

Draft Environmental Assessment- Adaptively Manage Predation on Caspian Terns in the Lower Columbia River Estuary

April 2013



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**US Army Corps
of Engineers** ®
Portland District

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List of Acronyms

AMP	Adaptive Management Plan
BiOp	Biological Opinion
BRNW	Bird Research Northwest
CORPS	United States Army Corps of Engineers
CRFM	Columbia River Fish Mitigation
CRITFC	Columbia River Inter-Tribal Fish Commission
DPS	Distinct Population Segment
ESA	Endangered Species Act
ESU	Evolutionary Significant Unit
FCRPS BiOp	Federal Columbia River Power System Biological Opinion
MBTA	Migratory Bird Treaty Act
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	NOAA's National Marine Fisheries Service
PFMC	Pacific Fishery Management Council
RM	River Mile
RM 5	River Mile 5 (East Sand Island)
RM 26	River Mile 26 (Willamette Falls)
RM 146	River Mile 146 (Bonneville Dam)
RPA	Reasonable and Prudent Alternative
USFWS	United States Fish and Wildlife Service
WRDA	Water Resource Development Act

Glossary of Terms

Anadromous. Describes fish that migrate from the sea to fresh water to spawn (breed).

Dredged material. Any excavated material from waterways.

Estuary. The wide part of a river where it meets the sea; fresh and salt water mix.

Foraging range. The area where an animal searches for food and provisions.

Habitat. The type of environment in which an organism or group normally lives or occurs.

Hazing. Disturbance to double-crested cormorants early in the nesting season through the use of repeated walks through of the nesting area by people. Hazing can also include modification of habitat to make it unsuitable for nesting and disturbing resting or foraging birds.

Nest Site Fidelity. The breeding pair's commitment to a nest site or colony.

Out-migrating. Juvenile fish migrating out of their native rivers or streams on their way to ocean waters.

Pacific Flyway. The area birds migrate to for nesting, roosting and wintering. It is within the breeding range of the Western Population of Caspian terns.

Pelagic. Of or pertaining to the ocean; applied especially to animals that live at the surface of the ocean, away from the coast.

Piscivorous. Fish-eating.

PIT tags. Passive Integrated Transponder. Very small (12 mm by 2.1 mm) glass tube containing an antenna and an integrated circuit chip inserted into the juvenile fish's body cavity that remains inactive until activated at a PIT-tag monitoring facility.

Prospecting. To search for nesting habitat.

Productivity. The number of young raised per breeding pair.

Roosting. A place where birds regularly settle or congregate to rest at night.

Salmonid. Of, belonging to, or characteristic of the family Salmonidae, which includes the salmon, trout, whitefish and steelhead.

Smolts. Young salmon two or three years old, when it has acquired its silvery color.

Sub-yearling. A juvenile fish less than one year old.

Yearling. A fish that is one year old or has not completed its second year.

Chapter 1. Purpose of and Need for Action

1.1 Introduction

Since the late 1990's the U.S Army Corps of Engineers, Portland District (Corps) has been researching, monitoring and managing Caspian terns (*Hydroprogne caspia*) (also referred to as terns) on islands the Corps owns and/or uses to dispose of dredged material in the Columbia River Estuary. In 1999, the Corps began a project to socially attract the terns, using decoys and playing pre-recorded callbacks, away from Rice Island to East Sand Island, which also is owned and managed by the Corps. This was done to decrease the numbers of juvenile salmon consumed by the terns to meet commitments made in consultation with the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries).

Early studies on the diet of Caspian terns nesting on Rice Island indicate their consumption of juvenile salmonids was nearly two times higher when compared to a similar number of birds nesting on East Sand Island (Roby et al. 2002). Based on these studies, East Sand Island is generally considered to be the best location for piscivorous (fish-eating) waterbirds in the estuary in terms of their reduced impacts to juvenile salmon because it is closer to the Pacific Ocean and contains a greater diversity of forage fish (anchovy, herring, etc.). The Caspian tern colony on East Sand Island is the largest of its kind in the world (Roby et al. 2013).



