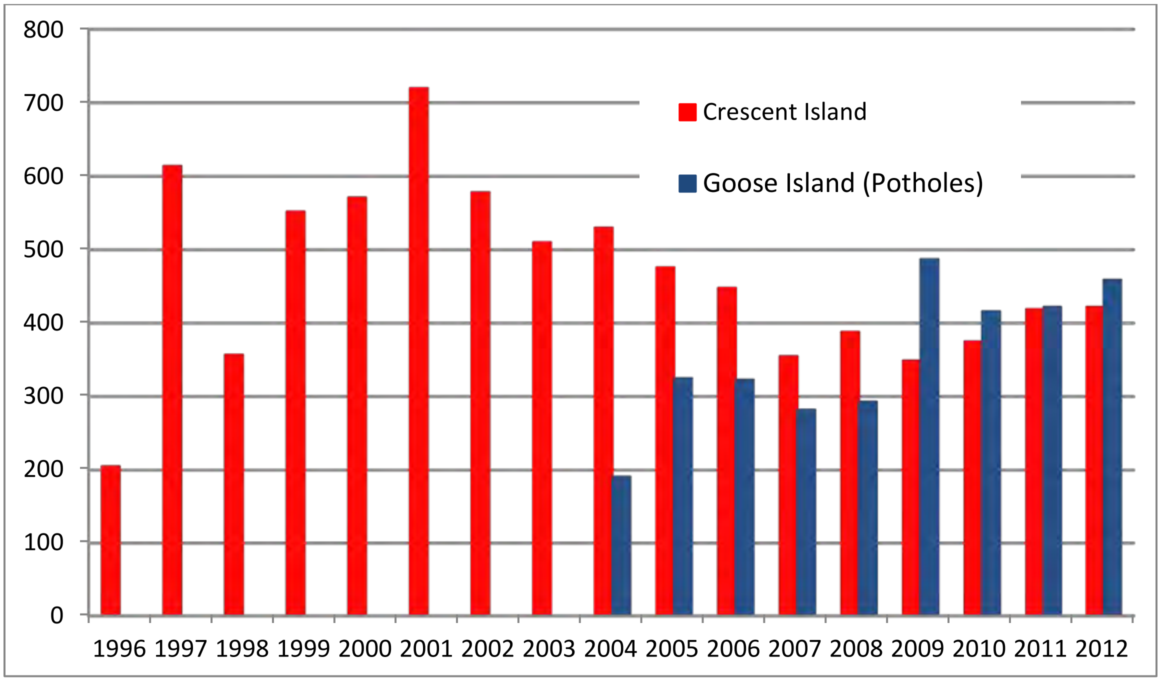


Source: Modified from Roby et al. 2013.

Figure 1-2. Project Area in the Columbia River Basin – This figure shows the locations of active and former breeding colonies of piscivorous colonial waterbirds.

The Corps commissioned a study, hereinafter referred to as the Benefits Analysis, to assess the effects of potential inland avian management activities on increasing the average annual salmonid population growth rates (Lyons et al. 2011a). This study became the biological basis for the development of the IAPMP. The Benefits Analysis focused primarily on the five species of colonial waterbirds mentioned above. Data were collected from the 18 different breeding colonies used by these five species during 2004 to 2010 (Adkins et al. 2011). The goal of this analysis was to estimate benefits to salmonid populations from potential reductions in avian predation by colonies of piscivorous waterbirds in the inland Columbia River Basin region. Using predation rate data for inland bird colonies (i.e., upstream of Bonneville Dam) and the framework of a simple deterministic population growth model, potential changes in juvenile salmonid survival due to reductions in avian predation was translated into increases in the average annual population growth rate referred to as lambda (λ).

This study identified nesting colonies of CATEs at Goose and Crescent Islands as major contributors to salmonid predation in the inland Columbia River Basin (Lyons et al. 2011a, 2011b). In 2012, these colonies had over 400 pairs of nesting CATEs each (Roby et al. 2013), and are the two largest CATE colonies in the inland region. The number of CATE pairs at Crescent Island has fluctuated between 200 in 1996 and 720 at the highest in 2001 (USFWS 2013a personal communication). At Goose Island, CATEs began nesting in 2004 when there were 191 pairs and increased to a high of 487 pairs in 2009 (USFWS 2013a personal communication) (Figure 1-3). In 2010, the Goose Island CATE colony consumed an estimated 110,000 to 134,000 juvenile salmonids. The consumption rate by CATEs on Crescent Island for 2010 was an estimated 420,000 juvenile salmonids from the Columbia and Snake Rivers combined.



Source: USFWS 2013a personal communication, Roby et al. 2013.

Figure 1-3. Numbers of CATE Pairs at Goose and Crescent Islands 1996 to 2012.

The estimated predation rate by CATEs nesting at Goose Island/Potholes Reservoir in 2012 (17.0 percent) was higher than the estimate in 2011 (12.7 percent), and was the second highest estimate since this study began in 2008. Higher predation rates in 2012 coincided with increased numbers of CATE nesting at Goose Island/Potholes in 2012, supporting a suggestive positive relationship between annual predation rates on steelhead and the number of CATE breeding pairs at the Goose Island/Potholes colony, which fluctuates from year to year (Roby et al. 2013).

Based on PIT tag recovery data, it is estimated that Goose Island CATEs have had up to a 14.6 percent predation rate on Upper Columbia River steelhead, and Crescent Island CATEs up to a 2.7 percent predation rate on Snake River steelhead (Table 1-1). In comparison to CATEs, predation rates on salmonids by other bird species, when adjusted to account for the portion of juvenile salmonid transported around the inland Columbia River Basin waterbird colonies, appear to be much lower (less than 2 percent) (Lyons et al. 2011b).

Table 1-1. CATE Predation Rates from 2007 to 2010 on Select Islands – Rates are adjusted to account for fraction of the ESU transported around the Columbia Plateau waterbird colonies

		Chinook (%)			Sockeye	Steelhead (%)	
Bird	**Island**	**SR[b] (sp/su)**	**SR[b] (fall)**	**UCR[c] (sp)**	**SR[b]**	**SR[b]**	**UCR[c]**
CATE	Goose	-	-	3.0	-	-	14.6/11.4[a]
CATE	Crescent	0.6	0.6	0.4	0.6	2.8	2.7/2.3[a]
CATE	Blalock	0.1	<0.1	0.1	≤0.1	<0.4	0.7
DCCO	Foundation	0.8	0.4	<0.1	1.1	1.6/1.4[a]	0.1
Gulls[d]	Miller Rocks	0.3	0.3	0.4	0.6	1.2	1.6

Source: Lyons et al., 2011a.

Notes:

a Hatchery reared fish/wild fish where there was a significant difference

b SR=Snake River

c UCR=Upper Columbia River

d Both ring-billed and California gulls

The Benefits Analysis concluded the greatest benefits to salmonids would result from reducing predation by CATEs at the Goose and Crescent Island colonies. The largest potential benefits in reducing predation by a single colony is at Goose Island, with up to a 4.2 percent increase in λ for Upper Columbia River (UCR) steelhead and a 0.7 percent increase in λ for UCR Chinook (see Benefits Analysis, Table 8 [Lyons et al. 2011a]). The maximum λ benefits for Crescent Island are 0.7 percent for Upper Columbia River steelhead and 0.5 percent for Snake River steelhead. The potential benefits to Snake River steelhead were lower, in part, because large portions of juvenile salmonids are transported downstream in barges and are therefore unavailable to avian predators in the mid-Columbia River. Furthermore, there is a broader array of salmonid ESUs within the foraging range of CATE nesting at Crescent Island such that CATE consumption rates by individual ESU are generally lower than predation rates on UCR steelhead for CATE nesting at Goose Island. These reductions in predation rates and increase to λ assume the entire colony will be dissuaded from Goose Island and not relocate elsewhere within the foraging range of the Columbia River Basin.

In comparison to CATE nesting at Goose Island and Crescent Island, the incremental benefits to salmonids are expected to be substantially lower through reductions in predation by other avian predators within the inland Columbia River Basin including CATEs at Blalock Islands, DCCOs at Foundation Island, and gulls nesting on Miller Rocks. The management of these other inland waterbird colonies appears to provide only marginal or undetectable reductions in predation and population growth rate increases.

Based on these results, it was determined that the greatest potential for increasing juvenile salmonid survival by managing inland avian predators will be gained by focusing management efforts on CATEs at Crescent and Goose Islands. Efforts to reduce predation by other existing or incipient piscivorous waterbird colonies may warrant consideration in the future based on data obtained through the adaptive management portion of the IAPMP or through other data sources.

1.1.3 Purpose of the Biological Assessment

The purpose of this BA is to ensure that the IAPMP, a federal action, complies with the requirements of the ESA. The IAPMP is being prepared to develop a program with the greatest potential to reduce avian predation-related loss of juvenile salmonids in compliance with the 2008 NMFS BiOp as amended in 2010. Because salmonid species under the jurisdiction of NMFS have been addressed in the 2008/2010 BiOp, this BA has been prepared to address the effects of the IAPMP on bull trout, listed federally under the jurisdiction of the USFWS.

1.1.4 Project Purpose and Need

The purpose of the proposed action is to increase survival of ESA-listed juvenile salmonids by reducing predation-related losses from CATE colonies at Crescent and Goose Islands through development and implementation of an IAPMP, in accordance with the FCRPS BiOp. The effectiveness of CATE dissuasion at Goose and Crescent Islands would be enhanced by actions to limit CATEs from forming new colonies and/or expanding existing colonies within the Columbia River Basin. The IAPMP will include habitat enhancement measures to attract CATEs to areas outside the basin, and adaptive management dissuasion actions to limit the formation or expansion of incipient colonies within the basin. In addition to providing substantial and achievable benefits to ESA-listed salmonids, the IAPMP actions should minimize impacts to CATEs, which are protected under the Migratory Bird Treaty Act (MBTA), as well as other resources and species of concern, in compliance with all applicable laws. The need for action is based on the FCRPS Action Agencies' requirement to avoid jeopardizing the listed species pursuant to the FCRPS BiOp. The IAPMP uses adaptive management and a phased approach to implementation to allow for a major portion of the benefits to be realized early during implementation (consistent with the Draft 2013 Supplemental BiOp), while additional information is garnered and uncertainties are resolved through adaptive management. Additional benefits for ESA-listed salmonids would be achieved in later years of implementation.

1.2 LISTED SPECIES AND CRITICAL HABITAT

Table 1-2 notes the names, the ESU/DPS designation, and ESA status of the species addressed in this consultation.

Table 1-2. Species Addressed[a]

Common Name	Scientific Name	ESU or DPS	Federal ESA Status
Bull trout	*Salvelinus confluentus*	Columbia River DPS of Conterminous U.S.	Threatened
Canada lynx[b]	*Lynx canadensis*	Contiguous U.S. DPS	Threatened
Ute ladies'-tresses[b]	*Spiranthes diluvialis*	Not applicable	Threatened
Spalding's catchfly[b]	*Silene spaldingii*	Not applicable	Threatened
Gray wolf[b]	*Canis lupus*	Not applicable	Endangered
Pygmy rabbit[b]	*Brachylagus idahoensis*	Columbia Basin DPS	Endangered
Northern spotted owl[b]	*Strix occidentalis caurina*	Not applicable	Threatened
North American Wolverine[b]	*Gulo gulo luteus*	Contiguous U.S. DPS	Proposed Threatened
Umtanum desert buckwheat[b]	*Eriogonum codium*	Not Applicable	Proposed Threatened
White Bluffs bladderpod[b]	*Physaria douglasii* ssp. *tuplashensis*	Not Applicable	Proposed Threatened
Oregon spotted frog[b]	*Rana pretiosa*	Not Applicable	Proposed Threatened

a USFWS species lists for Grant, Walla Walla, Benton, Klickitat, Franklin and Morrow counties are located in Appendix A; review of Candidate Species potentially occurring within the project area is located in Appendix B.

b These species are addressed in the No Effect analysis (see Appendix C).

Listed species within Table 1-2 that could (based on USFWS species lists) potentially occur in the proposed project area, but that analysis has determined will not be affected by the project, are addressed within a No Effect analysis.

Critical habitat is designated for the Columbia River bull trout DPS within the mainstem Columbia River, including the project area.

1.3 CONSULTATION HISTORY

This section provides information on the ESA consultation history that pertains specifically to the action being proposed considered within the action area.

As mentioned above, the preparation of the IAPMP was required in the 2008 NMFS BiOp (RPA Action 47), as amended in 2010. NMFS, in early January 2012, indicated that ESA consultation for salmonid species has been fully addressed in the 2008/2010 BiOp, and that no further consultation for salmonids would be necessary. This determination was confirmed in September 2013.

During the development of IAPMP, reviews of PIT tag data recovered from Crescent Island revealed information indicating CATEs may have consumed ESA-listed juvenile bull trout. After careful consideration by the Corps, it was determined that the proposed alternatives addressing the management of CATEs would potentially have a beneficial effect (although very small) on bull trout, and as a result, would trigger the need for ESA Section 7 consultation.

In January 2013, Corps contacted the USFWS Eastern Washington Field Office regarding consultation on the IAPMP, and the USFWS confirmed that actions at Crescent and Goose Island would be under their jurisdiction. In February 2013, the Corps provided the USFWS with a draft description of the alternatives being considered. Based on the review of these alternatives and the fact that adverse effects are not anticipated, it was determined that informal consultation would likely be sufficient.

The consultation requirement of Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) directs Federal agencies to consult with NMFS on all actions, or proposed actions that may adversely affect Essential Fish Habitat (EFH). Adverse effects include the direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside EFH, and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR § 600.810). Section 305(b) also requires NMFS to recommend measures that may be taken by the Action Agency to conserve EFH.

Under the Pacific salmon EFH designation, Chinook salmon (*O. tshawytscha*) and coho (*O. kisutch*) salmon EFH is present within the action area; however, EFH for these species has been addressed in the 2008/2010 BiOp. Because this BA has been prepared to address bull trout, a non-EFH species, and because there will be no adverse effects to EFH from actions within the IAPMP, no further consultation under the MSA is required.

2. DESCRIPTION OF THE PROPOSED ACTION

The purpose of the proposed action is to increase survival of ESA-listed juvenile salmonids by reducing predation-related losses from CATE colonies at Crescent and Goose Islands through development and implementation of an IAPMP, in accordance with the FCRPS BiOp. The IAPMP is being prepared to develop a program with the greatest potential to reduce avian predation-related loss of juvenile salmonids in the Columbia River Basin. Based on the selection process during the development of an EA under NEPA, it was ultimately decided that for the purpose of the IAPMP, actions to CATEs at Goose and Crescent Islands presented the most robust opportunities for achieving benefits to salmonid growth rates within the inland Columbia River Basin (Figure 2-1).

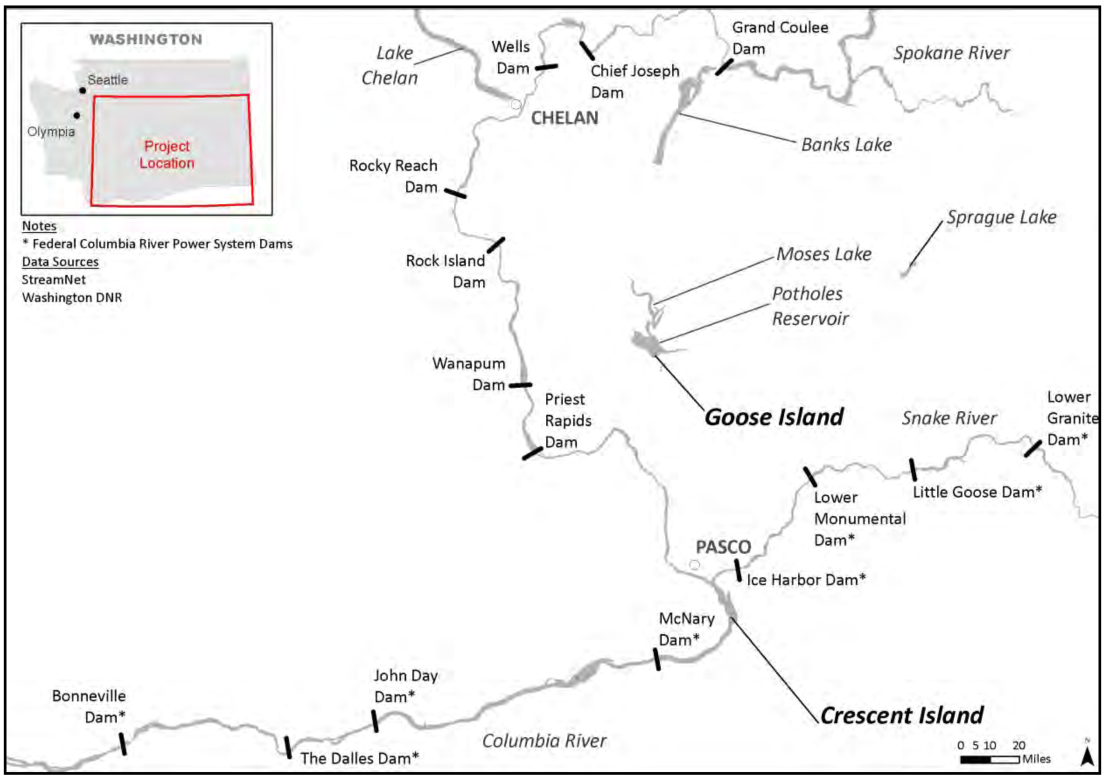


Figure 2-1. Vicinity Map.

2.1 LOCATION

The proposed project study area includes areas within the inland Columbia River Basin, from Bonneville Dam to Chief Joseph Dam and including related adjacent inland areas in Oregon and Washington. As identified in the Purpose and Need, the focus of initial management actions is on Goose and Crescent Islands. However, the geographic scope also includes at-risk islands where there is a probability of incipient CATE colony expansion or new establishment within the inland Columbia River Basin.

For further discussion on at-risk islands please see Section 2.6 below.

The potential effects associated with dissuasion at both Crescent and Goose Islands and potential adaptive management actions at ten at-risk islands are evaluated at a site-specific level. Given that the potential sites where these actions may occur are wide-ranging from southern California to Alaska, and the potential effects could differ widely depending on the site(s) that are selected, these actions will also require subsequent analysis prior to implementation.

Crescent Island and several other at-risk islands are managed by the USFWS as part of the McNary National Wildlife Refuge. Crescent Island was transferred to the USFWS from the Corps in 2007 as documented in Public Law 110-114. However, by this law, the Corps maintains the ability to carry out management of avian predation management on juvenile salmonids at these locations. Goose and Crescent Islands, where primary actions that aim to dissuade CATE nesting will occur, are within Grant and Walla Walla Counties, Washington. At-risk island, where secondary actions are proposed, are located within the following counties: Grant, Walla Walla, Franklin, Benton, and Klickitat Counties in Washington and Morrow County in Oregon.

2.2 PROJECT DESCRIPTION

The project will consist of a two-phase approach and aims to dissuade CATE nesting on Goose and Crescent Islands and provide conditions suitable for new CATE colonies outside of the inland basin and distant from ESA-listed salmonid populations. The approach outlined below will require monitoring and additional analysis prior to implementation of the habitat enhancement in Phase 2 to document site-specific conditions and potential environmental effects. As part of implementation, continued coordination with stakeholders and resource agencies will occur throughout both phases of the project.

Phase 1 of this approach includes the following actions:

- On Goose Island, passive hazing will be combined with active hazing of CATEs and gulls, and, if needed, limited CATE egg take.
- If needed, the formation of incipient CATE colonies on Crescent Island will be prevented by using passive hazing and active hazing of CATEs and gulls, and, if needed, limited CATE egg take.
- Willows will be experimentally planted on Crescent Island to evaluate their survival.

- If necessary, dissuasion actions will be implemented on at-risk islands—islands where there is a high risk for incipient CATE colonies to establish.
- CATE habitat enhancement site research and National Environmental Policy Act (NEPA) analysis will be completed.

Phase 2 of the plan includes the following actions:

- CATE habitat enhancement site(s) will be prepared to attract CATE nesting.
- If necessary, Goose Island substrate may be modified by adding large rubble to further dissuade nesting.
- In order to dissuade the primary CATE colony on Crescent Island, vegetation will be planted and/or a berm may be constructed (passive hazing). As necessary, active hazing of CATEs and gulls, and, if needed, limited CATE egg take may be conducted.
- CATE dissuasion will be performed as needed on at-risk islands.

The implementation sequence for the various actions in Phases 1 and 2 is shown on Table 2-1. It is anticipated that Year 1 will occur as early as 2014. The year these actions are actually initiated, however, will be dependent on the availability of funding and the timing of planning efforts for Phase 2 activities and may occur sooner or later than indicated in the table.

Table 2-1. Estimated Habitat Modification Phased Implementation Timeline

Action	Year 1	Year 2	Year 3	Year 4	Year 5
Phase 1					
On Goose Island, implementation of passive hazing outside the nesting season.	X	X	X	(X)	(X)
If needed, formation of incipient CATE colonies on Crescent Island will be prevented by using passive hazing measures outside the nesting season.		(X)	(X)		
Willows will be experimentally planted on Crescent Island to evaluate survival.	X				
If necessary, dissuasion actions will be implemented on at-risk islands—islands where there is a high risk for incipient CATE colonies to establish.		(X)	(X)		
Habitat enhancement site research and NEPA analysis will be completed.	X	(X)			

Action	Year 1	Year 2	Year 3	Year 4	Year 5
Phase 2					
Habitat enhancement site(s) will be prepared to attract CATE nesting.			X		
If necessary, Goose Island substrate may be modified by adding large rubble to further dissuade nesting.				(X)	(X)
In order to dissuade the primary CATE colony on Crescent Island, vegetation may be planted and/or a berm may be constructed (passive hazing).				X	(X)
CATE dissuasion will be performed as needed on at-risk islands.				(X)	(X)

Note: (X) is Implemented only if warranted.