Figure 1. Vicinity Map of East Sand Island, Rice Island, Miller Sands Spit and Pillar Rock Island in the lower Columbia River Estuary. The Corps manages these islands for dredged disposal sites.

In 2000, the Corps was working to complete the project to socially attract the terns to East Sand Island and preclude nesting on Rice Island. This work was challenged under the National Environmental Policy Act (NEPA) by Seattle Audubon, National Audubon, American Bird Conservancy and Defenders of Wildlife. In 2002 the parties involved in the lawsuit reached a settlement agreement.

The 2002 settlement agreement allowed for the continuation of the efforts to socially attract the birds to East Sand Island but also required the Corps, U.S. Fish and Wildlife Service (USFWS) and NOAA Fisheries to develop an Environmental Impact Statement to develop a plan for managing the terns in the long term with the goal of reducing predation on juvenile salmonids. Subsequently, the three federal agencies (Corps, USFWS and NOAA Fisheries) completed the *Caspian Tern Management to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary Final Environmental Impact Statement* (USFWS 2005a) (also known as FEIS). The USFWS and Corps each issued their own record of decision (ROD) in 2006. These three documents are collectively referred to in this document as the Caspian Tern Plan.

1.1.1 Caspian Tern Plan

The Caspian Tern Plan called for redistribution (~ 60 percent) of the East Sand Island colony via construction of new habitat (islands) in Oregon, California and Washington. Reduction of habitat on East Sand Island would be contingent upon creation of the new islands at a 2:1 ratio. Because Caspian terns nested on an average of 4.4 acres from 2001 to 2004 on East Sand Island, approximately 6-7 acres of new habitat would need to be created to reduce the East Sand Island habitat from between 1 to 1.5 acres (USFWS, 2005). This acreage was selected because it was assumed that it would be adequate to reduce the number of breeding pairs down to a range of 2,500- 3,125 and that a smaller Caspian tern colony on East Sand Island would achieve an overall increase salmonids population growth rates (USFWS 2005a).

Before the Corps' ROD was signed, plans for the creation of habitat in Washington State fell through, and a modified alternative was selected which involved constructing 7 acres of new habitat and ultimately reducing East Sand Island habitat to 1.5 to 2 acres. It was expected that reducing East Sand Island habitat by this amount would result in an estimated colony size of 3,125 to 4,375. Through identification and creation of new habitat, the acreage on East Sand Island could ultimately be reduced to 1 acre if other alternative sites are found, enhanced or created.

In 2008, implementation of the Caspian Tern Plan began. Over the last 4 years, the Corps has constructed 9 acres of new habitat, although some of the new islands have been unsuitable for nesting as they are dry during drought years. In 2012, available habitat for the Caspian tern colony was reduced to 1.58 acres. Habitat reduction is accomplished by allowing vegetation to grow in naturally. Every year the designated colony area (Figure 2) is prepared to create suitable habitat by tilling the soil and removing the encroaching vegetation to achieve the

desired habitat for the birds. Implementation of the plan called for the USFWS monitor the tern's regional population to ensure the conservation goals of Caspian terns are being met.



Figure 2. Caspian Tern Colony on the eastern portion of East Sand Island, 2012. Silt fence in vegetated area shows former areas of the colony (Photo Credit-BirdResearchNW)

The Corps' 2006 record of decision was incorporated into the 2008 Federal Columbia River Power System (FCRPS) Biological Opinion as reasonable and prudent alternatives. This requires the Corps to monitor and report (to NOAA Fisheries) the number of acreage available and breeding pairs on East Sand Island, the newly constructed islands and report on the consumption rates on juvenile salmonids at East Sand Island.

1.1.2 Caspian Tern Adaptive Management Team

Recognizing the difficult and often unpredictable situation of trying to manage the largest colony of Caspian terns in the world, the Caspian Tern Plan called for an adaptive management plan. In 2012 an inter-agency adaptive management team (AMT) began meeting to discuss the effectiveness of the plan and to make recommendations to the Corps on taking new courses of actions. These recommendations are based upon the response Caspian terns are having to management efforts. Members of the AMT include USFWS, NOAA Fisheries, Corps and the Bonneville Power Administration (BPA). BPA funds the monitoring of the terns on East Sand Island.