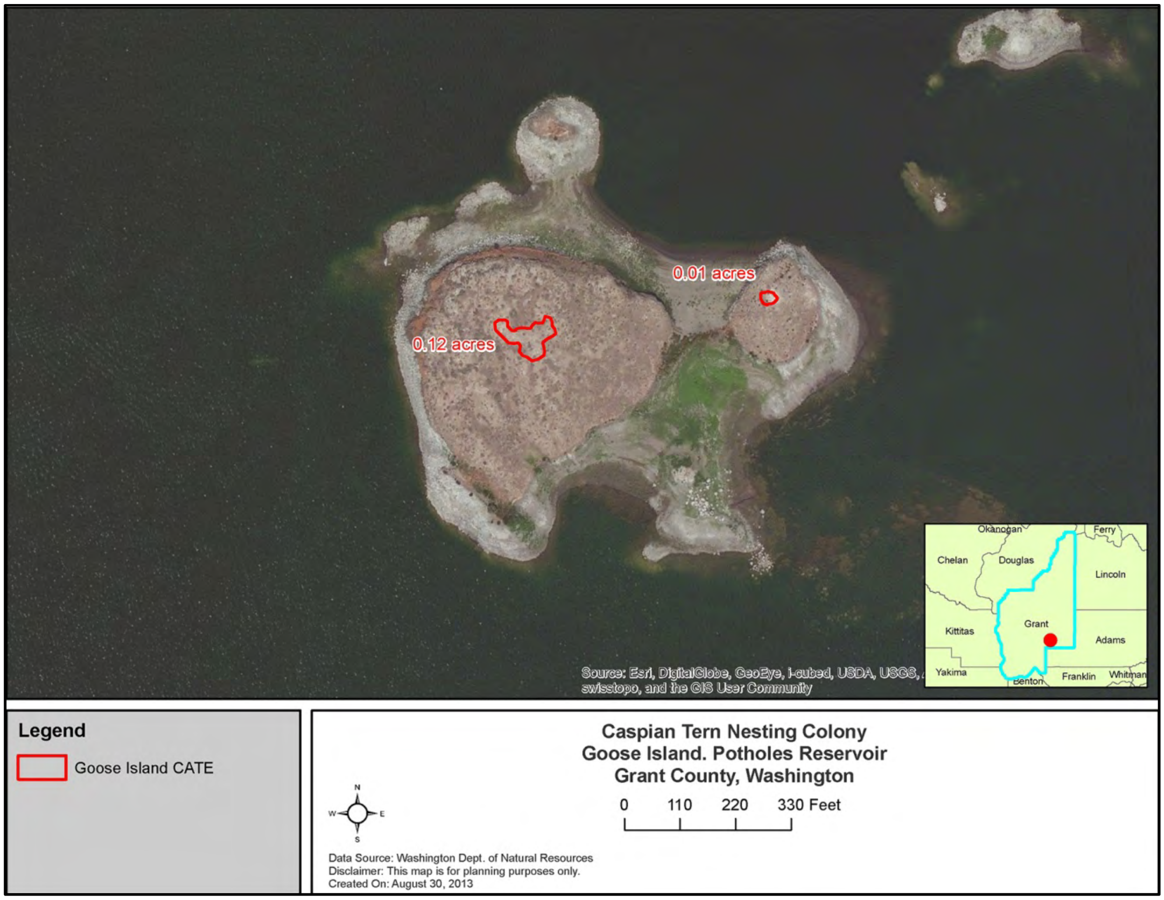
2.3 GOOSE ISLAND DISSUASION PLAN

This section covers all base actions (non-adaptive management actions) on Goose Island, including passive and active hazing (dissuasion, including limited egg take if needed) and monitoring. Additional details are contained in the FCRPS Adaptive Management Plan (AMP). In order to avoid potential take of gulls during CATE hazing activities, both CATEs and gull species will be dissuaded from establishing nests in the vicinity of either the east or the west colony sites during the hazing period.

2.3.1 Phase 1

2.3.1.1 Passive Hazing Methods

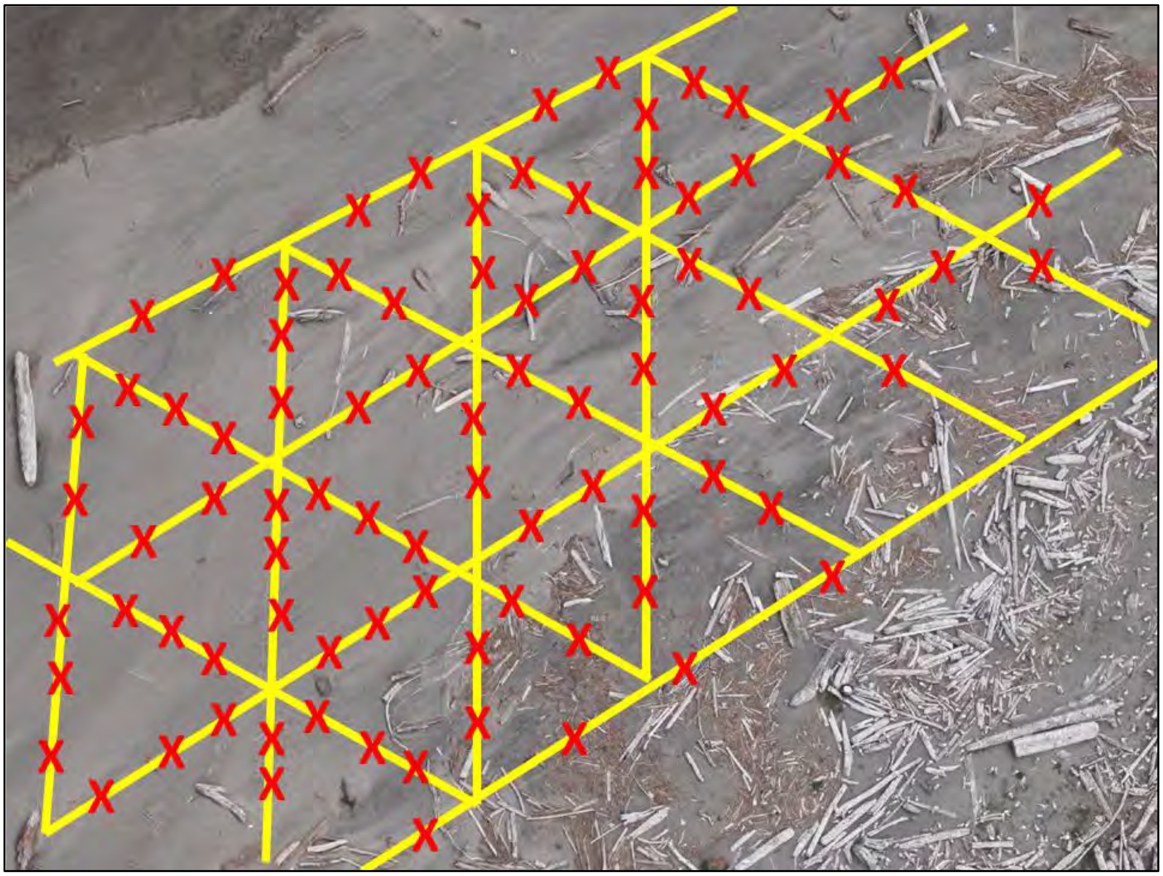
Phase 1 of these actions will consist of temporary installation of pier blocks with rope and flagging (passive hazing) within the two CATE nesting areas on Goose Island (Figure 2-2) immediately prior to the Year 1 nesting season. Posts (4 feet tall, 4 x 4 inches) will be inserted into pier blocks spaced at 10-foot intervals. Rope material, approximately 0.5-inch in diameter, will be strung between the posts. Two or more pieces of approximately 4-foot-long flagging material will be inserted into the rope between each post so the flagging hangs down and flutters in the wind (Figure 2-3).



Source: BRNW 2011.

Figure 2–2. Locations of CATE Colonies on Goose Island, Potholes Reservoir.

Rope and flagging on Goose Island will provide a proven, effective, and inexpensive solution where soil characteristics, precipitation levels, and slope limit other available dissuasion options, such as planting vegetation (Roby et al. 2013). This is similar to an approach used to dissuade CATEs from nesting at East Sand Island in the Columbia River estuary. To prevent CATEs from expanding their nesting into areas immediately beyond the present colony locations on Goose Island—into areas currently used by nesting gulls and other small plots where CATEs have attempted to nest in the past—the dissuasion area will be expanded to cover all likely potential nesting areas on the west island (approximately 1.2 acres) and east island (approximately 0.3 acre), a total dissuasion area of approximately 1.5 acres. Table 2–2 lists the estimated amount of materials required to cover the dissuasion area on Goose Island.



Source of underlying photograph: BRNW 2012.

Figure 2–3. Layout of Posts and Flagging Used to Dissuade CATE Nesting on East Sand Island – Yellow lines designate yellow rope and each red X represents a length of flagging tied to the rope.

Table 2–2. Estimated Quantity of Passive Hazing Materials on Goose Island

Area	Dissuasion Area	Pier Blocks and Posts	Rope (ft)	Flagging (ft)
Goose Island West	51,400 sf = 1.2 ac	565	17,810	21,440
Goose Island East	13,450 sf = 0.3 ac	155	4,650	5,570
Totals:	**64,900 sf = 1.5 ac**	**750**	**22,460**	**27,010**

If CATEs begin nesting beyond the initial 1.5-acre installation on Goose Island, the need for additional dissuasion measures will be assessed. Locations will be determined based on reconnaissance efforts, with additional passive hazing measures expected to cover no more than 1 acre.

Phase 1 will generally occur in project Years 1 through 3, with the option to continue during Phase 2 based on results of the first 3 years. Results of hazing activities on Goose Island will be monitored daily, or as warranted, during the CATE nesting season from approximately late February to early

July, or until nest initiation attempts have stopped. Active hazing efforts (see Active Hazing Methods below) may be reduced in Years 2 through 4 if passive hazing measures appear to be successful. Unless substrate modifications are implemented in Phase 2, passive hazing on Goose Island will continue until a decision is made that it is no longer needed.

2.3.1.2 Active Hazing Methods

In contrast to the habitat modification of passive hazing, active hazing on Goose Island will consist of actions directed specifically at the birds themselves. Active hazing will consist of people chasing CATEs and gulls away from potential nest sites and flattening nest scrapes. Active daily hazing will be employed during the CATE and gull breeding season, starting with the arrival of the first CATEs or gulls at the colony and ending when the first gull eggs are laid, approximately from late February to early July. If CATEs lay eggs, take would be allowed and hazing could continue until a maximum number of CATE eggs are taken (see Egg Take below). Active hazing will be used in conjunction with passive hazing throughout the dissuasion periods. To successfully dissuade all CATEs and gulls from nesting on Goose Island, hazing will begin prior to sunrise and finish after sunset.

Maintaining a regime of daily hazing will prevent CATEs and gulls from nesting on dissuasion islands. This daily hazing may be interrupted due to factors such as inclement weather that could make boat access challenging and/or dangerous. In cases where hazing is expected to be precluded by events such as inclement weather, hazing staff may camp overnight to ensure hazing activities are commenced the following day. However, hazing staff will not camp overnight in cases of lightning storms or other weather events deemed unsafe. Active hazing on Goose Island will continue through Phase 2 as warranted.

2.3.1.3 Egg Take

Even with the passive and active hazing activities in place, it is possible that some CATE eggs may need to be taken from Goose Island. CATE egg take will only be instigated after active and passive hazing activities have been conducted to the maximum extent possible (i.e., implementation of active and passive hazing efforts) and actions are still required to prohibit reestablishment of the colony. It is likely that no more than three or four eggs per year would actually need to be taken to achieve the IAPMP goals, based on experience in the Columbia River estuary where there are many more CATEs (Roby et al. 2013). A permit for the take of up to 200 eggs on both dissuasion islands and all at-risk islands combined per year will be requested by the Action Agencies to ensure success of dissuasion activities. It is assumed that five consecutive years of active hazing plus egg take will discourage CATEs from nesting on Goose Island.

2.3.1.4 Monitoring and Performance Metrics

Goose Island will be monitored for CATEs daily during hazing activities from approximately late February to early July. Monitoring of CATEs on Goose Island will be conducted using early morning ground counts made by observers in blinds at the edge of each colony, by boat, and on foot in areas with potential for minimal disturbance to nesting birds. Monitoring will determine the annual number of CATE nesting pairs on Goose Island. The measure of success of dissuasion activities will be 100 percent dissuasion of CATEs from Goose Island during Years 1 through 5 of implementation.

The reduction in predation on ESA-listed salmonids will be assessed based on the established relationship between monitored predation rates and CATE colony sizes. Success will be determined through annual CATE population surveys, extrapolated predation rates, and PIT tag recovery for confirmation, as needed. The final target metric is for a predation rate of less than 2 percent on any ESA-listed salmonid stock.

2.3.2 Phase 2

2.3.2.1 Passive Hazing Methods

Depending on the success achieved during Phase 1 of the project and the operations and maintenance costs and challenges, permanent substrate modification will be considered for Goose Island in Phase 2. The use of baseball-size (or larger) cobble or boulders to create an unsuitable nesting substrate for the CATEs will be a more permanent and less maintenance-intensive dissuasion method that will cover the same area where roping and flagging was deployed in Phase 1. An established rock pit near Banks Lake could provide a source for cobble/boulder material, which could be hauled and deposited on Goose Island by helicopter or boat then spread across the nesting area by a labor crew of up to 10 people. If substrate modification is not undertaken, passive hazing using rope and flagging will occur until a decision is made that it is no longer warranted.

2.3.2.2 Monitoring and Performance Metrics

Monitoring will continue during Phase 2 as described for Phase 1.

2.4 CRESCENT ISLAND DISSUASION PLAN

This section covers all base (non-adaptive management) actions on Crescent Island, including passive and active hazing (dissuasion) and monitoring. It includes a reference to measurements and targets associated with dissuasion activities during both Phase 1 and Phase 2 activities. Additional details are contained in the AMP. To minimize the potential for take of gull eggs during CATE hazing activities, both CATEs and gulls will be dissuaded from establishing nests in the vicinity of the existing CATE colony at Crescent Island. If additional CATE nesting occurs outside of the anticipated areas of nest establishment (area immediately adjacent to existing colony site), hazing of this newly established nest area may be delayed until the successive nesting season if it will potentially cause take of gulls.

2.4.1 Phase 1

2.4.1.1 Passive Hazing Methods

Passive hazing on Crescent Island in Phase 1 will consist of experimental vegetation plantings along with temporary ropes and flagging as needed to limit the formation of incipient CATE colonies. Experimental willow plantings (*Salix exigua* or similar native species) would be used to gather additional information on planting needs during Phase 1. Experimental plantings will be made along the shoreline near the 2010/2012 failed colony site at least 100 feet from the existing CATE colony to assess planting success. An estimated 75 willow whips will be planted at approximately 1 foot apart to a depth of up to 4 to 6 feet to facilitate access to groundwater. Experimental planting techniques include planting whips at different depths, using different sizes, using different watering schemes, or other methods yet to be determined. The Phase 1 experimental plantings are designed to assess effectiveness of planting techniques with potential ancillary benefits of precluding the formation of incipient CATE colonies.

In the event that incipient CATE colonies form on Crescent Island away from the primary colony, temporary passive hazing structures (i.e., ropes and flagging) will be placed on the island prior to the following nesting season. Temporary passive hazing structures may be installed in conjunction with active hazing measures, as described below, to limit the formation of incipient CATE colonies during implementation of Phase 1. The methods to be utilized for these passive hazing structures will be similar to those used for Goose Island.

2.4.1.2 Active Hazing Methods

The Crescent Island colony will be monitored during Phase 1 to ascertain whether CATEs and gulls dissuaded from Goose Island attempt to relocate to Crescent Island. If monitoring indicates that one or more incipient colonies establishes on Crescent Island away from the primary colony location, active hazing of CATEs and gulls will be conducted in these areas throughout the day as necessary. Hazing will likely be in both morning and late afternoon hours during the nesting season beginning as early as Year 2 and continuing through the remainder of Phase 1. Active hazing actions will occur from approximately late February to early July. Active hazing is not anticipated to occur in Year 1 because nesting gulls may preclude CATEs from establishing incipient colonies on the island. However, if CATEs are able to create nesting space outside of the current primary colony area in Year 1, active hazing of gulls and CATEs will occur in Year 2. Limited hazing of CATEs during Year 1 may occur if it can be done without leading to gull egg take. Active hazing will consist of people chasing CATEs and gulls away from potential nest sites and flattening nest scrapes.

Maintaining a regime of daily hazing is anticipated to prevent CATEs and gulls from nesting on dissuasion islands. This daily hazing may be interrupted due to factors such as inclement weather that could make boat access challenging and/or dangerous. In cases where hazing is expected to be precluded by factors such as inclement weather, hazing staff may camp on the island overnight to ensure hazing activities are commenced the following day. However, hazing staff will not camp overnight in cases of lightning storms or other weather events deemed unsafe. Because Crescent Island is part of the USFWS McNary National Wildlife Refuge Complex, a conditional permit for camping on the island will be requested from the USFWS. A pre-defined access route will be established for hazing trips to and from the colony site.

2.4.1.3 Egg Take

In the event that these dissuasion activities are not fully successful such that CATEs lay eggs in incipient colony areas, these eggs will be collected in support of dissuasion activities and to allow non-lethal measures to continue. While egg take is expected to not be necessary with daily active hazing, events such as inclement weather may limit island access for hazing such that CATEs and gulls may start nests and lay eggs in dissuasion areas. It is likely that no more than three or four eggs per year will actually need to be taken to achieve the IAPMP goals based on experience in the Columbia River estuary where there are many more CATEs (Roby et al. 2013). Up to 200 CATE eggs may be taken per year at dissuasion sites and at-risk sites combined. Egg take will be done in accordance with applicable USFWS permits.

2.4.1.4 Monitoring and Performance Metrics

Crescent Island will be monitored for CATEs daily during hazing activities from approximately late February to early July. Monitoring of CATEs on Crescent Island will be conducted using early morning ground counts made by observers in a blind at the edge of the colony, by boat, and on foot in areas with potential for minimal disturbance to nesting birds. Monitoring will determine the annual number of CATE nesting pairs on Crescent Island. The measure of success of dissuasion activities will be 100 percent dissuasion of CATEs from Crescent Island during Years 4 and 5.

The reduction in predation on ESA-listed salmonids will be assessed based on the established relationship between monitored predation rates and CATE colony sizes. Success will be determined through annual CATE population surveys, extrapolated predation rates, and PIT tag recovery for confirmation, as needed. The final target metric is for a predation rate of less than 2 percent on each ESA-listed salmonid stock.

2.4.2 Phase 2

To dissuade CATEs from nesting on Crescent Island, daily active hazing will be employed in conjunction with passive hazing as needed in Phase 2 during the CATE and gull breeding season starting with the arrival of the first CATEs and gulls at the island.

2.4.2.1 Passive Hazing Methods

The existing CATE colony on Crescent Island covers approximately 0.1 acre and will be the focus of the most intensive passive dissuasion methods upon implementation of Phase 2 (Figure 2-4). Phase 2 passive hazing will include the following habitat modification actions designed to create long-term visual barriers that will prevent CATEs from nesting at the site:

- Vegetation plantings to provide a low-maintenance, long-term deterrent to CATE nesting
- Silt fencing to dissuade CATE nesting and protect vegetation plantings
- Wire fencing to protect vegetation plantings
- Wood debris to create a visual barrier and an unsuitable nesting substrate
- Possible soil excavation to facilitate vegetation establishment and create berm

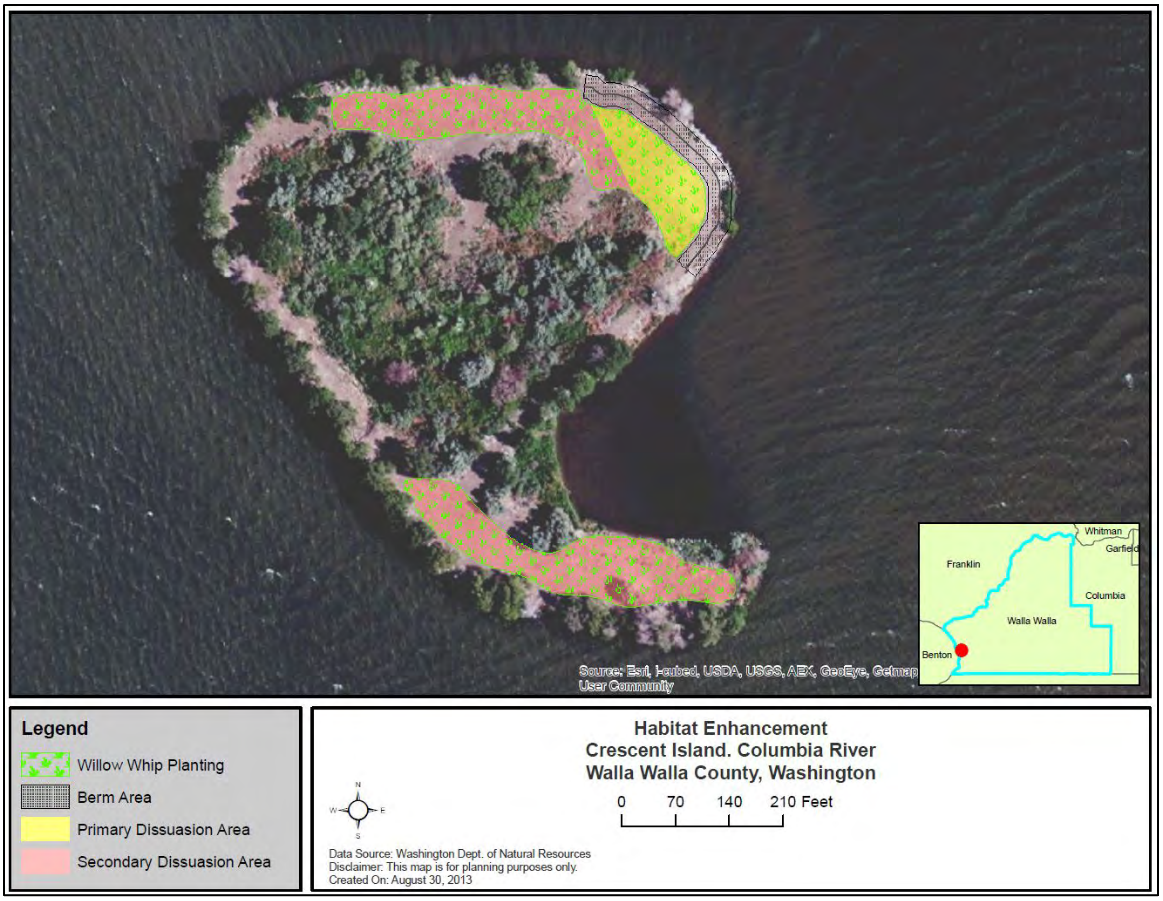
Vegetation Plantings

Based on the presence of abundant trees, shrubs, and herbaceous plants on parts of Crescent Island, vegetation is a readily available device to provide a low-maintenance, long-term deterrent to CATE nesting. Vegetation will provide a more robust deterrent to nesting than blocks, posts, rope, flags, or any other passive hazing actions.

Based on results of experimental plantings in Phase 1, whips of Coyote (narrowleaf) willow (*Salix exigua* or similar native species) will be planted across the primary dissuasion area and in the secondary dissuasion area (Figure 2-5). Willows will be obtained from local sources, most likely from McKay Creek National Wildlife Refuge, which is about 60 miles from Crescent Island (Lamont Glass, USFWS, pers. comm., September 27, 2012). When collected, willows will be stripped of branches and bundled before transport to Crescent Island. Immediately before whips are planted, approximately 1 inch will be cut off the bottom of each whip to facilitate water transpiration. The willow whips will be planted approximately 1 foot apart and to a depth of up to 4 feet to facilitate access to groundwater. Lines of planted willows will be arranged in rows 10 feet apart at the primary dissuasion area and 15 feet apart in the secondary dissuasion areas (other open areas of the island where gulls and a few CATEs nest (Figure 2-5). Holes for willow whips will be dug up to 4 feet deep using equipment such as a water jet stinger. Willow whips will be at least 7 feet long, but likely 8 feet long or longer so that they project at least 4 feet above the ground.

Source of underlying photo: BRNW 2011.

Figure 2–4. Location of Primary CATE Colony (Red Outline) and Previous Failed CATE Colony Attempts (Dotted Red-White Outline) on Crescent Island.



Source of underlying photo: Bird Research Northwest (20 May 2011)

Figure 2–5. Sketch of Planting Rows in the Primary Dissuasion Area (Yellow) and Planting Rows in the Secondary Dissuasion Areas (Pink) – Excavation in the primary dissuasion area is up to 2 feet below surface level with a berm up to 4 feet high on the northeast side of the island.

Willow whips will be planted in early February because they are dormant at that time and will establish more successfully. Hunters often use the island until the end of January but will be gone in February. There is also no danger of disturbing bird species of concern because none will be nesting at that time (Lamont Glass, USFWS, pers. comm., September 12, 2012).

Approximately 20,000 willow whips will be needed (Table 2–3). If more than half of the willows do not respond well in the experimental planting of Phase 1, soil excavation to create a berm may be employed or slightly deeper holes will be dug to allow the willows more access to water during the Phase 2 planting.

It is anticipated that additional vegetation will volunteer or reestablish from on-site sources with the reduced bird abundance. Fast growing grasses and other groundcover plants will likely establish as a result of nest dissuasion and may provide protection for shrubs that establish more slowly (Benson et al. 2011) while also dissuading nesting by CATEs. Herbaceous vegetation could also provide additional protection for willow plantings from animal disturbance (e.g., beavers).

Both ring-billed and California gulls often nest amongst vegetation, but ring-billed gulls (Pollet et al. 2012; Quinn et al. 1996) may better tolerate vegetation than California gulls (Jehl and Mahoney 1987; Winkler 1996). Thus the 15-foot spacing of willow rows in the secondary dissuasion areas may allow ring-billed gulls, and California gulls to a lesser extent, to continue to nest while dissuading CATE nesting (see Roby et al. 2002).

Table 2–3. Estimated Quantity of Dissuasion Planting Material and Silt Fencing Needed on Crescent Island

Area	Dissuasion Area	Approx. Number Willow Whips	Approx. 3-ft Tall Silt Fencing Needed (ft)
Primary Dissuasion (CATE nesting) Area	25,200 sf = 0.6 ac	13,840 (installed every foot on center)	2,290[a]
Secondary Dissuasion (gull nesting) Area	42,100 sf = 1.0 ac	6,630 (installed every foot along two rows for every row of silt fencing placed 15 ft apart)	3,320 (installed at 15-ft intervals)
Totals	**67,300 sf = 1.6 ac**	**20,475**	**5,600**

a If installed at 10-ft intervals in excavation areas, plus one row horizontally offset 3 ft on berm from toe of cut area, and two rows at 3-ft horizontal intervals on berm slope facing water, starting at toe of slope.

If significant (i.e., >75 percent) plant failure occurs in the first 3 years after planting, willow whips (or other native species as approved by Corps and USFWS National Wildlife Refuge managers) will be replanted to restore the original planting density. Planting of additional willow will occur in February or earlier in the winter before CATEs begin to nest on the island.

Silt Fencing

As part of planting willow during Phase 2, a temporary silt fence will be installed to dissuade CATE nesting and help vegetation become established before the CATE breeding season. This fence will be erected among the planted willows in rows 10 feet (primary area) and 15 feet (secondary area) apart (Figure 2-5) and will be removed once the willows are established and the dissuasion efforts are successful. The more conservative 10-foot spacing is denser than the minimum 15-foot spacing used to dissuade CATEs from nesting at Rice Island (Roby et al. 2002) because of anticipated aggressive efforts by CATEs to nest in this area as well as the potential for some willow plantings to fail. In the secondary dissuasion areas, the 15-foot intervals have already been shown to dissuade CATEs from nesting while potentially allowing gull nesting (Roby et al. 2002).

To minimize frequency of maintenance, high quality landscape fabric will be used for silt fencing due to its resistance to weathering. The silt fence will be at least 3 feet tall and will be attached with hog rings (both top and bottom edges) to galvanized bailing wire suspended between metal T-posts (fencing posts) at the prescribed intervals. Bailing wire will be strung at the tops and bottoms of the T-posts so that it is taut and anchored every 3 feet. Up to 5,600 feet of silt fencing may be needed on Crescent Island (Table 2–3). This arrangement will increase the life span of the silt fence and help prevent damage from wind.

If silt fencing becomes damaged, it will be repaired or replaced as needed. Silt fence repairs will typically occur in February, before CATEs begin to nest on the island, with potential for some limited in-season repairs to be performed as warranted.

Wire Fencing

Wire fencing will be utilized to prevent beaver and other animal and human damage to vegetation plantings. Rows of wire field fencing at least 4 feet tall with 6- to 8-inch-square mesh will be placed around the perimeter of the primary dissuasion area and around the water-facing side of the secondary dissuasion areas. The exact amount of wire fencing will be determined based on final site layout including position of willows and silt fences. Wire fencing will be maintained and replaced as necessary for up to 5 years after planting.

Woody Debris

Woody debris collected from the island will be placed in potential CATE nesting areas to create a visual barrier and an unsuitable nesting substrate that is intended to make the island less favorable for nesting CATEs. Woody debris will be placed in 3- to 5-foot-tall piles that are several feet wide around the perimeter of the island and between silt fences in the secondary dissuasion areas (Figure 2-5). The actual height, width, and distribution of woody debris piles will depend on the amount of debris available on site at the time of construction. Currently there is downed woody debris at several locations around the island, particularly along the western side. Most of this downed debris could be moved or realigned on the southern part of the island. Standing dead trees along the perimeter of the island will remain standing for use as perches for bald eagles and other raptors. In addition to this existing source of dead woody vegetation, live Russian olive trees or shrubs are extensive on the island and could be cut and used for these debris piles. Debris piles are anticipated to be created in Year 4 or 5 as part of Phase 2 activities and will not be an ongoing maintenance activity.

Soil Excavation

If experimental plantings in Phase 1 are successful at the same elevation as the proposed Phase 2 planting (at least a 25 percent survival rate), then Phase 2 plantings will be done without soil excavation. If experimental plantings in Phase 1 are unsuccessful, a layer of soil will be removed before Phase 2 plantings are installed to decrease the distance between the willow roots and water table.

If soil excavation is necessary to establish plantings, this excavated soil will be used to form a 4-foot-tall berm on the northeast side of the island, creating a further visual barrier for CATEs that might attempt to nest (Table 2–4). Soil excavation will be accomplished with small earth-moving machinery. The berm will be formed from material scraped from the primary dissuasion (and planting) area on the northeast side of the island (Figure 2-5).

Table 2–4. Estimated Area and Materials of Cut and Fill on Crescent Island

Area	Area footprint (sf)	Volume (cf)	Volume (cy)
Cut[a]	15,377	-22,514	-834
Fill[b]	9,852	22,514	834
Total Cut/Fill	**25,229**	**0**	**0**
Berm Cap[c]	9,852	2578	95

a Cut side slopes 3:1, depth 1.6 ft.

b Berm 3:1 side slopes 4 ft top width, 4 ft high from existing ground.

c Assume 3-inch thick riprap or cobbles.

To deter CATEs and other piscivorous waterbirds from nesting on the berm, it will be armored with rock, such as cobble or riprap, using an in-house source (Reclamation has some nearby rock pits) or a commercial source from a preapproved facility. If the experimental willow plantings are successful, soil excavation and berm construction will not be necessary and willow plantings, as described below, will be extended over the berm footprint.

2.4.2.2 Active Hazing Methods

Active hazing will consist of people chasing CATEs and gulls away from potential nest sites and flattening nest scrapes. Active daily hazing will be employed during the CATE and gull breeding season, starting with the arrival of the first CATEs or gulls at the colony and ending when the first gull eggs are laid, approximately from late February to early July. If CATEs lay eggs, take would be allowed and hazing could to continue until a maximum number of CATE eggs are taken (see Egg Take, below). Active hazing will be used in conjunction with passive hazing throughout the dissuasion periods. To successfully dissuade all CATEs and gulls from nesting on Crescent Island, hazing will begin prior to sunrise and finish after sunset.

2.4.2.3 Egg Take

The Action Agencies anticipate that passive and active hazing efforts at Goose and Crescent Islands will result in very few to no CATE breeding pairs remaining on the islands. CATE egg take at Crescent Island will only be started after active and passive hazing activities have been conducted to the maximum extent possible. Based on hazing activities in the Columbia River estuary, it is anticipated that no more than three or four eggs per year may need to be taken based on CATE experience at East Sand Island where an intensive hazing schedule was employed (Roby et al. 2013). A permit for take of up to 200 eggs on both dissuasion islands and all at-risk islands combined per year will be requested by the Action Agencies to ensure success of dissuasion activities.

2.4.2.4 Monitoring and Performance Metrics

CATE Monitoring

Monitoring of CATEs on Crescent Island will be conducted to assess pertinent colony information such as colony size, habitat use, and total area occupied by CATEs. Information will be collected by observers in blinds at the edge of each colony, as well as by boat, on foot, and via aerial surveys. The measure of success of dissuasion activities will be 100 percent dissuasion of CATEs from Crescent Island in Year 5.

The number of CATE nesting pairs outside the main colony area at Crescent Island will be determined through monitoring during frequent visits to the island and from boat and air-based surveys.

If CATEs begin to nest beyond the dissuasion areas of Crescent Island, the need for additional silt fencing and/or willow planting will be assessed in cooperation with the National Wildlife Refuge. Any in-season actions that may be taken are adaptive management actions. If CATE nesting attempts occur along the shoreline in the vicinity of the 2010/2012 failed colony attempt (Figure 2-4), cobbles and/or willow plantings may be added to create an unsuitable nesting substrate.

The success of the reduction in predation rates on ESA-listed salmonids will be assumed based on the relationship between historical monitored predation rates and CATE colony sizes. Success will be determined through annual

CATE population surveys, extrapolated to predation rates, and confirmed through predation studies (e.g., PIT tag recovery) as needed. The final target measured over 3 years is for predation rates of less than 2 percent per ESA-listed salmonid stock.

Vegetation and Fencing Monitoring

Plantings will be monitored at the time of hazing activities for successful establishment (≥25 percent survival). No additional planting is anticipated unless significant (i.e., >75 percent) plant failure occurs in the first 3 years after planting. If this occurs, willow whips (or other native species as approved by Corps and USFWS National Wildlife Refuge managers) will be replanted to restore the original planting density. Planting of additional willow will occur in February or earlier in the winter before CATEs begin to nest on the island.

Silt fencing will be monitored at the time of hazing activities for damage. If silt fencing becomes damaged, it will be repaired or replaced as needed. Silt fence repairs will typically occur in February before CATEs begin to nest on the island with potential for some limited in-season repairs to be performed as warranted. Silt fencing is a short-term action that will be reevaluated from year to year, and fencing will be removed after willow plantings become established and dissuasion activities are successful.

Wire fencing will be monitored and maintenance and replacement will continue as necessary for 5 years after planting to encourage a high survival rate of willows.

2.5 SUMMARY OF GOOSE ISLAND AND CRESCENT ISLAND DISSUASION PLANS

2.5.1 Goose Island

Management actions are focused on achieving 100 percent dissuasion of CATEs nesting on Goose Island during Phase 1. To achieve this, management activity will include passive and active hazing of CATEs and gulls on Goose Island along with monitoring, and, if needed, limited egg take.

2.5.1.1 Phase 1

Installation of passive hazing structures (i.e., pier blocks with ropes and flagging) will occur immediately prior to the Year 1 nesting season and will be repeated as necessary before each breeding season.

Active daily hazing of CATEs and gulls will be conducted throughout the day as necessary during the nesting season from late February to early July starting before the arrival of gulls and CATEs. Active hazing may consist of chasing CATEs and gulls away from potential nest sites and flattening nest scrapes.

If all other available options have been attempted, egg take of up to 200 eggs on both dissuasion islands and all at-risk islands combined per year may occur. Egg take is not expected to be necessary with daily active hazing unless unusual circumstances prevent hazing actions. For example, during periods of poor weather, limited island access could permit CATEs and gulls to start nesting. Under these circumstances, some egg take may be necessary.

Dispersal of CATEs away from Goose Island during Years 1 through 3 will be monitored during the breeding season on a local level (in the Columbia River Basin) and less intensively monitored by partners on a regional level on the Pacific Coast from Alaska to Mexico and at other CATE nesting areas east to Montana. Monitoring actions will be similar to actions conducted on these islands prior to initiation of management efforts. During these dissuasion activities on Goose Island, the search will continue for a habitat enhancement site within the western CATE metapopulation.

2.5.1.2 Phase 2

During Phase 2, it may be determined that a more permanent dissuasion solution may be desired, in which case large cobble or rocks may be added to the Goose Island CATE nesting areas to permanently dissuade nesting in those areas. Passive and active hazing on Goose Island will continue through Phase 2 as warranted. Monitoring will continue during Phase 2 as described for Phase 1. Both passive and active dissuasion actions may continue on Goose Island beyond Year 5 if needed.

2.5.2 Crescent Island

Management activity is focused on preventing formation of incipient colonies through recruitment of displaced birds during Phase 1, followed by 100 percent dissuasion of CATE nesting on Crescent Island during Phase 2. To achieve this, management activities will include experimental plantings and measures to address the formation of incipient CATE colonies in Phase 1 as warranted. These measures include passive hazing, such as vegetation planting and other actions including possible berm creation, and active hazing of all CATEs and gulls in Phase 2.

2.5.2.1 Phase 1

Experimental willow planting will occur during Phase 1 to improve success of plantings during Phase 2. Experimental plantings will take place prior to the gull nesting season and away from the current CATE colony.

Crescent Island will also be monitored during Year 1 to ascertain whether CATEs dissuaded from Goose Island attempt to relocate to Crescent Island. Aside from the experimental planting area, there will be no Phase 1 dissuasion activity at Crescent Island if CATEs do not establish incipient colonies on the island. If an incipient CATE colony is detected through monitoring, dissuasion of CATEs and gulls will be conducted in the vicinity of the incipient colony if this is possible while avoiding gull egg take. Egg take is not expected to be necessary with daily active hazing unless unusual circumstances prevent hazing actions. For example, during periods of inclement weather, limited island access for hazing may allow CATEs and gulls to start nests. Under these circumstances, some CATE egg take might be necessary.

2.5.2.2 Phase 2

During implementation of Phase 2, management actions will consist of habitat modifications (passive hazing) and active hazing. Habitat modification measures on Crescent Island as described above will include vegetation planting combined with silt fencing, protective wire fencing, and possible construction of berm topped with cobble. In addition, active hazing and monitoring will continue as necessary. Implementation of the habitat modification actions are timed to coincide with implementation of habitat enhancement actions occurring at habitat enhancement sites. Both passive and active dissuasion actions may continue on Crescent Island beyond Year 5 if needed.

If CATEs attempt to nest outside of primary dissuasion areas on Crescent Island at any time during Phase 2, temporary ropes and flagging may be placed in the area to render it unsuitable for nesting, though this is not anticipated.

2.6 HABITAT ENHANCEMENT SITE PLAN

As part of developing the IAPMP and EA, the Corps and Reclamation have conducted initial efforts to identify suitable sites for habitat enhancement based on the site assessment report conducted by Oregon State University (Collis et al. 2012) and other readily available information. For the site assessment study, Collis et al. (2012) used existing information on biotic (e.g., prey suitability, predation pressure) and abiotic (e.g., land ownership) factors to rank the suitability of approximately 150 sites in the western CATE metapopulation for potential habitat enhancement. As part of Phase 1, the Corps and Reclamation will further investigate these and additional sites, conduct analysis as appropriate including NEPA review, and select a site for implementation as part of Phase 2 (see Table 2–1).

Using Appendix G of the Columbia River Estuary CATE Impact Statement, Seto et al. (2003), and Collis et al. (2012) as a basis, criteria for habitat enhancement sites for this IAPMP are that the site:

1. Contains sufficiently available, suitable nesting habitat to support approximately 1,000 nesting CATE pairs, does not experience frequent flooding or drought events, and has suitable base substrates.
2. Has no long-term expensive operations and maintenance requirements.
3. Is in sufficient proximity to a relatively stable and abundant prey source for CATEs.
4. Is located in an area with minimal potential conflicts with ESA-listed fish (and other) species.
5. Potential mammalian and avian predators and human disturbances are absent, not a limiting factor, or controllable.

Potential CATE enhancement sites will be evaluated for suitability for nesting CATEs based on the five criteria above and any new information that becomes available during analysis efforts will be considered. The availability of suitable CATE nesting areas as well as metrics of habitat quality (e.g., substrate type, lack of predators, access to forage) will be used to determine the success of the habitat enhancement site(s). Once suitable site(s) and site specific uncertainties are identified, these metrics will be further defined to the specifics of the habitat enhancement site(s).

2.7 AT-RISK ISLANDS PLAN

As a consequence of CATE dissuasion on Goose and Crescent Islands and potential other movements of CATEs within the western North America metapopulation, it is possible that CATEs will move to other islands in the inland basin (e.g., at-risk islands) and continue to consume ESA-listed salmonids. There are higher-risk and lower-risk sites among the at-risk islands within the Columbia River Basin. Ten of the potentially highest at-risk islands have been identified (see Table 2–5 and Figure 2-6), but other sites could develop during any given nesting season. The ten islands identified as at-risk islands are considered at-risk because they are believed to hold potential for CATE nesting and would likely contribute to similar predation losses of ESA-listed salmonids as Goose and Crescent Islands.

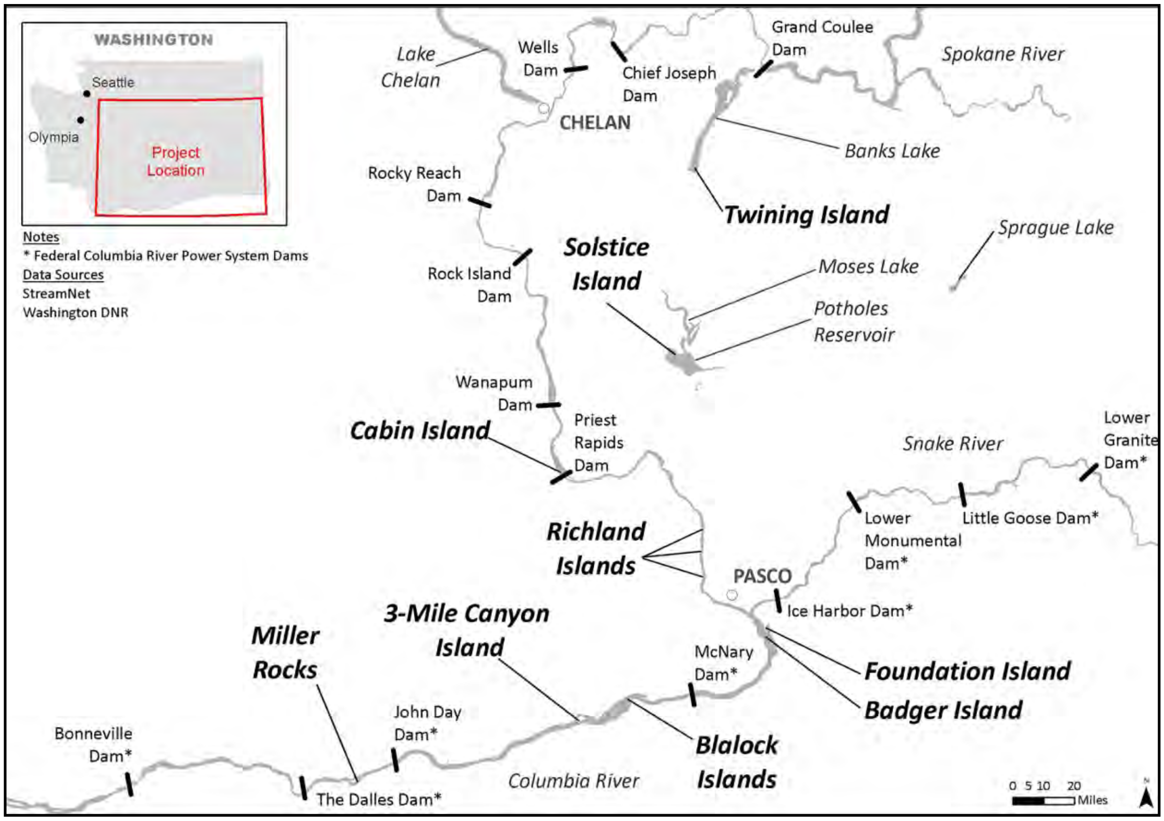


Figure 2-6. At-Risk Islands Vicinity Map

Table 2–5. At-Risk Islands in the Columbia River Basin

Island Name	Location	Risk Level
Badger Island	Columbia River	Higher
Blalock Islands	Columbia River	Higher
Cabin Island	Columbia River	Lower
Foundation Island	Columbia River	Lower
Harper Island	Sprague Lake	Higher
Miller Rocks	Columbia River	Lower
Richland Islands (e.g., Islands 18 and 20)	Columbia River	Lower
Solstice Island	Potholes Reservoir	Lower
Threemile Canyon Island	Columbia River	Lower
Twinning Island	Banks Lake	Higher

These identified at-risk islands will be surveyed at least once per CATE nesting season. Furthermore, the inland basin will be monitored for any CATE colony that grows large enough to have a substantial negative impact on ESA-listed salmonids. Additional details related to monitoring of the inland basin including at-risk islands are covered in the AMP.

At-risk islands that have 40 or more nesting pairs of CATE may be further monitored for consumption rates of ESA-listed salmonids (e.g., PIT tag recovery type studies) and possibly be subject to dissuasion activities, depending on the situation. The assumed rates of predation by CATE colony size will be determined based on existing information about CATE observed predation rates in similar areas. Dissuasion on at-risk islands will be passive (e.g., temporary ropes and flagging or other measures) or active as local conditions dictate.

The final target is for fewer than 40 CATE pairs nesting on any one at-risk island and fewer than 200 CATE pairs nesting within the inland Columbia River Basin combined with a predation rate on ESA-listed salmonid stocks of less than 2 percent per island, or less than 5 percent for all islands averaged over 3 years.

2.8 AVOIDANCE AND MINIMIZATION MEASURES

All work will be performed according to the requirements and conditions of the regulatory permits issued by federal, state, and local governments. Avoidance and minimization measures, including Best Management Practices (BMPs) are outlined below in Section 5.7.

2.9 INTERRELATED AND INTERDEPENDENT ACTIONS

No interrelated or interdependent actions are anticipated as part of the proposed project.

2.10 ACTION AREA

The action area includes the following aquatic and terrestrial areas:

- Areas within the inland Columbia River Basin, from Bonneville Dam to Chief Joseph Dam and including related adjacent inland areas in Oregon and Washington.
- Potholes Reservoir and Banks Lake.
- Goose and Crescent Islands, located within the waterways listed above.
- At-Risk Islands – nine of the ten at-risk islands are found in the Columbia River within the inland basin, and one island is located within Banks Lake (Twinning Island) (Figure 2-6).
- Receiving sites (habitat enhancement studies and supplemental NEPA documentation will be prepared prior to the implementation of new habitat enhancement).