Predictions were made in the Caspian Tern Plan on how many nesting pairs would occupy a reduced habitat of 1.5 to 2 acres. Based on previous nesting densities on East Sand Island and Rice Island, it was expected that the 1 to 1.5 acres would be adequate to provide for a colony range of 3,125 to 4,375 breeding pairs (Corps, 2006). It was also believed that the proposed acreage and associated colony size would be suitable to encourage social attraction and prevent colony abandonment (USFWS 2005a).

During implementation of the Caspian Tern Plan, the response from Caspian terns was somewhat unexpected, particularly in 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 3,125-4,375 pairs (Roby et al. 2013).

Caspian terns have also attempted (and have had limited success in nesting) on East Sand Island outside of the designated 1.58 acre colony area (Roby et al. 2013). Non-lethal hazing efforts (placement of flags to modify suitable habitat) has occurred on East Sand Island with the attempts to contain the colony to the designated and maintained area.

One factor not anticipated in the Caspian Tern Plan and is of primary and immediate concern to the AMT is the impact natural predators are having on the colony's productivity (number of young raised per breeding pair). For the last three nesting seasons (2010-2012), productivity for the colony has been at an all time low. In 2011 the colony did not produce a single fledgling (Figure 3).

The low productivity, in 2011 and 2012 for the Caspian tern colony is attributed primarily to glaucous-winged/western gulls (*Larus glaucescens/occidentalis*), a hybrid species on the island that consumes the tern eggs and chicks after bald eagles (*Haliaeetus leucocephalus*) flush the adults from the colony (Roby et al. 2011). The threat of adult mortality, as in bald eagle disturbance, may cause immediate and permanent nest abandonment (Cuthbert 1988). Nest predation is considered to be a primary factor influencing Caspian tern production and nest-site fidelity (Cuthbert 1988; Danchin et al. 1998; Strong et al. 2004).