3. ENVIRONMENTAL BASELINE

This section describes existing baseline conditions in the project area, both in a regional and local context. Because the presence of avian predators is a key element of the existing environmental conditions, this section also describes the ecology of CATEs.

3.1 REGIONAL CONDITIONS

The action area is located within the Columbia River subbasin. The Columbia River and its tributaries are the dominant aquatic system in the Pacific Northwest. The Columbia River originates on the west slope of the Rocky Mountains in Canada and flows approximately 1,200 miles to the Pacific Ocean, draining an area of approximately 219,000 square miles in Washington, Oregon, Idaho, Montana, Wyoming, Nevada, and Utah. Within the U.S., there are 11 major dams along the main reach of the river (four of which are within the action area). In addition, there are 162 smaller dams that form reservoirs with capacities greater than 5,000 acre-feet in the Canadian and United States' portions of the basin (Fuhrer et al. 1996). The Columbia River within the action area is described in more detail in Section 3.2 below, Description of the Action Area.

Goose Island is a 4.9-acre, steep-sided rocky island located within the southern end of Potholes Reservoir near the City of Moses Lake, Washington. Crescent Island is approximately 7.5 acres and is located on the Columbia River above McNary Dam near the Town of Wallula, Washington (RM 316). Both islands and Potholes Reservoir are discussed in additional detail below (see Section 3.2 Description of the Action Area).

3.1.1 Avian Predation within the Region

Research has identified that the greatest potential for increasing survival of smolts from ESA-listed salmonid stocks from inland avian predation will result from focusing management efforts on CATEs at Goose and Crescent Islands (Lyons et al. 2011b).

Breeding CATE eat almost exclusively fish, catching a diverse array of species with shallow plunge dives, usually completely submerging themselves underwater (Cuthbert and Wires 1999). The average foraging distance from the colony of CATE during the breeding season on East Sand Island was observed to range from 8 to 13 miles (Anderson et al. In Review). The sizes of fish caught and the composition of their diets are largely determined by geography and annual and seasonal prey availability. CATEs prey base is typically composed of fish 5 to 25 cm long, occurring near the surface of the water.

At colonies in the inland Columbia River Basin, juvenile salmonids constitute a majority of the prey base (see further discussion below in Section 3.2). Prey resources at inland sites may be highly variable from year to year. For a detailed review of current, historic, and potential CATE nesting habitat throughout the Pacific Region see: *A Review of Caspian Tern Nesting Habitat: A Feasibility Assessment of Management Opportunities in the U.S. Fish and Wildlife Service Pacific Region* (Seto et al. 2003). In interior Oregon (Summer and Crump Lakes), a study conducted in 2003 found tui chubs (*Gila bicolor*) to be the primary prey of nesting CATE (Roby et al. 2003). In San Diego, food habits of CATE were studied in 1995, 1997, and 1998. These studies consistently found CATE to feed primarily on sardines, anchovies, and topsmelt (Horn et al. 1996; Horn and Dahdul 1998, 1999).

Since 2007, a total of 51 bull trout PIT tags, primarily from releases into the Walla Walla River Basin, have been recovered within the inland basin, however, these were from DCCO and AWPE colonies and not from CATEs (BRNW 2008-2012).

Descriptions of specific CATE nesting sites in the inland Columbia River Basin where management activities will be conducted are discussed in detail in Section 3.2 below. These nesting sites include Crescent and Goose Islands.

3.2 DESCRIPTION OF THE ACTION AREA

3.2.1 Mainstem Columbia River

The action area includes areas within the inland Columbia River Basin, from Bonneville Dam to Chief Joseph Dam and including related adjacent inland areas in Oregon and Washington.

The mainstem Columbia River is a major migratory corridor for at least thirteen listed fish species. The Columbia and Snake Rivers (mainstem habitat) serve as migration corridors for migrating salmon and steelhead between the Pacific Ocean and their freshwater spawning and rearing habitats. Features of migration habitat important to these fish generally include: substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food (prey), riparian vegetation, space, and safe passage. The mainstem migratory corridor extends from the base of Hells Canyon Dam, on the Snake River, and from Chief Joseph Dam, on the Columbia River, to the mouth of the Columbia River.

The following description of the mainstem Columbia River is adapted from the FCRPS 2008 Biological Opinion (NMFS 2008).

3.2.1.1 Habitat and Migratory Corridor

Bull trout are relatively dispersed throughout the tributaries of the Columbia River Basin. The Columbia River bull trout DPS includes bull trout residing in portions of Oregon, Washington, Idaho, and Montana. Bull trout are estimated to have occupied about 60 percent of the Columbia River Basin and currently occur in 45 percent of the estimated historical range. The Columbia River bull trout DPS comprises 141 bull trout subpopulations in four geographic areas of the Columbia River Basin. The current distribution of bull trout in the lower Columbia River Basin is less than the historical range (USFWS 2005).

Current conditions within much of the mainstem Columbia River are altered compared to historic conditions. The development of hydropower and water storage projects within the Columbia River basin have resulted in the inundation of many mainstem spawning and shallow-water rearing areas (loss of spawning gravels and access to spawning and rearing areas) and altered water quality (reduced spring turbidity levels), water quantity (seasonal changes in flows and consumptive losses resulting from use of stored water for agricultural, industrial, or municipal purposes), water temperature (including generally warmer minimum winter temperatures and cooler maximum summer temperatures), water velocity (reduced spring flows and increased cross-sectional areas of the river channel), food (alteration of food webs, including the type and availability of prey species), and safe passage (increased mortality rates of migrating juveniles) (Williams et al. 2005; Ferguson et al. 2005).

Within the Columbia River Basin, floodplains have been reduced, off-channel habitat features have been eliminated or disconnected from the main channel, and the amount of large woody debris in the mainstem has been greatly reduced. Remaining habitats often are affected by flow fluctuations associated with reservoir water management for power peaking, flood control, and other operations.

Bull trout use the mainstem Columbia River as foraging, migration and overwintering habitat. Within the migratory corridor, both dams and their associated reservoirs influence the current status of Columbia River Basin salmonids. To a greater or lesser extent specific to each dam, the dams present fish passage hazards, causing passage delays and varying rates of injury and mortality. The altered habitats in project reservoirs reduce smolt migration rates and create more favorable habitat conditions for fish predators, including native northern pikeminnow (*Ptychocheilus oregonensis*), nonnative walleye (*Sander vitreus*), and smallmouth bass (*Micropterus dolomieu*).

Prior to the development of mainstem dams (ca. 1938–1978), the mainstem migratory corridor was free-flowing with high velocities and a broad complex of habitats including rapids, short chutes, falls, riffles, and pools. Dams within the migratory corridor converted much of the once free-flowing river into a stairstep series of slow pools, which has increased travel times for outmigrating juveniles by at least 40 to 50 percent. This increased travel time (migration delay) presents an array of potential survival hazards to migrating juvenile salmonids: increasing their exposure to potential mortality vectors in the reservoirs (e.g., predation, disease, thermals stress), disrupting arrival timing to the estuary, (which likely affects predator/prey relationships), depleting energy reserves, potentially causing metabolic problems associated with smoltification, and contributing to residualism (a loss of migratory behavior). A substantial fraction of the mortality experienced by juvenile outmigrants occurs in the reservoirs (e.g., about half of the mortality of in-river migrating juvenile spring Chinook and steelhead) and reducing migration delays have therefore been a focus of recent actions to improve juvenile outmigrant survival.

A substantial proportion of juvenile salmonids can be killed while migrating through dams, both directly through collisions with structures and abrupt pressure changes during passage through turbines and spillways, and indirectly, through non-fatal injury and disorientation which leave fish more susceptible to predation and disease, resulting in delayed mortality. In recent years, operational improvements and passage route configuration changes at several of the dams have reduced juvenile mortality and injury rates. The proportion of water released through spillways has increased at most of the dams, resulting in a higher proportion of the migrants passing through these routes.

Adult fish passage, in the form of fish ladders, is provided at the four dams in the action area. Unlike downstream migrating juveniles, there is no indication that reservoirs substantially delay adult upstream migration (Ferguson et al. 2005). However, salmonids may have difficulty finding ladder entrances, and fish also may fall back over the dam. Some adults that fall back or migrate downstream pass through project turbines and juvenile bypass systems. Adult mortality rates have been estimated between 22 percent and 59 percent, depending on the species and size of the individual fish (Ferguson et al. 2005).

Listed salmonids in the Columbia River have also been affected by degradation of tributary habitat, which has declined as a result of past and current forestry, farming, grazing, road construction, hydrosystem development, mining, and urbanization practices.

3.2.1.2 Hydrologic Conditions

Flow regulation, water withdrawal, and climate change have reduced the Columbia River's average flow, altered its seasonality, and reduced sediment discharge and turbidity (NRC 1996; Sherwood et al. 1990; Simenstad et al. 1982 and 1990; Weitkamp 1994). Annual spring freshet flows through the Columbia River estuary are about one-half of the predevelopment levels that flushed the estuary and carried smolts to sea. Total sediment discharge is about one-third of nineteenth-century levels.

Combined with the influence of reservoirs behind the dams within the migratory corridor, reductions in spring and early summer flows slow juvenile fish emigration, increases their exposure to injury and mortality factors within the reservoirs (e.g., predation, temperature stress, disease, and others), and changes ocean-entry timing. These flow reductions also reduce turbidity, which has also been shown to reduce juvenile survival. Flow-related changes in estuary bathymetry likely reduce juvenile rearing habitat, significant primarily to lower river populations and ESUs/DPSs.

3.2.1.3 Water Quality

Water quality characteristics of the mainstem Columbia River are affected by an array of land and water use developments. Water temperatures are affected by storage, diversion, and irrigation return flows in both the mainstem and tributaries. Water quality characteristics of particular concern are: water temperature, turbidity, total dissolved gas, and chemical pollutants.

Water temperature variability has decreased, resulting in generally warmer minimum winter temperatures and cooler maximum summer temperatures. High water temperatures stress all life stages of anadromous fish, increase the risk of disease and mortality, affect toxicological responses to pollutants, and can cause migrating adult salmonids to stop or delay their migrations. Warm water temperatures also increase the foraging rate of predatory fish thereby increasing the consumption of smolts.

Flow regulation and reservoir existence reduces turbidity in the Columbia River. Reduced turbidity can increase predator success through improved prey detection, increasing the susceptibility of smolts to predation.

Spill at mainstem dams can cause downstream waters to become supersaturated with dissolved atmospheric gasses. Supersaturated total dissolved gas conditions can cause gas bubble trauma in adult and juvenile salmonids resulting in injury or death.

3.2.1.4 Predation and Disease

Salmonids are exposed to high rates of natural predation during all life stages. Fish and birds prey on juvenile and adult bull trout (Poe et al. 1994).

The primary resident fish predators of salmonids in the Columbia River are northern pikeminnow (*Ptychocheilus oregonensis*) (native), smallmouth bass (*Micropterus dolomieu*) (introduced), and walleye (*Sander vitreus*) (introduced) (NMFS 2000). Other predatory resident fish include channel catfish (*Ictalurus punctatus*) (introduced), Pacific lamprey (*Entosphenus tridentata*) (native), yellow perch (*Perca flavescens*) (introduced), largemouth bass (*Micropterus salmoides*) (introduced), and other bull trout (native).

CATE, DCCO, glaucous-winged/western gull hybrids, California gulls, and ring-billed gulls are the principal avian predators in the basin (NMFS 2000). For many of the listed salmonid species migrating through the Columbia River, avian predation is considered one of the primary limiting factors affecting juvenile survival (Fresh et al. 2005).

Since 2007, a total of 51 bull trout PIT tags, primarily from releases into the Walla Walla River basin, have been recovered primarily on the Foundation Island DCCO and Badger Island AWPE colonies (BRNW 2008-2012).

3.2.2 Crescent Island

Crescent Island is on the Columbia River above McNary Dam near the Town of Wallula, Washington, and is owned and managed by the U.S. Fish and Wildlife Service as part of McNary National Wildlife Refuge. Crescent Island is artificial and was created from dredged materials in 1985 as mitigation for waterfowl nesting habitat lost during construction of the Wallula pulp mill; today it consists of approximately 7.5 acres with a mix of dense upland shrub habitat (island interior) and bare ground (island periphery). CATEs have nested on Crescent Island since shortly after the island was built. Until 2009, the CATE colony on Crescent Island was the largest of its kind on the Columbia Plateau. In 2001 the CATE colony consisted of over 650 nesting pairs, but has steadily declined to approximately 350 breeding pairs in 2009. The area used by nesting CATE is small (0.09 acre) compared to the much larger area used by nesting California gulls, which use the area immediately adjacent to the CATE colony and around the island’s periphery. About 6,500 pairs of California gulls nested on Crescent Island in 2009, the last year for which census data is available. The presence of the large gull colony on Crescent Island seems to limit the area used by the CATE colony. Black-crowned night-herons and great blue herons nest in trees in the island's interior.

Diet studies of the CATE colonies on Crescent Island indicate that anadromous juvenile salmonids are the most prevalent prey type (approximately 70 percent), followed by centrarchids (bass and sunfish, 15 percent), cyprinids (carp and minnows, 9 percent), and "other" fish species. CATEs nesting on Crescent Island in 2006 to 2008 annually consumed an estimated 330,000 to 400,000 juvenile salmonids from the Columbia and Snake Rivers with no evidence that any of these juvenile salmonids were bull trout. The proportion of juvenile salmonids in the diet of Crescent Island CATE generally peaks during the first week of May, and declines gradually thereafter (Roby et al. 2010). Seasonal changes in the proportion of salmonids in the diet probably reflect changes in availability of hatchery-reared smolts near the Crescent Island CATE colony. The percentage of salmonid smolts in the Crescent Island CATE diet was approximately 60 to 70 percent, substantially higher than the East Sand Island CATE colony in the Columbia River Estuary (approximately 30 percent juvenile salmonids in the diet during the same time period) (note there has been no definitive evidence to date of PIT-tagged bull trout mortality from CATEs on Crescent Island). These minimum consumption estimates are based on bioenergetic modeling and do not include the number of fish kleptoparasitized by California and ring-billed gulls that also nest on Crescent Island.

Colony size at the CATE colony on Crescent Island trended downward from 2001 to 2007, and has remained relatively stable since 2007. Nesting success at the Crescent Island CATE colony in 2010 was below the 10-year average for 2000 to 2009, but above what was observed during the previous 2 years (Roby et al. 2010).

Predation rates by Crescent Island CATE were highest for upper Columbia (1.2 percent, 95 percent confidence interval [c.i.] = 1.0 to 1.6 percent) and Snake River (2.8 percent, 95 percent c.i. = 2.4 to 3.2 percent) steelhead stocks. Predation rates were substantially lower (< 1.0 percent) for other species (Chinook, coho, and sockeye) and stocks. Predation rates on smolts by Crescent Island CATE in 2010 were significantly lower relative to the previous 6 years. However, as mentioned above, there has been no evidence of PIT-tagged bull trout mortality from CATEs on Crescent Island (BRNW 2008-2012).

3.2.3 Goose Island

Goose Island is an approximately 4.9-acre, steep-sided rocky island located near the southern end of Potholes Reservoir, near the City of Moses Lake, Washington; it is owned by the Bureau of Reclamation and managed in cooperation with the Washington Department of Fish and Wildlife. Nesting by CATE on Potholes Reservoir dates back to the early 1980s; CATE nested on a number of different small, low-lying sandy islands within the reservoir during 1982 to 2009. In 2002, CATE began nesting on Goose Island, where a large gull colony was located. Currently, Goose Island is the only known nesting site for CATE in Potholes Reservoir. In 2009, the CATE colony located on Goose Island was estimated at 487 breeding pairs, eclipsing the size of the Crescent Island CATE colony and becoming the largest CATE colony on the Columbia Plateau for the first time since monitoring.

On Goose Island, approximately 416 breeding pairs attempted to nest in 2010, a decline from the colony size estimate in 2009 (487 breeding pairs). Poor nesting success at Goose Island in 2010 was likely caused by a combination of unseasonable cool and wet weather, nocturnal disturbances to the colony by a great horned owl (*Bubo virginianus*), the presence of at least three American mink (*Neovison vison*) on the island, and human disturbance. Nevertheless, the Goose Island colony is currently the largest CATE colony in the Columbia Plateau region and has been for the past 2 years (Roby et al. 2010).

Predation rates by Goose Island CATE were greatest on steelhead, with an estimated minimum predation rate of 9.6 percent (95 percent c.i. = 8.3 to 11.3 percent) in 2010. Predation rates on other salmonids species and stocks were much less (< 1.0 percent). Predation rates on salmonid species and stocks by CATE nesting on Goose Island were lower than those observed in 2009, but similar to those observed during 2007 to 2008 (Roby et al. 2010).

To date, there has been only one confirmed PIT-tagged bull trout consumed by an inland nesting Caspian tern. The tag (placed at the Entiat River on May 7, 2013, as part of tagging effort CSS13126.HB4) was detected by researchers on August 5, 2013, on the Goose Island CATE colony (A. Evans, pers. comm. September 3, 2013).

3.2.4 Potholes Reservoir

Created by O'Sullivan Dam, Potholes Reservoir lies immediately downstream of Moses Lake in the Lower Crab Creek Basin.

A survey of fish at the Potholes Reservoir conducted in 1978 found that perch (*Perca flavescens*) were the most abundant fish species, followed by carp (*Cyprinus carpio*). Other fish species found at the Potholes Reservoirs included largemouth and smallmouth bass, bluegill (*Lepomis macrochirus*), long-nose sucker (*Catostomus catostomus*), black crappie (*Pomoxis* *nigromaculatus*), pumpkinseed (*Lepomis gibbosus*), sculpin (*Cottus* spp.), rainbow trout (*O. mykiss*), brown bullhead (*Ameiurus nebulosus*) and walleye (Reclamation 2002). No state or federally listed fish species occur in Potholes Reservoir.

The largest breeding colony of DCCO on the Columbia Plateau is located at the north end of the Potholes Reservoir in the North Potholes Reserve.

3.2.5 At-Risk Islands

As previously mentioned, ten islands have been identified which have the highest risk for incipient colonies to develop. These ten at-risk islands include: Blalock Island, Badger Island, Threemile Canyon Island, Richland Islands (18 and 20), Foundation Island, Miller Rocks, Twinning Island, Solstice Island, and Cabin Island. Eight of the ten at-risk islands are found in the Columbia River within the inland basin, with Solstice Island located within Potholes Reservoir and Twinning Island located within Banks Lake (Twinning Island) (Figure 2-9).

To date, there has been no evidence of PIT-tagged bull trout mortality from CATEs on any of the at-risk islands (BRNW 2008-2012).

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4. NATURAL HISTORY AND SPECIES OCCURRENCE

4.1 BULL TROUT (COLUMBIA RIVER DPS)

4.1.1 Listing Status

Bull trout in the conterminous United States were listed as threatened in 1999 (64 FR 58910). Degradation of habitat by land and water management activities, competition and hybridization with introduced nonnative fish, and illegal harvest were identified as factors contributing to listing.

4.1.2 Life History

Bull trout are members of the salmon family known as char. Bull trout exhibit both resident and migratory life-history strategies (Rieman and McIntyre 1993). Resident bull trout complete their entire life cycle in the tributary (or nearby) streams in which they spawn and rear. Migratory bull trout spawn in tributary streams where juvenile fish rear 1 to 4 years before migrating to either a lake (adfluvial form) or river (fluvial form) (Fraley and Shepard 1989; Goetz 1989). The size and age of bull trout at maturity depends upon life-history strategy. Resident fish tend to be smaller than migratory fish at maturity and produce fewer eggs (Fraley and Shepard 1989; Goetz 1989). Bull trout normally reach sexual maturity in 4 to 7 years. Spawning typically occurs from August to November. Eggs hatch in late winter or early spring. Fry may remain in the stream gravels for up to 3 weeks before emerging (USFWS 2002).

Habitat components that influence bull trout distribution and abundance include water temperature, cover, channel form and stability, substrate for spawning and rearing, and migratory corridors. Bull trout are found in colder streams and require colder water than most other salmonids for incubation, juvenile rearing, and spawning. Bull trout of all life stages require complex forms of cover, including large woody debris, undercut banks, boulders, and pools. Bull trout require loose, clean gravel relatively free of fine sediments for spawning and rearing. Bull trout use migratory corridors to move from spawning and rearing habitats to foraging and overwintering habitats and back (USFWS 2002).

The habitat within the mainstem Columbia River within the project area is considered essential to conservation of mid-Columbia River populations and for maintaining connectivity and providing for the expression of historic migratory life history forms throughout the lower and mid-Columbia River basins (USFWS 2009a).

Historically, the mainstem Snake and Columbia Rivers were likely used as migration corridors, foraging areas, and overwintering habitat by fluvial bull trout that originated in tributary streams throughout the basins. Presently, mainstem habitat is used by small numbers of bull trout (Anglin et.al. 2010) depending on the strength of their populations in tributary streams and the availability of migration corridors that connect to the Columbia and Snake rivers. Bull trout have been observed passing the fish ladders at numerous mainstem Columbia River dams (e.g., Bonneville, Wells, Rocky Reach, and Rock Island dams) (USFWS 2002), confirming potential presence in the project area. Bull trout in one study of habitat use of the mainstem mid-Columbia River were documented utilizing the mainstem for migration and, in general, entered mainstem tributaries by mid-June (Chelan PUD 2002).

4.1.3 Population Status and Trends

Although bull trout are presently widespread within their historical range in the coterminous United States, they have declined in overall distribution and abundance during the last century. Several local extirpations have been documented since the 1950s in areas of California, Idaho, and Washington. Bull trout occur in portions of the Columbia River and tributaries within the basin, including its headwaters in Montana and Canada (USFWS 2002).

Rangewide bull trout abundance has not been estimated due to sampling variability, differences in methods used to estimate abundance, and, in some core areas, a complete lack of data. Population trends are unknown for most core areas, and no broad trend can be described for bull trout population abundance rangewide. In general, geographically smaller core areas tend to have lower population numbers, while large adult populations (1,000 adults or more) tend to occur in larger core areas where the habitat is spatially well connected and well distributed throughout the core area. The quality and quantity of the habitat and its relative degree of connectivity play a major role in determining population size (USFWS 2008).

4.2 CRITICAL HABITAT

This section discusses designated critical habitat for bull trout, including the primary constituent elements (PCEs), and specifies which PCEs are present within the action area. Critical habitat is defined under the ESA as: (1) specific areas within the geographical area occupied by the species at the time of listing, on which are found those physical or biological features that are essential to the conservation of the listed species and that may require special management considerations or protection, and (2) specific areas outside the geographical area occupied by the species at the time of listing that are essential for the conservation of a listed species (70 FR 52630).

Critical habitat was designated for the Columbia River DPS of bull trout in 2005 (70 FR 56211), and was redesignated in 2010 (75 FR 63897). The mainstem Columbia River within the action area is designated critical habitat for bull trout.

Critical habitat units (CHU) are described by their PCEs, which are the physical and biological features of critical habitat essential to the conservation of listed species, including, but not limited to (1) space for individual and population growth and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and (5) habitats that are protected from disturbance or are representative of the historic geographic and ecological distributions of a species (USFWS and NMFS 1998). The sections below identify the PCEs for each critical habitat designation and describe the current functional condition of each PCE occurring in the action area.