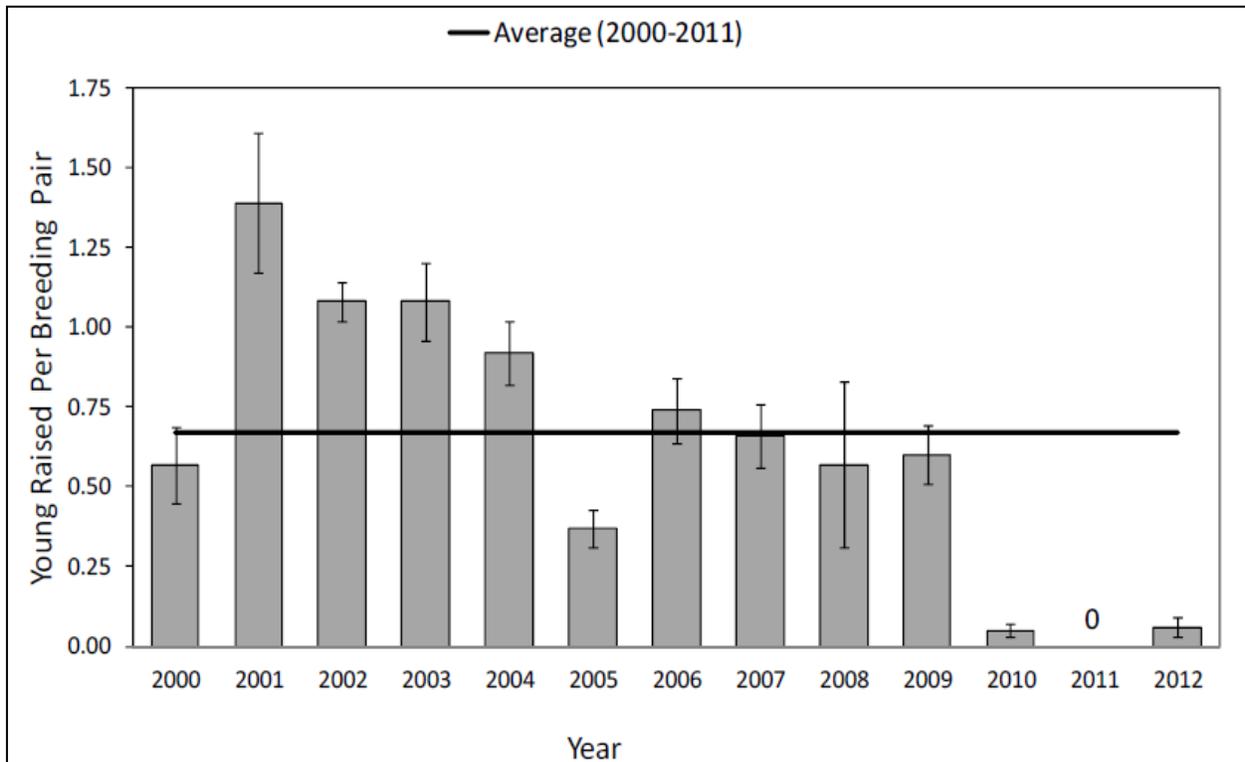


Figure 3. Number of Young Raised per Caspian Tern Breeding Pairs on East Sand Island (Roby et al. 2013).

1.1.3 Hazing Efforts on Rice Island, Miller Sands Spit and Pillar Rock Islands

To address concerns about the terns' potential to go upriver and consume greater numbers of salmon, the Caspian Tern Plan called for hazing at Rice Island, Miller Sands Spit and Pillar Rock Islands. The Corps uses these islands on a semi-regular basis to place dredged material thereby creating suitable habitat for the terns.

Recent efforts to haze the birds have only been necessary on Rice Island, as the birds have not exhibited nesting behavior on Miller Sands Spit or Pillar Rock Islands (Roby et al. 2012). However, Rice Island and Miller Sands Spit are the two most likely places Caspian terns may seek out for roosting or nesting as relatively recent dredged disposal events and clearing for those events have created some suitable habitat (total area unknown). Caspian terns have used Rice and Miller Sands for roosting/ foraging but their use of the islands in this way (as observed by hazers) has been limited to the mud flats on the beaches.

Placement of material on Miller Sands Spit occurs on annual or bi-annual basis and typically only on the shore where it erodes through natural process. In 2012, dredged material placed on Miller Sands Spit was contoured to establish mounds that were successful in making the newly created habitat less suitable for terns.

Methods used on Rice Island have primarily consisted of using silt fence and flagging to modify tern suitable habitat (Figure 4). Hazing efforts also include presence of human beings (hazers) to flush the birds away from the island. The Caspian Tern Plan also called for other measures to prevent terns from using these islands, such as establishing vegetation to make habitat unsuitable for the birds, using eagle kites, personnel with dogs and all terrain vehicles to cover the distances. These efforts begin April 1 and continue to June 15 each year (USFWS 2005a).



Figure 4. Wood stakes with rope and flagging used to modify suitable Caspian tern habitat on Rice Island. (Photo Credit Corps)

To assist in preventing the establishment of new tern colonies on Rice Island, Miller Sands Spit and Pillar Rock, the USFWS would issue a depredation permit to collect eggs, should hazing with non-lethal methods fail to prevent tern nesting. Since the implementation of the Caspian Tern Plan, a total of 10 eggs have been collected under permit, all from Rice Island. The Corps was issued a permit to collect 100 Caspian tern eggs each year from 2009 to 2012 and has applied for a renewal for 2013.

Periodic boat-based and aerial surveys of Rice Island, Miller Sands Spit and Pillar Rock Island are conducted annually during the breeding season in order to detect signs of nesting attempts by Caspian terns. In May of 2009, one year after implementation of the Caspian Tern Plan, approximately 520 Caspian terns were observed loafing on upland areas of Rice Island, and their observed behavior (courtship displays, exchange of courtship meals, copulations and digging of nest scrapes) indicated an intention to nest (Roby et al. 2010). Stakes and flagging were put out in these areas, and terns were successfully dissuaded from nesting. The following year in May, approximately 75 Caspian terns were observed in an upland area east of the old colony site on Rice Island and were again effectively hazed off the island by placing stakes and flagging on the island (Roby et al. 2011).