The project area includes two CHUs for bull trout: the Mainstem Lower Columbia River CHU and the Mainstem Upper Columbia River CHU. The Mainstem Lower Columbia River CHU extends from the mouth of the Columbia River to John Day Dam and is located in the States of Oregon and Washington. This unit includes 211.5 miles of stream and provides connecting habitat.

The Mainstem Upper Columbia River CHU includes the Columbia River from John Day Dam upstream 323.2 miles to Chief Joseph Dam. The Mainstem Upper Columbia River CHU supports foraging, migration, and overwintering (FMO) habitat for fluvial bull trout; several accounts exist of bull trout in the Columbia River between the Yakima and John Day rivers. The Mainstem Upper Columbia River CHU provides connectivity to the Mainstem Lower Columbia River CHU and 13 additional CHUs. This unit is located in north-central, central, and south-central Washington and in north-central and northeast Oregon (75 FR 63897).

Three main tributaries in which bull trout may migrate to/from the mainstem Columbia River within the project area include: Walla Walla River, Yakima River, and the Tucannon River.

The Walla Walla River Basin includes two critical habitat subunits (CHSUs). The unit includes 383.7 km (238.4 miles) of stream, extending across portions of Umatilla and Wallowa Counties in Oregon and Walla Walla and Columbia Counties in Washington. There are five known bull trout local populations in this unit: two in the Walla Walla River Basin and three in the Touchet River Basin. The subunits within this unit provide spawning, rearing, foraging, migratory, connecting, and overwintering habitat (75 FR 63897).

The Yakima River CHU supports adfluvial, fluvial, and resident life-history forms of bull trout. This CHU includes the mainstem Yakima River and tributaries from its confluence with the Columbia River upstream to the uppermost point of bull trout distribution. The basin occupies most of Yakima and Kittitas Counties, approximately half of Benton County, and a small portion of Klickitat County. This CHU does not contain any subunits because it supports one core area (75 FR 63897).

The Lower Snake River Basin contains two CHSUs: the Tucannon River Basin CHSU located in Columbia and Garfield Counties, and Asotin Creek Basin CHSU within Garfield and Asotin Counties. Approximately 270.8 km (168.3 miles) of stream are designated as critical habitat for bull trout. The subunits within this unit provide spawning, rearing, foraging, migratory, connecting, and overwintering habitat.

Critical habitat for bull trout consists of nine PCEs, described below.

PCE 1: Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.

These habitat characteristics are applicable to spawning and rearing habitat and are found primarily in tributaries to the mainstem Columbia River. The majority of the critical habitat designated within the action area is characterized as foraging, migration, and overwintering (FMO) habitat. FMO habitat is discussed in more detail in the sections below.

PCE 2: Migratory habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.

FMO habitat between core areas and habitat within the mainstem Columbia River is essential for conservation by providing year-round connectivity and the expression of migratory life history forms. The Columbia River in some cases provides the only FMO and connectivity for many core recovery areas (USFWS 2009b).

The action area functions as a migration corridor for bull trout, but this PCE is degraded, particularly with respect to water quality (see Section 3.2). The Washington State 303(d) list includes records in the action area for water temperatures of greater than 68°F, well above standards for salmonid survival (Ecology 2010). Water temperatures within the action area are likely to seasonally limit bull trout presence. Water temperatures above 15ºC (59ºF) may limit bull trout distribution (Fraley and Shepard 1989; Rieman and McIntyre 1995). Depending on the year, water temperatures in the action area may exceed the bull trout tolerance threshold of 15ºC (59ºF) between May and October.

The eight mainstem dams on the Columbia River within the action area do not function as passage barriers, but may result in delayed movement between core areas for some adults.

PCE 3: An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.

This PCE is present within the action area. Aquatic macroinvertebrates (e.g., sand shrimp, mysids) are present in the mainstem Columbia River (NMFS 2005). Forage fish species for bull trout include sculpins (*Cottus* spp.), minnows (Cyprinidae), whitefish *(Prosopium* spp.), and juvenile salmonids (Rieman and McIntyre 1993), all of which are present in the Columbia River.

PCE 4: Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure.

The complexity of riverine habitat in the action area has been reduced relative to historical conditions. Mainstem hydropower dams, levees located along shorelines, and channel modification (e.g., armoring, reshaping) have restricted habitat forming processes such as sediment transport and deposition, erosion, and natural flooding. Shoreline erosion rates are likely slower than they were historically due to flow regulation. Connection to historical floodplains and side channels has been altered or lost and the river channel is deeper and narrower than historical conditions. Therefore, this PCE is present, but degraded, in the action area.

PCE 5: Water temperatures ranging from 36° to 59°F (2° to 15°C), with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shade, such as that provided by riparian habitat; and local groundwater influence.

This PCE is degraded in the action area, as water temperatures exceed the tolerance threshold for bull trout for significant portions of the year. Compared to other salmonids, bull trout have a more narrow tolerance for habitat quality parameters, and require particularly cold, clean water. Water temperatures above 59ºF (15ºC) likely limit bull trout distribution (Fraley and Shepard 1989; Rieman and McIntyre 1995). Depending on the year, water temperatures in the action area may exceed the bull trout tolerance threshold of 59ºF (15ºC) between May and October. During these months, adequate thermal refugia are likely to be scarce in the action area. Water temperatures between November and April, however, are suitable for bull trout.

PCE 6: ***Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount (e.g., less than 12 percent) of fine substrate less than 0.03 inch (0.85 mm) in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions.***

This PCE is specific to bull trout spawning and rearing habitat, and is not present in the action area.

PCE 7: ***A natural hydrograph, including peak, high, low, and base flows within historical and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph.***

This PCE is present but is degraded from historical conditions. Development of the hydropower system on the Columbia River has significantly influenced peak seasonal discharges and the velocity and timing of flows in the river. The Columbia River estuary historically received annual spring freshet flows that were 75 percent to 100 percent higher on average than current freshet flows. Historical winter flows (October through March) also were approximately 35 percent to 50 percent lower than current flows (ISAB 2000). Although current conditions represent a departure from the natural hydrograph, base flows in the action area have not been disrupted to the extent that foraging, migration, and overwintering behavior are significantly impaired for bull trout.

PCE 8: ***Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.***

As discussed above, water quality is impaired within the action area, and flows are altered from historical conditions. However, water quality and quantity are suitable to the extent that foraging, migration, and overwintering behavior of bull trout is possible. Spawning and rearing habitat is not present, although growth and survival of bull trout are not precluded by current conditions.

PCE 9: ***Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass), inbreeding (e.g., brook trout), or competitive (e.g., brown trout) species present.***

Nonnative fish species are present in the action area; however, the extent to which nonnative fish affect bull trout in the action area is unknown. Because bull trout occurring in the action area are expected to be subadults or adults, they are likely to be less susceptible to predation than juveniles. Therefore, nonnative predatory fish are unlikely to have a significant impact on bull trout in the action area. Bull trout do not breed in the action area, and would not be affected by the potential for inbreeding with nonnative species. Nonnative competitive species may be present in the action area.

Therefore, this PCE is not expected to be present in the action area because the potential exists for nonnative competitive fish species to be present.

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5. ANALYSIS OF THE EFFECTS OF THE ACTION

This section discusses the effects of the proposed project in detail for each listed species and critical habitat. This section also describes how these effects will be avoided and minimized and describes conservation measures that will be implemented.

5.1 DIRECT EFFECTS

As of 2010 Crescent and Goose Islands populated the largest CATE colonies in the Columbia Plateau Region (Roby et al. 2011). Diet studies of the CATE colonies on Crescent Island indicate that juvenile salmonids are the most prevalent prey type, and in 2006 to 2008 CATEs from Crescent Island annually consumed an estimated 330,000 to 400,000 juvenile salmonids from the Columbia and Snake rivers (approximately 8,337 PIT-tagged smolts were estimated to have been consumed by the Crescent Island CATE colony in 2010). Further, substantial numbers of PIT tags from juvenile salmonids from the mid-Columbia River have been discovered on the Goose Island CATE colony. Approximately 7,595 PIT-tagged smolts were estimated to have been consumed by the Goose Island CATE colony in 2010, for example. However, to date, there has been only one confirmed PIT-tagged bull trout consumed by an inland nesting Caspian tern. The tag (placed at the Entiat River on May 7, 2013, as part of tagging effort CSS13126.HB4) was detected by researchers on August 5, 2013, on the Goose Island CATE colony (A. Evans, pers. comm. September 30, 2013).

Due to the level of predation on juvenile salmonids by Crescent and Goose island CATEs, the Action Agencies (Corps, Reclamation, and BPA) believe that denying or reducing CATE access to Goose and Crescent Islands will reduce juvenile bull trout mortality resulting from CATE predation. The extent of that reduction is dependent on how feeding behavior is altered at the relocation site(s).

Project actions proposed to deny or reduce CATE access on Goose and Crescent Islands include:

- Placement of a network of rope and flagging, plantings of native vegetation, installation of silt fencing, and the incorporation of substrate (cobbles/boulders) and large wood on the islands.
- Active hazing actions (observers will walk through the CATE colony to disturb CATEs away from potential or actual nesting sites while making as much effort as possible not to disturb other species).

- Collection of 200 CATE eggs total for all locations (including at-risk islands) per year for up to 5 years (egg removal would only be used after all other options have been exhausted).

It is believed that these actions will have no direct effects on bull trout because in-water work is not proposed, project activities will not impact water quality, and bull trout are not present at the dissuasion sites.

5.2 INDIRECT EFFECTS

As a result of the proposed project, it is possible that CATE colonies may relocate to areas within the Columbia River Basin, other than receiving sites, in which an increase in CATE predation on bull trout may occur.

With regard to federally listed species, the colonization of CATE at enhancement sites may have some minor impact to these species. However, the choice of enhancement sites will include an analysis of biological resources, especially the presence of listed and sensitive species, to avoid significant conflicts between relocated CATE and listed species.

5.3 EFFECTS TO CRITICAL HABITAT

The Action Agencies believe that critical habitat will not be adversely affected by the proposed project based on the following:

- The islands affected by this action are dominated by grasses and low lying shrubs that do not provide much carbon loading or insect drift to the waterways. Increased vegetation on the islands would increase the potential for some carbon loading and insect drift to occur.
- No in-water work will occur and the alteration of habitat on the islands will be conducted away from the waterline and in a manner that would not allow for materials to enter the water and affect water quality.
- As stated earlier in this BA, the intent of the habitat alterations on the islands is to move predatory birds from an area where salmonids are the principal prey source to an area that has a higher diversity of prey to alleviate mortality on ESA-listed salmonids. A shift in feeding behavior by CATEs would decrease mortality of juvenile bull trout as they migrate through and rear within the action area, thereby providing safer passage.

Table 5-1 summarizes effects to bull trout PCEs.

Table 5-1. Summary of Effects to Bull Trout PCEs

PCE	Effect
PCE 1: Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.	No Adverse Effect
PCE 2: Migratory habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats.	No Adverse Effect
PCE 3: An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	No Adverse Effect
PCE 4: Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure.	No Adverse Effect
PCE 5: Water temperatures ranging from 36° to 59°F (2° to 15°C), with adequate thermal refugia available for temperatures at the upper end of this range.	No Adverse Effect
PCE 6: Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival.	No Adverse Effect
PCE 7: A natural hydrograph, including peak, high, low, and base flows within historical and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph.	No Adverse Effect
PCE 8: Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	No Adverse Effect
PCE 9: Few or no nonnative predatory, inbreeding, or competitive species present.	No Adverse Effect

5.4 ESTIMATING TAKE

The Action Agencies are not anticipating *take* of bull trout during proposed project activities; however, very limited CATE predation of bull trout may continue within the action area (i.e., near at-risk islands) and/or increase outside the action area as a result of the proposed project, pending the effectiveness of the proposed action.

5.5 EFFECTS FROM INTERRELATED AND INTERDEPENDENT ACTIONS

No interrelated or interdependent actions are anticipated as part of the proposed project.

5.6 CUMULATIVE EFFECTS

No Cumulative Effects analysis required for informal consultation.

5.7 AVOIDANCE, MINIMIZATION, AND CONSERVATION MEASURES

This section describes the impact avoidance and minimization measures, including best management practices (BMPs), that will be conducted as part of the proposed action to avoid and minimize impacts to bull trout and critical habitat.

- No in-water work will occur as part of the proposed project.
- The alteration of habitat on the islands will be conducted well away from the waterline and in a manner that would not allow for materials to enter the water and affect water quality.
- A biologist(s) will annually re-evaluate the project for changes in design and evaluation methods not previously employed in the BA to assess potential impacts associated with those changes, as well as the status and location of listed species until the project is completed. Re-initiation of consultation with the Services is required if new information reveals project effects that may affect listed species or critical habitat in a manner or to an extent not previously considered. Re-initiation of consultation is also required if the identified action is modified in a manner that causes an effect to species that was not considered in the BA or if a new species is listed or critical habitat is designated that may be affected by the action.
- All work will be performed according to the requirements and conditions of the regulatory permits issued by federal, state, and local governments.
- Seasonal restrictions, e.g., work windows, may be applied to the project to avoid or minimize potential impacts to listed or proposed species based on agreement with, and the regulatory permits issued by USFWS and NMFS.
- All equipment to be used for proposed project activities will be cleaned and inspected prior to arriving at the project site, to ensure no potentially hazardous materials are exposed, no leaks are present, and the equipment is functioning properly.
- If necessary, a Temporary Erosion and Sediment Control Plan (TESC) will be developed prior to excavation, vegetation removal, grading, berm construction, and/or other substrate alteration activities.
- A Spill Prevention, Control, and Countermeasures (SPCC) Plan will be developed prior to beginning project activities involving the use of machinery. The SPCC Plan will identify the appropriate spill containment materials; as well as the method of implementation. All

elements of the SPCC Plan will be available at the project site at all times.

- Additional willow plantings and silt fence repairs will occur before CATEs begin to nest on an island.
- All work occurring at locations other than Goose and Crescent Island, with the exception of visits to other locations for the purpose of monitoring or active hazing will require additional review under Section 106 of the National Historic Preservation Act.

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6. FINDING OF EFFECT

This section makes an effect determination for each listed species and critical habitat.

6.1 FINDING OF EFFECTS TO BULL TROUT

The proposed project *may affect, but is not likely to adversely affect* Columbia River bull trout. Although the proposed project may not totally alleviate mortality to bull trout from avian predation within the action area, the proposed project is anticipated to decrease juvenile bull trout mortality associated with CATE predation.

6.2 FINDING OF EFFECTS TO CRITICAL HABITAT

The proposed project *may affect, but is not likely to adversely affect* bull trout critical habitat based on the following:

- In-water work will not occur,
- Habitat alterations will occur within upland locations and will not impact the waterways (i.e., increased turbidity, pollutants, etc.),
- Increased plantings may improve shade and allochthonous input to the waterways, and
- Improved migration corridors—safer passage for juvenile bull trout.

6.3 CONCLUSION

Based on the information presented in this BA, the Action Agencies have determined that the implementation of the AMIP will reduce impacts from avian predation to Columbia River bull trout and other ESA salmonid species and is not likely to adversely affect bull trout or their critical habitat.

The Action Agencies reached this conclusion based on the following: (1) the biological requirement for increased migration survival by juvenile bull trout will be potentially improved by the alteration of habitat that allows for relocation of predatory bird species, (2) long-term impacts are not expected due to the interim nature of this project (pending analysis), and (3) critical habitat will not be altered to the detriment of migrating juveniles.

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APPENDIX A

Species Lists from USFWS

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN

IN **BENTON COUNTY**

AS PREPARED BY

THE U.S. FISH AND WILDLIFE SERVICE

CENTRAL WASHINGTON FIELD OFFICE

(Revised September 3, 2013)

LISTED

Bull trout *(Salvelinus confluentus)*

Gray wolf *(Canis lupus)*

Pygmy rabbit *(Brachylagus idahoensis)* – Columbia Basin DPS

Major concerns that should be addressed in your Biological Assessment of project impacts to listed animal species include:

1. Level of use of the project area by listed species.

2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.

3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

Spiranthes diluvialis (Ute ladies'-tresses)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in the project vicinity.

2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and loss of habitat.

3. Changes in hydrology where taxon is found.

DESIGNATED

Critical habitat for bull trout

PROPOSED

Eriogonum codium (Umtanum desert buckwheat)
Critical habitat for *Eriogonum codium*

CANDIDATE

Greater sage grouse *(Centrocercus urophasianus)* - Columbia Basin DPS
Yellow-billed cuckoo *(Coccyzus americanus)*

SPECIES OF CONCERN

Bald eagle *(Haliaeetus leucocephalus)*
Burrowing owl *(Athene cunicularia)*
California floater *(Anodonta californiensis)*
Columbia clubtail *(Gomphus lynnae),*
Ferruginous hawk *(Buteo regalis)*
Giant Columbia spire snail *(Fluminicola columbiana)*

Loggerhead shrike *(Lanius ludovicianus)*

Long-eared myotis *(Myotis evotis)*

Margined sculpin *(Cottus marginatus)*

Pacific lamprey *(Lampetra tridentata)*

Pallid Townsend's big-eared bat *(Corynorhinus townsendii pallescens)*

Redband trout *(Oncorhynchus mykiss)*

River lamprey *(Lampetra ayresi)*

Sagebrush lizard *(Sceloporus graciosus)*

Townsend's ground squirrel *(Spermophilus townsendii)*

Western brook lamprey *(Lampetra richardsoni)*

Astragalus columbianus (Columbia milk-vetch)

Cryptantha leucophaea (gray cryptantha)

Haplopappus liatriformis (Palouse goldenweed)

Lomatium tuberosum (Hoover's desert-parsley)

Mimulus jungermannioides (liverwort monkey-flower)

Rorippa columbiae (persistent sepal yellowcress)

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN

IN **FRANKLIN COUNTY**

AS PREPARED BY

THE U.S. FISH AND WILDLIFE SERVICE

CENTRAL WASHINGTON FIELD OFFICE

(Revised September 3, 2013)

LISTED

Bull trout *(Salvelinus confluentus)*
Gray wolf *(Canis lupus)*
Pygmy rabbit *(Brachylagus idahoensis)* – Columbia Basin DPS

Major concerns that should be addressed in your Biological Assessment of project impacts to listed animal species include:

1. Level of use of the project area by listed species.

2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.

3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

Spiranthes diluvialis (Ute ladies'-tresses)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in the project vicinity.

2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and loss of habitat.

3. Changes in hydrology where taxon is found.

DESIGNATED

Critical habitat for the bull trout

PROPOSED

Physaria douglasii ssp. tuplashensis (White Bluffs bladderpod)
Critical habitat for *Physaria douglasii* ssp. *tuplashensis*

CANDIDATE

Washington ground squirrel *(Spermophilus washingtoni)*
Yellow-billed cuckoo *(Coccyzus americanus)*

SPECIES OF CONCERN

Bald eagle *(Haliaeetus leucocephalus)*

Burrowing owl *(Athene cunicularia)*

California floater *(Anodonta californiensis)*

Columbia clubtail *(Gomphus lynnae)*

Ferruginous hawk *(Buteo regalis)*

Giant Columbia spire snail *(Fluminicola columbiana)*

Loggerhead shrike *(Lanius ludovicianus)*

Long-eared myotis *(Myotis evotis)*

Pacific lamprey *(Lampetra tridentata)*

Pallid Townsend's big-eared bat *(Corynorhinus townsendii pallescens)*

Redband trout *(Oncorhynchus mykiss)*

River lamprey *(Lampetra ayresi)*

Sagebrush lizard *(Sceloporus graciosus)*

Western brook lamprey *(Lampetra richardsoni)*

Cryptantha leucophaea (gray cryptantha)

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN IN GRANT COUNTY AS PREPARED BY THE U.S. FISH AND WILDLIFE SERVICE CENTRAL WASHINGTON FIELD OFFICE

(Revised March 15, 2012)

LISTED

Bull trout *(Salvelinus confluentus)*
Gray wolf *(Canis lupus)*
Pygmy rabbit *(Brachylagus idahoensis)* – Columbia Basin DPS

Major concerns that should be addressed in your Biological Assessment of project impacts to listed animal species include:

1. Level of use of the project area by listed species.

2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.

3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

Spiranthes diluvialis (Ute ladies'-tresses)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in the project vicinity.

2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and loss of habitat.

3. Changes in hydrology where taxon is found.

DESIGNATED

Critical habitat for the bull trout

PROPOSED

None

CANDIDATE

Greater sage grouse *(Centrocercus urophasianus)* – Columbia Basin DPS
Washington ground squirrel *(Spermophilus washingtoni)*
Yellow-billed cuckoo *(Coccyzus americanus)*
Artemisia campestris ssp. *borealis* var. *wormskioldii* (northern wormwood)

SPECIES OF CONCERN

Bald eagle *(Haliaeetus leucocephalus)*
Burrowing owl *(Athene cunicularia)*
California floater *(Anodonta californiensis)*
Columbian sharp-tailed grouse *(Tympanuchus phasianellus columbianus)*
Ferruginous hawk *(Buteo regalis)*
Giant Columbia spire snail *(Fluminicola columbiana)*
Kincaid meadow vole *(Microtus pennsylvanicus kincaidi)*
Loggerhead shrike *(Lanius ludovicianus)*
Long-eared myotis *(Myotis evotis)*
Northern goshawk *(Accipiter gentilis)*
Northern leopard frog *(Rana pipiens)*
Pacific lamprey *(Lampetra tridentata)*
Pallid Townsend's big-eared bat *(Corynorhinus townsendii pallescens)*
Redband trout *(Oncorhynchus mykiss)*
River lamprey *(Lampetra ayresi)*
Sagebrush lizard *(Sceloporus graciosus)*
Western brook lamprey *(Lampetra richardsoni)*
Cryptantha leucophaea (gray cryptantha)
Erigeron basalticus (basalt daisy)
Lomatium tuberosum (Hoover’s desert-parsley)
Oxytropis campestris var. *wanapum* (Wanapum crazyweed)

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN

IN **KLICKITAT COUNTY**

AS PREPARED BY

THE U.S. FISH AND WILDLIFE SERVICE

CENTRAL WASHINGTON FIELD OFFICE

(Revised September 3, 2013)

LISTED

Bull trout *(Salvelinus confluentus)*

Gray wolf *(Canis lupus)*

Northern spotted owl *(Strix occidentalis caurina)*

Major concerns that should be addressed in your Biological Assessment of project impacts to listed animal species include:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.
3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

Spiranthes diluvialis (Ute ladies'-tresses)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in the project vicinity.

2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and loss of habitat.

3. Changes in hydrology where taxon is found.

DESIGNATED

Critical habitat for bull trout

PROPOSED

North American wolverine *(Gulo gulo luteus)* – contiguous U.S. DPS
Oregon spotted frog *(Rana pretiosa)*
Critical habitat for Oregon spotted frog

CANDIDATE

Fisher *(Martes pennanti)* - West Coast DPS
Yellow-billed cuckoo *(Coccyzus americanus)*
Artemisia campestris ssp. *borealis* var. *wormskioldii* (northern wormwood)
Pinus albicaulis (whitebark pine)

SPECIES OF CONCERN

Bald eagle *(Haliaeetus leucocephalus)*

Burrowing owl *(Athene cunicularia)*

California floater *(Anodonta californiensis)*

Ferruginous hawk *(Buteo regalis)*

Giant Columbia spire snail *(Fluminicola columbiana)*

Larch Mountain salamander *(Plethodon larselli)*

Loggerhead shrike *(Lanius ludovicianus)*

Long-eared myotis *(Myotis evotis)*

Mardon skipper *(Polites mardon)*

Northern goshawk *(Accipiter gentilis)*

Olive-sided flycatcher *(Contopus cooperi)*

Pacific lamprey *(Lampetra tridentata)*

Pacific Townsend's big-eared bat *(Corynorhinus townsendii townsendii)*

Pallid Townsend's big-eared bat *(Corynorhinus townsendii pallescens)*

Peregrine falcon (*Falco peregrinus*)

Redband trout *(Onchrhynchus mykiss)*

River lamprey *(Lampetra ayresi)*

Sagebrush lizard *(Sceloporus graciosus)*

Sharptail snake *(Contia tenius)*

Townsend's ground squirrel *(Spermophilis townsendii)*

Western brook lamprey *(Lampetra richardsoni)*

Western gray squirrel *(Sciurus griseus griseus)*

Western pond turtle *(Clemmys marmorata)*

Westslope cutthroat trout *(Oncorhynchus clarki lewisi)*

Astragalus pulsiferae var. *suksdorfii* (Ames' milk-vetch)

Calochortus longebarbatus var. *longebarbatus* (long-bearded sego lily)

Cypripedium fasciculatum (clustered lady's-slipper)

Lomatium suksdorfii (Suksdorf's desert-parsley)

Meconella oregana (white meconella)

Mimulus jungermannioides (liverwort monkey-flower)

Penstemon barrettiae (Barrett's beardtongue)

Ranunculus reconditus (obscure buttercup)

Rorippa columbiae (persistent sepal yellowcress)

Sisyrinchium sarmentosum (pale blue-eyed grass)

Texosporium sancti-jacobi (woven spore lichen)

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES
AND SPECIES OF CONCERN
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE
WHICH MAY OCCUR WITHIN MORROW COUNTY, OREGON**

PROPOSED SPECIES

None

No Proposed Endangered Species	PE
No Proposed Threatened Species	PT

CANDIDATE SPECIES

Mammals

Terrestrial:

Washington ground squirrel	*Urocitellus washingtoni*

SPECIES OF CONCERN

Mammals

Silver-haired bat	*Lasionycteris noctivagans*
Small-footed myotis bat	*Myotis ciliolabrum*
Long-eared myotis bat	*Myotis evotis*
Yuma myotis bat	*Myotis yumanensis*

Birds

Northern goshawk	*Accipiter gentilis*
Western burrowing owl	*Athene cunicularia hypugaea*
Ferruginous hawk	*Buteo regalis*
Olive-sided flycatcher	*Contopus cooperi*
Willow flycatcher	*Empidonax traillii adastus*
Yellow-breasted chat	*Icteria virens*
Lewis' woodpecker	*Melanerpes lewis*
Mountain quail	*Oreortyx pictus*
White-headed woodpecker	*PIcoides albolarvatus*

Reptiles and Amphibians

Northern sagebrush lizard	*Sceloporus graciosus graciosus*

Fish

Margined sculpin	*Cottus marginatus*
Pacific lamprey	*Lampetra tridentata*

Plants

Robinson's onion	*Allium robinsonii*
Laurence's milk-vetch	*Astragalus collinus var. laurentii*

DELISTED SPECIES

Birds

FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES AND SPECIES OF CONCERN UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE WHICH MAY OCCUR WITHIN MORROW COUNTY, OREGON

American Peregrine falcon	*Falco peregrinus anatum*
Bald eagle	*Haliaeetus leucocephalus*

Definitions:

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

Key:

E	Endangered
T	Threatened
CH	Critical Habitat has been designated for this species
PE	Proposed Endangered
PT	Proposed Threatened
PCH	Critical Habitat has been proposed for this species

Notes:

Marine & Anadromous Species: Please consult the National Marine Fisheries Service (NMFS) (http://www.nmfs.noaa.gov/pr/species/) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

Marine Turtle Conservation and Management: All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. In 1977, NOAA Fisheries and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding to jointly administer the Endangered Species Act with respect to marine turtles. NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and the U.S. Fish and Wildlife Service has the lead for the conservation and recovery of sea turtles on nesting beaches. For more information, see the NOAA Fisheries webpage on sea turtles http://www.nmfs.noaa.gov/pr/species/turtles/.

Gray Wolf: In 2008, the Service published a final rule that established a distinct population segment of the gray wolf (*Canis lupis*) in the northern Rocky Mountains (which includes a portion of Eastern Oregon, east of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of Oregon east of the centerline of Highway 95 south of Burns Junction). Any wolves found west of this line in Oregon belong to the conterminous USA population [see 73 FR 10514]. On May 5, 2011, the Fish and Wildlife Service published a final rule – as directed by legislative language in the Fiscal Year 2011 appropriations bill – reinstating the Service's 2009 decision to delist biologically recovered gray wolf populations in the Northern Rocky Mountains. Gray wolves in Oregon are State-listed as endangered, regardless of location.

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN
IN WALLA WALLA COUNTY
AS PREPARED BY
THE U.S. FISH AND WILDLIFE SERVICE
CENTRAL WASHINGTON FIELD OFFICE

(Revised March 15, 2012)

LISTED

Bull trout *(Salvelinus confluentus)*
Canada lynx *(Lynx canadensis)*

Major concerns that should be addressed in your Biological Assessment of project impacts to listed animal species include:

1. Level of use of the project area by listed species.

2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.

3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

Spiranthes diluvialis (Ute ladies'-tresses)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in the project vicinity.

2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and loss of habitat.

3. Changes in hydrology where taxon is found.

DESIGNATED

Critical habitat for the bull trout

PROPOSED

None

CANDIDATE

Washington ground squirrel *(Spermophilus washingtoni)*
Yellow-billed cuckoo *(Coccyzus americanus)*

SPECIES OF CONCERN

Bald eagle *(Haliaeetus leucocephalus)*
Burrowing owl *(Athene cunicularia)*
California floater *(Anodonta californiensis)*
Ferruginous hawk *(Buteo regalis)*
Giant Columbia spire snail *(Fluminicola columbiana)*
Loggerhead shrike *(Lanius ludovicianus)*
Long-eared myotis *(Myotis evotis)*
Margined sculpin *(Cottus marginatus)*
Northern goshawk *(Accipiter gentilis)*
Olive-sided flycatcher *(Contopus cooperi)*
Pacific lamprey *(Lampetra tridentata)*
Pallid Townsend's big-eared bat *(Corynorhinus townsendii pallescens)*
Redband trout *(Onchrhynchus mykiss)*
River lamprey *(Lampetra ayresi)*
Rocky Mountain tailed frog *(Ascaphus montanus)*
Sagebrush lizard *(Sceloporus graciosus)*
Western brook lamprey *(Lampetra richardsoni)*
Westslope cutthroat trout *(Oncorhynchus clarki lewisi)*
Astragalus kentrophyta var. *douglasii* (thistle milk-vetch)
Cryptantha leucophaea (gray cryptantha)
Mimulus jungermannioides (liverwort monkey-flower)

APPENDIX B

Candidate Species Review

Inland Avian Predation Management Plan
Candidate Species Review

This document discusses candidate species that could, based on U.S. Fish and Wildlife Service (USFWS) species lists, potentially occur in the Inland Avian Predation Management Plan (IAPMP) action area.

Candidate species are plant and animal taxa considered for possible addition to the List of Endangered and Threatened Species. These are taxa for which the USFWS has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposal to list, but issuance of a proposed rule is currently precluded by higher priority listing actions (61 FR 7596-7613 [February 28, 1996]).

Within this document, the term "action area" refers to the area of potential effect from all project activities. Section 2.9 of the IAPMP Biological Assessment (BA) provides details on the extent of the action area. The species addressed in this document are discussed relative to their use of and presence in the action area.

Species lists covering the terrestrial and aquatic portions of the action area were obtained from the USFWS website for Benton, Walla Walla, Grant, Franklin, and Klickitat Counties in Washington[1] and Morrow County in Oregon.[2] The species lists were most recently obtained in October 2013 and are included in Appendix A of the IAPMP BA.

Four candidate species under USFWS jurisdiction potentially occur within the project area; these species are listed in and described in the table below:

Table 1. Candidate Species Addressed

Common Name	Scientific Name	Location (County)
Greater Sage Grouse	*Centrocercus urophasianus*	Grant; Benton
Washington ground squirrel	*Spermophilus washingtoni*	Grant; Walla Walla; Franklin; Morrow
Wormskiold's northern wormwood	*Artemisia campestris* ssp. *borealis* var. *wormskioldii*	Grant; Klickitat
Whitebark pine	*Pinus albicaulis*	Klickitat
Fisher	*Martes pennanti*	Klickitat

Greater Sage Grouse (*Centrocercus urophasianus*)

Species and Habitat Occurrence

Greater sage-grouse inhabit shrub-steppe habitat and are closely associated with sagebrush. Historically, greater sage-grouse were distributed throughout much of the western United States in 13 states and along the southern border of three western Canadian provinces (WDFW 2012a).

Greater sage-grouse have declined dramatically in both distribution and population size in Washington due to conversion of shrub-steppe for production of crops and degradation of the remaining native habitat. Current range in the state is approximately eight percent of the historical range. Within Washington, the greater sage-grouse persists in two relatively isolated areas: one primarily on the U.S. Army's Yakima Training Center (YTC) in Kittitas and Yakima Counties and the other in Douglas County. Currently a third population is being reestablished in Lincoln County (WDFW 2012a).

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[1] http://www.fws.gov/wafwo/speciesmap_new.html

[2] http://www.fws.gov/oregonfwo/Species/Lists/Documents/County/morrow%20COUNTY.pdf

Effect Determination

The project is ***not likely to impact populations, individuals, or suitable habitat*** for the greater sage-grouse. Suitable habitat consisting of areas dominated by sagebrush are limited within the action area, and given the current range of the species and lack of documented detections, it is extremely unlikely that the greater sage-grouse occurs in the action area (WDFW 2012b). Therefore, it is reasonably certain that this species will not be exposed to project impacts.

Washington Ground Squirrel (*Spermophilus washingtoni*)

Species and Habitat Occurrence

Washington ground squirrels occupy shrub-steppe and native grassland habitats, especially on sites with deep silty loam soils, which may enhance burrow digging. They occur only in the Columbia Basin region of eastern Washington and north-central Oregon. In Washington, the species is found east and south of the Columbia and Spokane Rivers (WDFW 2012a).

The Washington ground squirrel has experienced major declines in abundance and range since the beginning of the twentieth century. During the last major survey of Washington ground squirrels in Washington in 2004, at least 220 sites were active in Douglas, Grant, and Adams Counties (WDFW 2012a).

Effect Determination

The project is ***not likely to impact populations, individuals, or suitable habitat*** for the Washington ground squirrel. Regular concentrations of Washington Ground Squirrel occur landward of Potholes Reservoir within the vicinity of the proposed project; however, suitable habitat does not occur within the action area (limited shrub-steppe/native grassland habitat). Given the lack of suitable habitat and documented detections within the action area, it is extremely unlikely that the Washington ground squirrel occurs in the action area (WDFW 2012b). Therefore, it is reasonably certain that this species will not be exposed to project impacts.

Wormskiold’s Northern Wormwood (*Artemisia campestris* ssp. *borealis* var. *wormskioldii*)

Species and Habitat Occurrence

Northern wormwood, a member of the aster family, is a low-growing, tap-rooted biennial or perennial plant endemic to the Columbia Basin physiographic province. It has crowded basal rosette leaves with two to three linear divisions and slightly smaller stem leaves of similar form. Leaves and other plant tissue are covered with silky hairs. Narrow inflorescences composed of ray (fertile) and disc (sterile) flowers with relatively large involucres appear from April through June (WDNR 1997).

Northern wormwood is normally found on relatively flat terrain, in arid areas of shrub-steppe vegetation on basalt, compacted cobble, and sand. Associated species include sagebrush, bluebunch wheatgrass, bluegrass, whiteleaf scorpionweed, winged dock, Pacific sage, bigleaf lupine, northern buckwheat, tumblemustard, sand beardtongue, and knapweed (WDNR 1997).

There are only two known occurrences of northern wormwood, both of which are located in Washington State: one in Grant County and one in Klickitat County. One island, Miller Island, within the project area is located within Klickitat County. It is anticipated that no Wormskiold’s northern wormwood are located on this island. However, if deterrence of Caspian terns is found to be required on Miller Island, a plant survey will be conducted on the island prior to the commencement of project activities.

Effect Determination

The project is ***not likely to impact populations, individuals, or suitable habitat*** for northern wormwood. Although the action area may overlap with the historical range of northern wormwood, it is outside of the known current range of this species. Given the current range of the species and the lack of documented detections, it is extremely unlikely that this plant occurs in the project area (WDFW 2012b). Therefore, it is reasonably certain that this species will not be exposed to project impacts.

Whitebark Pine (*Pinus albicaulis*)

Species and Habitat Occurrence

Whitebark pine is typically found in cold, windy, high elevation or high latitude sites in western North America and as a result, many stands are geographically isolated. The species is distributed in coastal mountain ranges (from British Columbia, Washington, Oregon, down to east-central California) and Rocky Mountain Ranges (from northern British Columbia and Alberta to Idaho, Montana, Wyoming, and Nevada). Threats to the whitebark pine include habitat loss and mortality from white pine blister rust, mountain pine beetle, catastrophic fire and fire suppression, environmental effects resulting from climate change, and the inadequacy of existing regulatory mechanisms (USFWS 2011).

Whitebark pine is a candidate species within Klickitat County. One island, Miller Island, within the project area is located within Klickitat County. It is anticipated that whitebark pine are not located on this island. However, if deterrence of Caspian terns is determined to be required on Miller Island, a tree survey will be conducted on the island prior to the commencement of project activities.

Effect Determination

The project is ***not likely to impact populations, individuals, or suitable habitat*** for whitebark pine. Although the action area may overlap with the historical range of the tree species, it is outside of the known current range of this species. Given the current range of the species it is extremely unlikely that this plant occurs in the project area. Therefore, it is reasonably certain that this species will not be exposed to project impacts.

Fisher (*Martes pennanti*)

Species and Habitat Occurrence

Fishers, a member of the weasel family, occur in northern coniferous forests and mixed forest of Canada and the northern U.S. In Washington, fishers were present on both east and west sides of the Cascades crest from elevations 1,970 to 7,200 feet. Due to a lack of sightings and trapping, fisher are considered to be extirpated from, or reduced to scattered individuals in, Washington. Forty female and 50 male fishers were captured in Canada and released into Olympic National Park between 2007 and 2010 (USFWS, 2013).

Fishers have long bodies, short legs, and long bushy tails. Their fur ranges in color from brown to dark blackish brown. Adults range in size from 2.5 to 4 feet long, 7 to 13 pounds for males, and 3 to 5.5 pounds for females. Fishers are solitary animals except during breeding which generally occurs from late February through April. Fishers require large diameter trees, with cavities, and large downed wood for denning and feeding. Fishers feed on small rodents, porcupines, reptiles, insects, carrion, vegetation, and fruit (USFWS, 2013).

Fishers are a candidate species in Klickitat County. One island, Miller Island, within the project area is located within Klickitat County. Fishers would not be located on this island due to a lack of sufficient habitat on the island and in the surrounding area.

Effect Determination

The project is ***not likely to impact populations, individuals, or suitable habitat for fisher***. Although the action area may overlap with the historical range of the mammal species, insufficient habitat is present to support populations, individuals, or suitable habitat for the species. Given the current conditions of the habitat on and around Miller Island it is extremely unlikely that fishers occur in the project area. Therefore, it is reasonably certain that this species will not be exposed to project impacts.

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APPENDIX C

Statement of No Effect

Inland Avian Predation Management Plan
Statement of No Effect for Listed Species

This document discusses listed species that could, based on U.S. Fish and Wildlife Service (USFWS) species lists, potentially occur in the Inland Avian Predation Management Plan (IAPMP) action area, but that analysis has determined would not be affected by the project. Thus, this document states that the IAPMP project will have **no effect** on these species.

Within this document, the term "action area" refers to the area of potential effect from all project activities. Section 2.10 of the IAPMP Biological Assessment (BA) provides details on the extent of the action area. The species addressed in this document are discussed relative to their use of and presence in the action area.

Species lists covering the terrestrial and aquatic portions of the action area were obtained from the USFWS website for Walla Walla, Grant, Franklin, Benton, and Klickitat Counties in Washington[1] and Morrow County, Oregon.[2] The species lists were most recently obtained in October 2013 and are included in Appendix A of the IAPMP BA.

Six listed species, and five proposed threatened species, may occur within the counties mentioned above, but are not addressed in the IAPMP BA, either because suitable habitat for these species does not occur within the action area or because critical habitat is not designated within the action area. All species addressed in this document are terrestrial species under USFWS jurisdiction. These species are described below.

Table 1. Species Addressed

Common Name	Scientific Name	ESU or DPS[a]	Federal ESA Status
Canada lynx	*Lynx canadensis*	Contiguous U.S. DPS	Threatened
Ute ladies'-tresses	*Spiranthes diluvialis*	Not applicable	Threatened
Gray wolf	*Canis lupus*	Not applicable	Endangered
Pygmy rabbit	*Brachylagus idahoensis*	Columbia Basin DPS	Endangered
Northern spotted owl	*Strix occidentalis caurina*	Not applicable	Threatened
Streaked horned lark	*Eremophila alpestris strigata*	Not applicable	Threatened
Yellow-billed cuckoo	*Coccyzus americanus*	Western DPS	Proposed Threatened
Wolverine	*Gulo gulo luscus*	Contiguous U.S. DPS	Proposed Threatened
White Bluffs bladderpod	*Physaria douglasii* ssp. *tuplashensis*	Not applicable	Proposed Threatened
Umtanum desert buckwheat	*Eriogonum codium*	Not applicable	Proposed Threatened
Oregon spotted frog	*Rana pretiosa*	Not applicable	Proposed Threatened

a DPS = Distinct Population Segment

[1] http://www.fws.gov/wafwo/speciesmap_new.html

[2] http://www.fws.gov/oregonfwo/Species/Lists/Documents/County/morrow%20COUNTY.pdf

Canada Lynx (*Lynx Canadensis*)

Species and Habitat Occurrence

In the contiguous United States, Canada lynx inhabit a mosaic between boreal forests and subalpine coniferous forest or northern hardwoods (63 FR 36993). In Washington, Canada lynx are primarily associated with subalpine and boreal forest types in the mountains of north-central and northeastern portions of the state (Okanogan, Chelan, Ferry, Stevens, and Pend Oreille Counties), and formerly occurred in the southern Cascades near Mount Adams (WDFW 2012a, Stinson 2001).

Lynx are adapted to cold temperatures and deep snows of boreal forest. In Washington, this generally includes conifer forests above 4,000 feet, such as lodgepole pine or Engelmann spruce/subalpine fir forests, and rarely includes dry lowland forests. Optimal lynx foraging habitat is vegetated with dense young stands of lodgepole pine that support high numbers of snowshoe hares. Lynx are largely dependent upon a single prey species (the snowshoe hare) but they also eat red squirrels, small mammals, birds, and carrion (Stinson 2001).

The Canada lynx was listed as a Washington state threatened species in 1993, and the contiguous U.S. Distinct Population Segment (DPS) was federally listed in April 2000 (65 FR 16051).

Critical habitat was designated for Canada lynx in 2009, including portions of Chelan and Okanagan Counties in Washington, but is not present in the action area (74 FR 8616).

Effect Determination

Habitat for Canada lynx is not present within the action area. The landscape within the action area is predominantly upland shrub with scattered deciduous trees at relatively low elevation (i.e., Crescent Island is approximately 400 feet above sea level and Goose Island is approximately 1,000 feet above sea level). Subalpine and boreal forest habitat types are not present. The action area is located outside of the range of this species. Although Canada lynx could theoretically transit through low elevation areas, they would not be expected to occur within the action area due to the distance to known populations and habitat; the lack of a suitable prey base; and a lack of access to the islands (i.e., lack of a land bridge). Therefore, based on lack of suitable habitat and lack of known presence, the proposed project will have **no effect** on Canada lynx.

Ute Ladies'-Tresses (*Spiranthes diluvialis*)

Species and Habitat Occurrence

Ute ladies'-tresses orchid is a perennial, terrestrial orchid with stems 20 to 50 centimeters (8 to 20 inches) tall, arising from tuberously thickened roots. The species is characterized by whitish, stout, ringent (gaping at the mouth) flowers. It blooms from approximately late July through August (USFWS 2010a).

Populations of Ute ladies'-tresses orchids are known from three broad general areas of the interior western United States: 1) near the base of the eastern slope of the Rocky Mountains in southeastern Wyoming and adjacent Nebraska and north-central and central Colorado; 2) in the upper Colorado River basin; and 3) in the Bonneville Basin along the Wasatch Front and westward in the eastern Great Basin, in north-central and western Utah, extreme eastern Nevada, and southeastern Idaho. The orchid also has been discovered in southwestern Montana, the Okanogan area, and along the Columbia River in north-central Washington.

Ute ladies'-tresses occurs along riparian edges, gravel bars, old oxbows, high flow channels, and moist to wet meadows along perennial streams. It typically occurs in stable wetland and seepy areas associated with old landscape features within historical floodplains of major rivers. It also is found in wetland and seepy areas near freshwater lakes or springs (USFWS 2010a).

Ute ladies'-tresses was listed in 1992 (57 FR 2048). The species was petitioned for delisting in 2004, and the USFWS determined that delisting may be warranted (69 FR 60605).

Ute ladies'-tresses was first documented in Washington at Wannacut Lake in Okanogan County in 1997 (Bjork 1997, as cited in Fertig et al. 2005). In 2000, the species was also found along a reservoir bordering the Columbia River near Chelan in Chelan County within the Columbia Plateau ecoregion.

Effect Determination

This species is not known to occur within the action area (Fertig et al. 2005; WDFW 2012b). Critical habitat has not been designated for Ute ladies'-tresses. The action area is located outside of the known range of this species. Therefore, based on lack of presence in or near the action area, the proposed project will have **no effect** on Ute ladies'-tresses.

Gray Wolf (*Canis lupus*)

Species and Habitat Occurrence

Gray wolves are habitat generalists and prefer wildland habitat. They are opportunistic carnivores that are keenly adapted to hunt large prey species, such as deer, elk, and moose, although they may also prey on smaller animals, scavenge carrion, and eat fish and vegetation (Wiles et al. 2011). Within their historical geographic distribution, gray wolves occurred in every habitat with large ungulates, including forests, deserts, prairies, swamps, tundra, and coasts (Fuller et al. 2003). Elevations ranging from sea level to mountains were occupied. Gray wolves are adaptable enough that they will also enter and forage in towns and farms, cross highways and open environments, and den near sites heavily disturbed by people such as logging sites and military firing ranges (Fuller et al. 2003). Surviving gray wolf populations in much of western North America, including the northern Rocky Mountain states and British Columbia, predominantly inhabit forests and nearby open habitats, with prey availability and extent of human tolerance strongly influencing occupancy (Wiles et al. 2011). Gray wolves exhibit a strong social structure and form packs of 2 to 12 animals. Packs typically occupy territories as large as 518 to 1,295 km^2 (200 to 500 mi^2) (74 FR 15123).

In Washington, gray wolves are subject to both the federal Endangered Species Act (ESA) and Washington state law (RCW 77.15.120, WAC 232-12-014). Gray wolves were listed as endangered in 1973 under the federal ESA. The Northern Rocky Mountain (NRM) gray wolf DPS, designated in 2008, encompasses the eastern one-third of Washington and Oregon, a small part of north-central Utah, and all of Montana, Idaho, and Wyoming. Delisting of this DPS was proposed, ruled, and subject to legal challenge in a series of actions between 2008 and 2010. On May 5, 2011, gray wolves in the Northern Rocky Mountain DPS, except Wyoming, were delisted as a result of a rider attached to the 2011 federal budget bill (Wiles et al. 2011).

However, gray wolves remain federally protected outside of the DPS boundaries: wolves occurring in the western two-thirds of Washington remain protected under the federal ESA, and in the eastern one-third of the state they are protected under state law and managed by the Washington Department of Fish and Wildlife (WDFW) under the Wolf Conservation and Management Plan. Gray wolves are delisted east of Highway 97 from the British Columbia border south to Monse, Highway 17 from Monse south to Mesa, and Highway 395 from Mesa south to the Oregon border, but remain federally listed west of these highways (Wiles et al. 2011). Eight of the ten at-risk islands are west of this DPS boundary.

Two documented gray wolf packs are known in western Washington (outside of the DPS boundaries), and a third is suspected to be present in north-central Washington at the Canadian border. Four gray wolf packs are documented, and another four suspected to occur, in eastern Washington (WDFW 2012c). The majority (77 to 93 percent) of habitat used to date by two packs in Washington has been on public land (federal and state), primarily U.S. Forest Service (Wiles et al. 2011).

Critical habitat has been designated for this species, but is only present in Michigan and Minnesota (43 FR 9607).

Effect Determination

The terrestrial portion of the action area is/are small, uninhabited islands with sparse vegetative cover. Land use in areas where gray wolves are known to occur ranges from dispersed outdoor recreation, timber production, or livestock grazing to home sites within the rural/wildland interface, hobby farming/livestock, or full-scale resort developments (Wiles et al. 2011). Although gray wolves are habitat generalists and could occur within the action area, project activities are not expected to affect gray wolves, their habitat, or their prey base because: 1) the action area contains marginal gray wolf habitat and limited prey base for the gray wolf; 2) project activities will occur on islands where gray wolves have not been documented and are unlikely to be present due to difficult access (i.e., lack of a land bridge); and 3) Caspian terns are not known to be a prey species for the gray wolf. Therefore, based on lack of suitable habitat and lack of known presence, the proposed project will have **no effect** on the gray wolf.

Pygmy Rabbit (*Brachylagus idahoensis)* (Columbia Basin DPS)

Species and Habitat Occurrence

The pygmy rabbit historically occupied portions of California, Oregon, Nevada, Idaho, Montana, Wyoming, Utah, and Washington. At the time of listing, pygmy rabbits in Washington were only known to occur in Douglas County, although the species probably occurred in portions of at least five Washington counties during the first half of the 1900s, including Douglas, Grant, Lincoln, Adams, and Benton counties. With the exception of a single site record from Benton County in 1979, Columbia Basin pygmy rabbits have been found only in southern Douglas and northern Grant Counties since 1956. The populations in Grant County declined for unknown reasons in the late 1990's and are thought to be extirpated (68 FR 10388). Healthy populations of pygmy rabbits occur in other parts of their range and are not federally listed. The Columbia Basin DPS occurs only in Washington.

Sixteen of the last-known wild Columbia Basin pygmy rabbits in Washington were captured in 2002 and placed in breeding programs. Their progeny, as well as pygmy rabbits from other states where healthy populations occur (e.g., Nevada, Utah), have been released in Douglas County at the Washington Department of Fish and Wildlife (WDFW) Sagebrush Flat Wildlife Area as part of the reintroduction effort.

The pygmy rabbit was listed as a Washington state endangered species in 1993. After the state population dropped to fewer than 40 rabbits in Douglas County by 2001, it was listed as a federal endangered species on March 5, 2003, as the Columbia Basin DPS (68 FR 10388).

Pygmy rabbits are typically found in areas of tall, dense sagebrush (*Artemisia* spp.) cover, and are highly dependent on sagebrush to provide both food and shelter throughout the year. Their diet in the winter consists of up to 99 percent sagebrush (USFWS 2011a).

Effect Determination

The Columbia Basin DPS of the pygmy rabbit is not known to occur within the action area. Critical habitat has not been designated for this species. The action area is located outside of the known range of this species. Therefore, based on lack of presence in or near the action area, the proposed project will have **no effect** on the Columbia Basin DPS of the pygmy rabbit.

Northern Spotted Owl (*Strix occidentalis caurina*)

Species and Habitat Occurrence

The northern spotted owl is believed to have historically inhabited most forests throughout southwestern British Columbia, western Washington and Oregon, and northwestern California as far south as the San Francisco Bay. Preferred nesting, roosting, and foraging habitat for northern spotted owls typically consists of older forest stands with a mosaic of age classes and spatial distribution. Suitable forest stands include multi-layered canopies of several tree species of varying size and age, both standing and fallen dead trees, and open space among the lower branches to allow flight under the canopy. Forest stands with these attributes are usually at least 150 to 200 years old (USFWS 2008).

No habitat containing appropriate structure and composition for northern spotted owls occurs in the action area. The islands consist of sparse vegetative cover and forested habitat, if present, are limited to small and patchy stands of trees. These stands of trees do not contain habitat of suitable structure or stand size to meet this species' life history requirements.

Critical habitat is designated for the northern spotted owl; however it is not designated within the action area (73 FR 47325).

Effect Determination

Based on the lack of suitable forest habitat in the action area, the project will have no effect on northern spotted owls.

Streaked Horned Lark (*Eremophila alpestris strigata*)

Species and Habitat Occurrence

Effective November 4, 2013, the USFWS designated streaked horned lark as a threatened species (78 FR 61451). The streaked horned lark is endemic to the Pacific Northwest, historically found in British Columbia, Washington, and Oregon. The current range of the streaked horned lark can be divided into three regions: 1) The south Puget Sound in Washington; 2) the Washington coast and lower Columbia River islands; and 3) the Willamette Valley in Oregon. On the lower Columbia River, streaked horned larks breed on several of the sandy islands downstream of Portland, Oregon. Recent surveys have documented breeding streaked horned larks on Rice, Miller Sands Spit, Pillar Rock, Welch, Tenasillahe, Whites/Browns, Wallace, Crims, and Sandy Islands in Wahkiakum and Cowlitz Counties in Washington, and Columbia and Clatsop Counties in Oregon (78 FR 61451).

A majority of streaked horned larks (72 percent) winter in the Willamette Valley, and 20 percent winter on the islands in the lower Columbia River. The remaining streaked horned larks winter on the Washington coast or in the south Puget Sound (78 FR 61451).

Habitat used by larks is generally flat with substantial areas of bare ground and sparse low-stature vegetation primarily comprised of grasses and forbs.

Critical habitat has been designated for the streaked horned lark; however it is not designated within the action area (78 FR 61505).

Effect Determination

Given the current range of the species, it is extremely unlikely that the streaked horned lark occurs in the action area (WDFW 2012b). None of the islands documented as breeding sites within the Lower Columbia River are included within the action area of the IAPMP. Islands included in the IAPMP are located upstream (east) of the Lower Columbia River islands listed above. Therefore, the project will have **no effect** on the streaked horned lark.

Yellow-Billed Cuckoo (*Coccyzus americanus*) (Western DPS)

Species and Habitat Occurrence

The USFWS proposes to list the yellow-billed cuckoo in the western portions of the United States, Canada, and Mexico (western yellow-billed cuckoo) as threatened. Yellow billed cuckoos that occur in the western United States are a distinct population segment (Western DPS) which include species west of the crest of the Rocky Mountains. Based on historic accounts, the species was locally common in Washington, occupying willow bottoms within the Puget Sound lowlands and along the lower Columbia River (USFWS 2011b).

The yellow-billed cuckoo may now be extirpated from Washington. The Washington Department of Fish and Wildlife ranks the species as having historical occurrences only, but still being expected to occur in Washington and it is currently a state candidate species. Although several surveys have been conducted in Okanogan and Yakima Counties in the last several years to check locations of previous sightings (Okanogan County) and potential habitat (Yakima County), no cuckoos were detected, despite a small number of statewide accounts in recent years (USFWS 2011b).

Western cuckoos breed in large blocks of riparian habitats, particularly woodlands with cottonwoods (*Populus fremontii*) and willows (*Salix* sp.) with dense understory foliage (USFWS 2011b). While the yellow-billed cuckoo is common east of the Continental Divide, biologists estimate that more than 90 percent of the bird’s riparian habitat in the West has been lost or degraded as a result of conversion to agriculture, dams and river flow management, bank protection, overgrazing, and competition from exotic plants (USFWS 2001).

Effect Determination

Suitable habitat does not occur within the action area (action area landscape does not contain large blocks of woodlands), and given the current range of the species and lack of documented detections, it is extremely unlikely that the yellow-billed cuckoo occurs in the action area (WDFW 2012b). Therefore, the project will have **no effect** on the yellow-billed cuckoo.

North American Wolverine (*Gulo gulo luscus*)

Species and Habitat Occurrence

The North American wolverine is proposed to be listed as threatened within the contiguous U.S. Wolverines inhabit exclusively alpine, arctic, and sub-arctic high elevation forests. Females den in deep snow banks during the spring during pregnancy and weaning periods. Wolverine habitat is usually isolated and patchy and is often separated by large areas of unsuitable habitat. The majority of wolverine habitat in the U.S. is federally owned or managed (USFWS 2013b).

Wolverines are found in the north Cascades in Washington and in the Wallowa Range in Oregon. Wolverine distribution is difficult to delineate because wolverines tend to live in remote regions away from human population and they occur at naturally low densities. Wolverine encounters are unpredictable as the animals tend to move long distances in short periods of time when branching out from the natal ranges. It is difficult or impossible to distinguish between established populations and representations of short-term occupancy (USFWS 2013a).

Effects Determination

Suitable habitat does not occur within the action area (action area landscape does not contain alpine, arctic, and sub-arctic forests) and given the current range of the species and habitat requirements (remote locations with sustained snow in the north cascades and Wallowa range), it is extremely unlikely that wolverine occur in the action area (WDFW 2012b). Therefore, the project will have **no effect** on the North American wolverine.

White Bluffs Bladderpod (*Physaria douglasii)*

Species and Habitat Occurrence

White Bluffs bladderpod is proposed to be listed as threatened in eastern Washington. The only known population of White Bluffs bladderpod is found on a steep, exposed, cemented, highly alkaline, calcium carbonate paleosol. The hard calcium carbonate covers several hundred feet of lacustrine sediments of the Ringold Formation. The habitat is arid with rainfall of about 6 inches per year. Little other vegetation is present in the area. The species may be an obligate calciphile (USFWS 2010b).

At its time of recognition, this species was only known to occur in a single population that occurred along the upper edge of the White Bluffs of the Columbia River in Franklin County, Washington. The taxon is still known only from this single population. Eighty-five percent of its distribution is within the Hanford Reach National Monument/Saddle Mountain National Wildlife Refuge (USFWS 2010b).

Effects Determination

The area anticipated to be disturbed by the proposed project does not contain any steep, exposed, cemented, highly alkaline, calcium carbonate paleosol, and given the current range of the species and habitat requirements, it is extremely unlikely that the White Bluffs bladderpod would occur in the action area (WDFW 2012b). Therefore, the project will have **no effect** on the White Bluffs bladderpod.

Umtanum Desert Buckwheat (*Eriogonum codium)*

Species and Habitat Occurrence

Umtanum desert buckwheat is a long-lived woody perennial plant that grows in low mats. Individual plants can exceed 100 years in age. The plant grows slowly with stem diameters averaging 0.17 mm of growth per year. The plant is found exclusively on basalt from the Lolo Flow of the Wanapum Basalt Formation. The only population of Umtanum desert buckwheat occurs on a wide mountain ridge in Benton County, Washington. The population is entirely within the Hanford National Monument (USFWS 2010c).

Fire may be the primary threat to this species, as it does not appear to be fire-tolerant. Fire also promotes the growth of invasive of nonnatives including cheatgrass, a competitor of Umtanum desert buckwheat. Disturbance from off-road vehicles, hikers, and livestock, is also a potential threat to this species (USFWS 2010c).

Effects Determination

This species is not known to occur within the action area (WDFW 2012b). Critical habitat has not been designated for Umtanum desert buckwheat. The action area is located outside of the known range of this species. Therefore, based on lack of presence in or near the action area, the proposed project will have **no effect** on Umtanum desert buckwheat.

Oregon Spotted Frog (*Rana pretiosa)*

Species and Habitat Occurrence

The Oregon spotted frog is a brown to reddish brown amphibian with black spots that cover its head, back, sides, and legs. The dark spots have ragged edges and light centers and are usually associated with raised areas of the skin. The eyes of the frog are upturned, and the jaw stripe extends to the shoulder. The frog is medium-sized, ranging from 44 to 105 mm in body length (USFWS 2013c).

The species inhabits emergent wetlands in forested areas, but it is not typically found under forest canopy. Oregon spotted frogs are found in or near a perennial body of water that includes shallow water and abundant emergent or floating aquatic plants. This species prefers warm marshes with a minimum size of 4 hectares, although they have been found in smaller areas down to 1 hectare in size. Large concentrations of frogs have been found in areas that include good breeding and overwintering sites. Good sites are connected by perennial water, have reliable water levels that maintain their depths throughout the period between oviposition and metamorphosis, and do not have introduced predators (USFWS 2013c and 78 FR 53538).

Effects Determination

Suitable habitat does not occur within the action area (action area landscape does not contain warm freshwater marshes) and given the current species habitat requirements (large bodies of still perennial water with emergent and floating plants), it is extremely unlikely that the Oregon spotted frog would occur in the area to be disturbed by this project (WDFW 2012b). Therefore, the project will have **no effect** on the Oregon spotted frog. Oregon spotted frog critical habitat does not occur within the action area and will not be affected.

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APPENDIX H

Section 106 Consultation Correspondence

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA WA 99362-1876

REPLY TO
ATTENTION OF:

September 12, 2012

Planning, Programs, and
Project Management Division

Mr. Rex Buck, Sr.
Wanapum
15655 Wanapum Village Ln. SW
Beverly, Washington 99321

Dear Mr. Buck:

I am writing to invite your consultation for the Inland Avian Predation Management Plan. This effort is being undertaken by the US Army Corps of Engineers and the US Bureau of Reclamation as part of our efforts to comply with the Biological Opinion for the Federal Columbia River Power System (FCRPS). This project involves efforts to reduce the effects of avian predation on listed salmon and steelhead within the Interior Columbia Basin above The Bonneville Lock and Dam. The Walla Walla District, US Army Corps of Engineers will be completing the National Historic Preservation Act, Section 106 consultation on behalf of the Federal partners of the program.

Enclosed is a map showing the 14 areas identified under the program. Currently, the only proposed work with potential to affect historic properties is the active dissuasion of Caspian Tern colonies located on Crescent Island in the Columbia River and Goose Island at Potholes Reservoir. The only activity scheduled for the other 12 locations consists of monitoring of and occasional visits to the islands.

Please review the maps and provide any information or comments the Corps should consider in its evaluation of effects. If you have any questions contact Mr. Scott Hall (509-527-7278, Scott.M.Hall@usace.army.mil) or me (509-527-7274, Alice.K.Roberts@usace.army.mil).

Sincerely,

Alice KS Roberts

Alice K. Roberts
Chief, Tribal Relations and Cultural Resources

Enclosure

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA WA 99362-1876

REPLY TO
ATTENTION OF:

September 12, 2012

Planning, Programs, and
Project Management Division

Mr. Michael Finley
Chairman, Business Council
Confederated Tribes
of the Colville Reservation
P.O. Box 150
Nespelem, Washington 99155-0150

Dear Chairman Finley:

I am writing to invite your consultation for the Inland Avian Predation Management Plan. This effort is being undertaken by the US Army Corps of Engineers and the US Bureau of Reclamation as part of our efforts to comply with the Biological Opinion for the Federal Columbia River Power System (FCRPS). This project involves efforts to reduce the effects of avian predation on listed salmon and steelhead within the Interior Columbia Basin above The Bonneville Lock and Dam. The Walla Walla District, US Army Corps of Engineers will be completing the National Historic Preservation Act, Section 106 consultation on behalf of the Federal partners of the program.

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Sincerely,

Alice K. Roberts
Chief, Tribal Relations and Cultural Resources

Enclosure

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA WA 99362-1876

REPLY TO
ATTENTION OF:

September 12, 2012

Planning, Programs, and
Project Management Division

Dr. Dennis Griffin
Oregon State Historic Preservation Office
725 Summer St NE, Suite C
Salem, OR 97301

Dear Dr. Griffin:

I am writing to invite your consultation for the Inland Avian Predation Management Plan. This effort is being undertaken by the US Army Corps of Engineers and the US Bureau of Reclamation as part of our efforts to comply with the Biological Opinion for the Federal Columbia River Power System (FCRPS). This project involves efforts to reduce the effects of avian predation on listed salmon and steelhead within the Interior Columbia Basin above The Bonneville Lock and Dam. The Walla Walla District, US Army Corps of Engineers will be completing the National Historic Preservation Act, Section 106 consultation on behalf of the Federal partners of the program.

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Sincerely,

Alice KS Roberts

Alice K. Roberts
Chief, Tribal Relations and Cultural Resources

Enclosure

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA WA 99362-1876

REPLY TO
ATTENTION OF:

September 12, 2012

Planning, Programs, and
Project Management Division

Mr. Les Minthorn
Chairman, Board of Trustees
Confederated Tribes
of the Umatilla Indian Reservation
46411 Timine Way
Pendleton, Oregon 97801

Dear Chairman Minthorn:

I am writing to invite your consultation for the Inland Avian Predation Management Plan. This effort is being undertaken by the US Army Corps of Engineers and the US Bureau of Reclamation as part of our efforts to comply with the Biological Opinion for the Federal Columbia River Power System (FCRPS). This project involves efforts to reduce the effects of avian predation on listed salmon and steelhead within the Interior Columbia Basin above The Bonneville Lock and Dam. The Walla Walla District, US Army Corps of Engineers will be completing the National Historic Preservation Act, Section 106 consultation on behalf of the Federal partners of the program.

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Sincerely,

Alice KS Roberts

Alice K. Roberts
Chief, Tribal Relations and Cultural Resources

Enclosure

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA WA 99362-1876

REPLY TO
ATTENTION OF:

September 12, 2012

Planning, Programs, and
Project Management Division

Mr. Harry Smiskin
Yakama Tribal Executive Committee
Confederated Tribes and Bands
of the Yakama Nation
P.O. Box 151
Toppenish, Washington 98948

Dear Chairman Smiskin:

I am writing to invite your consultation for the Inland Avian Predation Management Plan. This effort is being undertaken by the US Army Corps of Engineers and the US Bureau of Reclamation as part of our efforts to comply with the Biological Opinion for the Federal Columbia River Power System (FCRPS). This project involves efforts to reduce the effects of avian predation on listed salmon and steelhead within the Interior Columbia Basin above The Bonneville Lock and Dam. The Walla Walla District, US Army Corps of Engineers will be completing the National Historic Preservation Act, Section 106 consultation on behalf of the Federal partners of the program.

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Sincerely,

Alice KS Roberts

Alice K. Roberts
Chief, Tribal Relations and Cultural Resources

Enclosure

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA WA 99362-1876

REPLY TO
ATTENTION OF:

September 12, 2012

Planning, Programs, and
Project Management Division

Mr. Stanley "Buck" Smith, Jr.
Warm Springs Tribal Council
The Confederated Tribes
of Warm Springs
1233 Veterans Street
Warm Springs, Oregon 97761

Dear Chairman Smith:

I am writing to invite your consultation for the Inland Avian Predation Management Plan. This effort is being undertaken by the US Army Corps of Engineers and the US Bureau of Reclamation as part of our efforts to comply with the Biological Opinion for the Federal Columbia River Power System (FCRPS). This project involves efforts to reduce the effects of avian predation on listed salmon and steelhead within the Interior Columbia Basin above The Bonneville Lock and Dam. The Walla Walla District, US Army Corps of Engineers will be completing the National Historic Preservation Act, Section 106 consultation on behalf of the Federal partners of the program.

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Please review the maps and provide any information or comments the Corps should consider in its evaluation of effects. If you have any questions contact Mr. Scott Hall (509-527-7278, Scott.M.Hall@usace.army.mil) or me (509-527-7274, Alice.K.Roberts@usace.army.mil).

Sincerely,

Alice K. Roberts
Chief, Tribal Relations and Cultural Resources

Enclosure

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA WA 99362-1876

REPLY TO
ATTENTION OF:

September 12, 2012

Planning, Programs, and
Project Management Division

Mr. Silas C. Whitman
Chairman, Tribal Executive Committee
Nez Perce Tribe
P.O. Box 305
Lapwai, Idaho 83540-0305

Dear Chairman Whitman:

I am writing to invite your consultation for the Inland Avian Predation Management Plan. This effort is being undertaken by the US Army Corps of Engineers and the US Bureau of Reclamation as part of our efforts to comply with the Biological Opinion for the Federal Columbia River Power System (FCRPS). This project involves efforts to reduce the effects of avian predation on listed salmon and steelhead within the Interior Columbia Basin above The Bonneville Lock and Dam. The Walla Walla District, US Army Corps of Engineers will be completing the National Historic Preservation Act, Section 106 consultation on behalf of the Federal partners of the program.

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Please review the maps and provide any information or comments the Corps should consider in its evaluation of effects. If you have any questions contact Mr. Scott Hall (509-527-7278, Scott.M.Hall@usace.army.mil) or me (509-527-7274, Alice.K.Roberts@usace.army.mil).

Sincerely,

Alice KS Roberts

Alice K. Roberts
Chief, Tribal Relations and Cultural Resources

Enclosure

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA WA 99362-1876

REPLY TO
ATTENTION OF:

September 12, 2012

Planning, Programs, and
Project Management Division

Dr. Robert Whitlam
Washington State Department of Archaeology
and Historic Preservation
PO Box 48343
Olympia, Washington 95804-8343

Dear Dr. Whitlam:

I am writing to invite your consultation for the Inland Avian Predation Management Plan. This effort is being undertaken by the US Army Corps of Engineers and the US Bureau of Reclamation as part of our efforts to comply with the Biological Opinion for the Federal Columbia River Power System (FCRPS). This project involves efforts to reduce the effects of avian predation on listed salmon and steelhead within the Interior Columbia Basin above The Bonneville Lock and Dam. The Walla Walla District, US Army Corps of Engineers will be completing the National Historic Preservation Act, Section 106 consultation on behalf of the Federal partners of the program.

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Sincerely,

Alice KS Roberts

Alice K. Roberts
Chief, Tribal Relations and Cultural Resources

Enclosure

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA WA 99362-1876

REPLY TO
ATTENTION OF:

October 25, 2013

Planning, Programs, and Project (1105)
Management Division

Mr. Rex Buck
Wanapum
15655 Wanapum Village Ln. SW
Beverly, Washington 99321

Dear Mr. Buck:

Please find enclosed the *Cultural Resources Compliance Report: Proposed Activities Associated with the Inland Avian Predation Management Plan.* The enclosed report was prepared by the Corps of Engineers on behalf of the Federal agencies involved in the development of the plan, and contains the determination that the proposed avian management activities at Goose and Crescent islands, and bird monitoring and active dissuasion at 12 other islands within the Columbia River basin, will result in '*no historic properties affected*'. The enclosed report also details the need for further reviews and consultation in regard to any future activities associated with the Inland Avian Predation Management Plan.

Please review the determination of effect and advise whether you agree. If you have any questions contact Mr. Scott Hall at 509-527-7278, Scott.M.Hall@usace.army.mil or me at 509-527-7274, Alice.K.Roberts@usace.army.mil.

Sincerely,

ROBERTS.ALICE.K.1392453993

Digitally signed by ROBERTS.ALICE.K.1392453993
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=ROBERTS.ALICE.K.1392453993
Date: 2013.10.25 10:51:32 -07'00'

Alice K. Roberts
Chief, Tribal Relations and Cultural Resources

Enclosure

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA WA 99362-1876

REPLY TO
ATTENTION OF:

October 25, 2013

Planning, Programs, and Project (1105)
Management Division

Mr. Michael Finley
Chairman, Business Council
Confederated Tribes
of the Colville Reservation
P.O. Box 150
Nespelem, Washington 99155-0150

Dear Chairman Finley:

Please find enclosed the *Cultural Resources Compliance Report: Proposed Activities Associated with the Inland Avian Predation Management Plan*. The enclosed report was prepared by the Corps of Engineers on behalf of the Federal agencies involved in the development of the plan, and contains the determination that the proposed avian management activities at Goose and Crescent islands, and bird monitoring and active dissuasion at 12 other islands within the Columbia River basin, will result in '*no historic properties affected*'. The enclosed report also details the need for further reviews and consultation in regard to any future activities associated with the Inland Avian Predation Management Plan.

Please review the determination of effect and advise whether you agree. If you have any questions contact Mr. Scott Hall at 509-527-7278, Scott.M.Hall@usace.army.mil or me at 509-527-7274, Alice.K.Roberts@usace.army.mil.

Sincerely,

ROBERTS.ALICE.K.1392453993
Digitally signed by ROBERTS.ALICE.K.1392453993
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=ROBERTS.ALICE.K.1392453993
Date: 2013.10.25 10:51:52 -07'00'

Alice K. Roberts
Chief, Tribal Relations and Cultural Resources

Enclosure

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA WA 99362-1876

REPLY TO
ATTENTION OF:

October 25, 2013

Planning, Programs, and Project (1105)
Management Division

Dr. Dennis Griffin
Oregon State Historic Preservation Office
725 Summer St NE, Suite C
Salem, Oregon 97301

Dear Dr. Griffin:

Please find enclosed the *Cultural Resources Compliance Report: Proposed Activities Associated with the Inland Avian Predation Management Plan.* The enclosed report was prepared by the Corps of Engineers on behalf of the Federal agencies involved in the development of the plan, and contains the determination that the proposed avian management activities at Goose and Crescent islands, and bird monitoring and active dissuasion at 12 other islands within the Columbia River basin, will result in '*no historic properties affected*'. The enclosed report also details the need for further reviews and consultation in regard to any future activities associated with the Inland Avian Predation Management Plan.

Please review the determination of effect and advise whether you agree. If you have any questions contact Mr. Scott Hall at 509-527-7278, Scott.M.Hall@usace.army.mil or me at 509-527-7274, Alice.K.Roberts@usace.army.mil.

Sincerely,

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Date: 2013.10.25 10:52:12 -07'00'

Alice K. Roberts
Chief, Tribal Relations and Cultural Resources

Enclosure

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA WA 99362-1876

REPLY TO
ATTENTION OF:

October 25, 2013

Planning, Programs, and Project (1105)
Management Division

Mr. Silas C. Whitman
Chairman, Tribal Executive Committee
Nez Perce Tribe
P.O. Box 305
Lapwai, Idaho 83540-0305

Dear Chairman Silas:

Please find enclosed the *Cultural Resources Compliance Report: Proposed Activities Associated with the Inland Avian Predation Management Plan*. The enclosed report was prepared by the Corps of Engineers on behalf of the Federal agencies involved in the development of the plan, and contains the determination that the proposed avian management activities at Goose and Crescent islands, and bird monitoring and active dissuasion at 12 other islands within the Columbia River basin, will result in '*no historic properties affected*'. The enclosed report also details the need for further reviews and consultation in regard to any future activities associated with the Inland Avian Predation Management Plan.

Please review the determination of effect and advise whether you agree. If you have any questions contact Mr. Scott Hall at 509-527-7278, Scott.M.Hall@usace.army.mil or me at 509-527-7274, Alice.K.Roberts@usace.army.mil.

Sincerely,

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Alice K. Roberts
Chief, Tribal Relations and Cultural Resources

Enclosure

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA WA 99362-1876

REPLY TO
ATTENTION OF:

October 25, 2013

Planning, Programs, and Project (1105)
Management Division

Dr. Robert Whitlam
Washington State Department of Archaeology
and Historic Preservation
P.O. Box 48343
Olympia, Washington 95804-8343

Dear Dr. Whitlam:

Please find enclosed the *Cultural Resources Compliance Report: Proposed Activities Associated with the Inland Avian Predation Management Plan*. The enclosed report was prepared by the Corps of Engineers on behalf of the Federal agencies involved in the development of the plan, and contains the determination that the proposed avian management activities at Goose and Crescent islands, and bird monitoring and active dissuasion at 12 other islands within the Columbia River basin, will result in '*no historic properties affected*'. The enclosed report also details the need for further reviews and consultation in regard to any future activities associated with the Inland Avian Predation Management Plan.

Please review the determination of effect and advise whether you agree. If you have any questions contact Mr. Scott Hall at 509-527-7278, Scott.M.Hall@usace.army.mil or me at 509-527-7274, Alice.K.Roberts@usace.army.mil.

Sincerely,

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Alice K. Roberts
Chief, Tribal Relations and Cultural Resources

Enclosure

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA WA 99362-1876

REPLY TO
ATTENTION OF:

October 25, 2013

Planning, Programs, and Project (1105)
Management Division

Dr. Dennis Griffin
Oregon State Historic Preservation Office
725 Summer St NE, Suite C
Salem, Oregon 97301

Dear Dr. Griffin:

Please find enclosed the *Cultural Resources Compliance Report: Proposed Activities Associated with the Inland Avian Predation Management Plan.* The enclosed report was prepared by the Corps of Engineers on behalf of the Federal agencies involved in the development of the plan, and contains the determination that the proposed avian management activities at Goose and Crescent islands, and bird monitoring and active dissuasion at 12 other islands within the Columbia River basin, will result in '*no historic properties affected*'. The enclosed report also details the need for further reviews and consultation in regard to any future activities associated with the Inland Avian Predation Management Plan.

Please review the determination of effect and advise whether you agree. If you have any questions contact Mr. Scott Hall at 509-527-7278, Scott.M.Hall@usace.army.mil or me at 509-527-7274, Alice.K.Roberts@usace.army.mil.

Sincerely,

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Alice K. Roberts
Chief, Tribal Relations and Cultural Resources

Enclosure

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA WA 99362-1876

REPLY TO
ATTENTION OF:

October 25, 2013

Planning, Programs, and Project (1105)
Management Division

Mr. Les Minthorn
Chairman, Board of Trustees
Confederated Tribes
of the Umatilla Indian Reservation
46411 Timine Way
Pendleton, Oregon 97801

Dear Chairman Minthorn:

Please find enclosed the *Cultural Resources Compliance Report: Proposed Activities Associated with the Inland Avian Predation Management Plan*. The enclosed report was prepared by the Corps of Engineers on behalf of the Federal agencies involved in the development of the plan, and contains the determination that the proposed avian management activities at Goose and Crescent islands, and bird monitoring and active dissuasion at 12 other islands within the Columbia River basin, will result in '*no historic properties affected*'. The enclosed report also details the need for further reviews and consultation in regard to any future activities associated with the Inland Avian Predation Management Plan.

Please review the determination of effect and advise whether you agree. If you have any questions contact Mr. Scott Hall at 509-527-7278, Scott.M.Hall@usace.army.mil or me at 509-527-7274, Alice.K.Roberts@usace.army.mil.

Sincerely,

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Alice K. Roberts
Chief, Tribal Relations and Cultural Resources

Enclosure

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA WA 99362-1876

REPLY TO
ATTENTION OF:

October 25, 2013

Planning, Programs, and Project (1105)
Management Division

Mr. Stanley "Buck" Smith, Jr.
Warm Springs Tribal Council
The Confederated Tribes
of Warm Springs
1233 Veterans Street
Warm Springs, Oregon 97761

Dear Chairman Smith:

Please find enclosed the *Cultural Resources Compliance Report: Proposed Activities Associated with the Inland Avian Predation Management Plan.* The enclosed report was prepared by the Corps of Engineers on behalf of the Federal agencies involved in the development of the plan, and contains the determination that the proposed avian management activities at Goose and Crescent islands, and bird monitoring and active dissuasion at 12 other islands within the Columbia River basin, will result in '*no historic properties affected*'. The enclosed report also details the need for further reviews and consultation in regard to any future activities associated with the Inland Avian Predation Management Plan.

Please review the determination of effect and advise whether you agree. If you have any questions contact Mr. Scott Hall at 509-527-7278, Scott.M.Hall@usace.army.mil or me at 509-527-7274, Alice.K.Roberts@usace.army.mil.

Sincerely,

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Alice K. Roberts
Chief, Tribal Relations and Cultural Resources

Enclosure

DEPARTMENT OF
ARCHAEOLOGY &
HISTORIC PRESERVATION
Protect the Past, Shape the Future

Allyson Brooks Ph.D., Director
State Historic Preservation Officer

October 30, 2013

Ms. Alice Roberts
Walla Walla District /Corps of Engineers
201 North Third Avenue
Walla Walla, Washington 99362-1876

Re: Inland Avian Predation Management Plan
PM-EC-2007-0001 / 2013-NWW-022
Log No: 091813-11-COE-WW

Dear Ms. Roberts;

Thank you for contacting our department. We have reviewed the professional cultural resources survey report you provided for the proposed Inland Avian Predation Management Plan in Walla Walla and Grant Counties, Washington.

We concur with your Determination of No Historic Properties Affected.

We would appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

In the event that archaeological or historic materials are discovered during project activities, work in the immediate vicinity must stop, the area secured, and this office notified.

These comments are based on the information available at the time of this review and on the behalf of the State Historic Preservation Officer in conformance with Section 106 of the National Historic Preservation Act and its implementing regulations 36CFR800. Should additional information become available, our assessment may be revised. Thank you for the opportunity to comment and a copy of these comments should be included in subsequent environmental documents.

Sincerely,

Robert G. Whitlam, Ph.D.
State Archaeologist
(360) 586-3080
email: *rob.whitlam@dahp.wa.gov*

Oregon
John A. Kitzhaber, MD, Governor

Parks and Recreation Department
State Historic Preservation Office
725 Summer St NE, Ste C
Salem, OR 97301-1266
(503) 986-0690
Fax (503) 986-0793
www.oregonheritage.org

Nature
HISTORY
Discovery

November 5, 2013

Ms. Alice Roberts
USACE Walla Walla Dist
201 N 3rd
Walla Walla, WA 99362

RE: SHPO Case No. 13-1449
Inland Avian Predation Management Plan
FOE/reduce avian predation on salmon & steelhead
COE/USBR
Multiple legals, Various, Various County

Dear Ms. Roberts:

I have recently received a request from your office to review the project referenced above for any known cultural resources within this project area. Unfortunately, your request arrived without a copy of a USGS map that will allow me to pinpoint the exact location of the proposed project, an incorrect legal description, and without an electronic copy of the report (on CD); all components that are needed for all reports reviewed by our office. Can you please send me a map of the project area (using a 7.5' USGS map) that clearly shows the proposed land development area in relation to the Township, Range and Section? Our GIS system is based on USGS maps and the aerial photos alone are not sufficient for me to locate your project area. Within Range 28E, townships only extend as far as 5 north. What is the correct legal description?

Upon receipt of a missing data, I will review your project report and get back to you in a timely manner. In order to help us track your project accurately, please be sure to reference the SHPO case number above in all correspondence.

Sincerely,

Dennis Griffin

Dennis Griffin, Ph.D., RPA
State Archaeologist
(503) 986-0674
dennis.griffin@state.or.us

Oregon
John A. Kitzhaber, MD, Governor

Parks and Recreation Department
State Historic Preservation Office
725 Summer St NE, Ste C
Salem, OR 97301-1266
(503) 986-0690
Fax (503) 986-0793
www.oregonheritage.org

January 7, 2014

Ms. Alice Roberts
USACE Walla Walla Dist
201 N 3rd
Walla Walla, WA 99362

RE: SHPO Case No. 13-1449
Inland Avian Predation Management Plan
FOE/reduce avian predation on salmon & steelhead
COE/USBR
Multiple legals, Various, Various County

Dear Ms. Roberts:

Thank you for sending our office the maps that we had requested in order to complete our review of your proposed project. They helped in locating the islands within Oregon's state boundary and in understanding the locations where impacts to cultural resources may occur. While our office does have concerns over potential impacts to cultural resources on islands along the Columbia River resulting from displacement activities at Goose and Crescent islands, the impacts of future nesting is never really addressed in your report. The Blalock islands have a number of very significant archaeological sites that could be adversely affected by future nesting activities. There have been no previous cultural resource surveys conducted on the other islands highlighted within Oregon State waters (e.g., Miller Rocks, 3-Mile Canyon Island). I am curious as to the impacts that have resulted from such nesting activities at other islands along the Columbia? Aside from other (non-cultural) issues that have resulted from recent bird nesting problems on such islands, what has the degree of disturbance been to archaeological sites? No details are provided in your report and I would think that such information would be worth knowing since similar impacts may result on other islands from the proposed displacement. I realize that the surveys that have been done on Goose Island resulted in negative findings but have other nesting sites been surveyed that were located within known archaeological sites? I know that the Corps' Portland District instituted some avian management program over the past few years in the Columbia River. Do any of their project results add insight to the current proposal? Our office has no problem with the proposed monitoring regime that you describe in your report; however, so discussion should be spent on how often future nesting sites will be discouraged by monitoring by boat and physical chasing birds away. More intensively during particular nesting months as opposed to year-round monitoring at a set interval? While your proposed efforts sound fine on paper too little details on how such efforts will be coordinated is included within your report.

If you have any additional information regarding the above project or questions regarding my comments, our office looks forward to hearing from you in the near future. In order to help us track your project accurately, please be sure to reference the SHPO case number above in all correspondence.

Sincerely,

Dennis Griffin

Dennis Griffin, Ph.D., RPA
State Archaeologist
(503) 986-0674
dennis.griffin@state.or.us

From:	Dennis Griffin
To:	Hall, Scott M NWW
Subject:	RE: [EXTERNAL] Re: Inland Avian Predation Management Plan (SHPO Case No. 13-1449)
Date:	Thursday, January 16, 2014 11:20:19 AM

Scott,

Many thanks for the detailed response. I have learned a lot more about avian relocations and their potential effects than I knew earlier. Our office has no problem with the Corps proceeding with the project as planned.

\ Dennis /

"Hall, Scott M NWW" <Scott.M.Hall@usace.army.mil> 1/16/2014 8:43 AM >>>
Dennis,

Thanks for the additional comments in your January 13, 2014 email, which also referenced your January 7, 2014 letter. Your email and letter requested further information on how monitoring of displaced CATEs would be accomplished and what (if any) real impact displaced CATEs would have on other islands located in Oregon in the mid-Columbia River? I believe the information below adequately addresses your questions.

The Walla Walla District (District) has considered the potential effects to historic properties associated with activities of displaced CATEs at islands located in the mid-Columbia River and it has not changed our "No historic properties affected" determination. That determination is based on the following:

1. The District's proposed Inland Avian Predation Management Plan (IAPMP) includes an Adaptive Management Plan (AMP) requiring monitoring of displaced CATES and efforts to prevent the development of incipient colonies at other islands in the mid-Columbia River.

2. Islands of concern in the State of Oregon located in the mid-Columbia River are already subject to nesting by gulls and other water birds (e.g., Blalock Islands complex). The District is unaware of any documented adverse effects by such birds and the limited (temporary) addition of incipient nesting (if any) is not expected to affect historic/cultural properties.

Additional information specific to monitoring of displaced CATEs and efforts to prevent incipient colonies/nesting can be found in the Environmental Assessment (EA) and the IAPMP/AMP on the District's website (http://www.nww.usace.army.mil/Missions/Projects/InlandAvianPredationManagementPlan.aspx). The purpose and need section of the EA (Section 1.3) states, the IAPMP will include "habitat enhancement measures to attract CATEs to areas outside the basin, and adaptive management dissuasion actions to limit the formation or expansion of incipient colonies within the basin." Additionally, the description of the preferred alternative in Section 2.2.4 of the EA (incorporating Section 2.2.2) specifically includes efforts (based on monitoring) to preclude development of incipient colonies of CATEs at ten (10) known "at-risk" islands in the mid-Columbia River, with provision to expand those efforts to other islands if necessary. The IAPMP includes an "At-Risk Island Plan" (Section 2.7) and the AMP (Chapter 3) includes specific requirements for monitoring and efforts to dissuade/prevent incipient colonies/nesting.

Regarding potential effects associated with CATE temporary nesting, we do not believe that limited nesting at other islands will affect historic properties. Although no studies have been conducted to our knowledge about the effects of CATE nesting on cultural resources, their nesting habits lead us to believe that they would not affect historic/cultural properties. Additionally, CATEs are ground nesters, and only scratch out a small basin 2-3" deep. They tend to focus on barren high points on islands because the islands tend to have fewer predators than areas located on (or connected to) the shores and prefer sandy substrates. For example, some of the potential CATE nesting habitat within the Blalock Islands currently contains large gull nesting colonies. Gull nesting has a similar effect as CATE nesting and we are unaware of associated adverse effects. We believe CATEs are not likely to nest within the Blalock Islands in great numbers, but (again) efforts to monitor and dissuade incipient colonies is part of the plan and should prevent effects (if any) associated with additional nesting.

Finally, regarding Portland District's efforts to relocate CATEs from the Columbia River Estuary, we are unaware of any effects to historic properties associated with such dissuasion efforts.

We are looking to close out this consultation. We did not interpret your letter to indicate that you did not concur with the report's determination of effect. At this point we consider consultation complete for the activities described in the report referenced above, but request written concurrence if it can be provided before January 17, 2014. Having said that, if you have additional questions and want to discuss anything further please give call me.

Thank you,

Scott M. Hall
Archaeologist
US Army Corps of Engineers
Walla Walla District
(509) 527-7278
Scott.M.Hall@usace.army.mil

-----Original Message-----
From: Dennis Griffin [mailto:dennis.griffin@state.or.us]
Sent: Monday, January 13, 2014 7:34 AM
To: Hall, Scott M NWW
Subject: RE: [EXTERNAL] Re: Inland Avian Predation Management Plan (SHPO Case No. 13-1449)

Scott,

I sent Alice a reply letter concerning your project earlier this month. I have attached a copy of my letter for your use and reference. It states that while we have no problem with your office following through with the proposed monitoring scheme, no details were noted as to how the monitoring would be done and what is the real impact of future nesting activities. Let me know if you have any comments regarding my questions or have additional information that you could share with our office regarding potential impacts.

\ Dennis /

Dennis Griffin, Ph.D., RPA
State Archaeologist
Oregon State Historic Preservation Office
(503) 986-0674
(503) 986-0793, fax
dennis.griffin@state.or.us

Dennis Griffin, Ph.D., RPA
State Archaeologist
Oregon State Historic Preservation Office
(503) 986-0674
(503) 986-0793, fax
dennis.griffin@state.or.us

>>> "Hall, Scott M NWW" <Scott.M.Hall@usace.army.mil> 1/10/2014 1:01 PM >>>
Dr. Griffin,

I wanted to follow-up with you on this project. I sent a revised report that hopefully clarified what portions of the project were taking part in Oregon and what was occurring in WA. I also provided the follow-up tribal correspondence, and a memo to help clarify what was occurring specifically in Oregon. I was just curious if you'd had a chance to review yet. We are trying to finalize the NEPA documentation, and they are looking to me to provide copies of all correspondence.

Thanks,

Scott M. Hall
Archaeologist
US Army Corps of Engineers
Walla Walla District
(509) 527-7278
Scott.M.Hall@usace.army.mil

-----Original Message-----
From: Dennis Griffin [mailto:dennis.griffin@state.or.us]
Sent: Tuesday, December 17, 2013 12:49 PM
To: Hall, Scott M NWW
Cc: Roberts, Alice K NWW
Subject: [EXTERNAL] Re: Inland Avian Predation Management Plan (SHPO Case No. 13-1449)

Scott,

If you could send our office a hard copy of a good project map showing the extent of your project in Oregon and a description of what is intended there I should be able to complete my review. The earlier document lacked much of the details that I needed to understand the project, hence my letter. If you could include a USGS map that would work best for our office. Also be sure to include the SHPO Case# so that I can match your response to the existing file.

\ Dennis /

Dennis Griffin, Ph.D., RPA
State Archaeologist
Oregon State Historic Preservation Office
(503) 986-0674
(503) 986-0793, fax
dennis.griffin@state.or.us

>>> "Hall, Scott M NWW" <Scott.M.Hall@usace.army.mil> 12/16/2013 11:47 AM >>>
Dr. Griffin,

We received your response letter in regards to the above referenced project (letter dated November 5, 2013). I was wondering if you had a few minutes to speak about this project and the response letter? I don't think I did a great job, in the report, of explaining that the majority of the work is occurring in Washington. Only two locations, 3-Mile Canyon Island and Blalock Islands, actually occur within the state of Oregon. At this time the only proposed actions at these islands would involve monitoring the islands for the presence of Caspian terns, and potentially some active dissuasion (meaning actively chasing the birds from potential nesting habitat early on during the nesting season). I can see how the report could be confusing, and I'd like to get it cleaned up to meet your needs. I also realize the omission of topos was not good, and we did fail to provide a CD copy, and of course there isn't a Range 28E, T7N in Oregon!

Please let me know when would be a good time to call and discuss?

Thanks,

Scott M. Hall
Archaeologist
US Army Corps of Engineers
Walla Walla District
(509) 527-7278
Scott.M.Hall@usace.army.mil