In April of 2011, Caspian terns appeared interested in nesting at two sites - on Rice Island near the former colony site that was used in the 1990s and on a pier at Tongue Point. Stakes and flagging were erected in the areas where terns were attempting to nest, and human hazers were on the island attempting to keep the birds off until June 15 when hazing ended. Caspian terns returned to Rice Island in late June and initiated nesting there. In July, 3 Caspian tern nests, with a total of 4 eggs, were discovered on Rice Island adjacent the old colony site and near areas that had previously been staked and flagged to prevent tern nesting. In August, approximately 460 adult Caspian terns (most were roosting) and 3 tern chicks were observed at the colony site on Rice Island (Roby et al. 2012). In 2012 efforts to dissuade terns from nesting on Rice Island were successful.

1.2 Purpose of and Need for Action

Purpose

The purpose of the proposed action is to prevent Caspian terns on East Sand Island from abandoning their designated colony and using nearby islands, specifically Rice Island and Miller Sands Spit for roosting and/or nesting, where their consumption of juvenile salmonids is known to be substantially higher.

Need

Nesting success peaked in 2001 and has been in decline since then (Roby et al. 2013). For three consecutive years reproductive success of the Caspian tern colony has been at zero or near zero productivity (less than 0.06 fledglings per pair). In 2010, 8,000 pairs produced approximately 500 young, in 2011 the colony experienced a total breeding failure, producing no young and in 2012 the colony produced only 400 fledglings (Roby et al. 2013). Nest predation by gulls, especially during colony disturbance events caused by bald eagles is considered to be a primary factor limiting productivity on the colony (Roby et al. 2013). It is expected based on 2011 and 2012 data that bald eagle colony disturbance and associate gull predation on tern eggs and chick will occur in 2013. The result will be the fourth year of zero to near zero tern productivity. This increases the likelihood of colony abandonment (Cuthbert 1988).

Predation on juvenile salmonids from avian predators is listed as one of the factors potentially limiting the recovery of: lower Columbia River Chinook, steelhead and coho; and Upper Willamette River Chinook and coho (NOAA, 2008). Studies on the diet of Caspian terns nesting on Rice Island indicated their consumption of juvenile salmonids increased by nearly 50% compared to birds nesting on East Sand Island (Roby et al. 2002). Based on this, there is a need to prevent the colony from abandoning East Sand Island and re-establishing a presence on Rice Island or Miller Sands Spit, where suitable habitat is available.

Colonial waterbirds, like the Caspian tern tend to recruit to the previous year's most productive colonies and to emigrate from the least productive ones (Danchin, et al 1998). The likelihood of colony site abandonment increases with each year of poor reproductive success. The Caspian

tern colony on East Sand Island is potentially entering its fourth consecutive year of low to nearly no nesting success on East Sand Island. Several studies suggest Caspian terns show a strong preference for a colony they have occupied before, unless their prior reproductive efforts were unsuccessful (Cuthbert, 1998). Because the colony has had little to no reproductive success in the last three years, there is a need to address their potential to abandon the East Sand Island colony.

1.3 Lead Agency

U.S. Army Corps of Engineers, Portland District

The Corps is the lead agency for this draft environmental assessment (draft EA) under the National Environmental Policy Act (NEPA). As the lead agency, the Corps ensures overall compliance with all associated environmental laws and regulations regarding the proposed federal action. Statutory authority for the action comes from Section 906(b)(1) of the 1986 Water Resources Development Act. Funding comes from the Columbia River Fish Mitigation Program.

Chapter 2. Alternatives, Including the Proposed Action

2.1 Introduction

The following alternatives identify what type of management strategy the Corps could pursue to achieve the stated purpose and need.

2.2 Detailed Description of Alternatives

2.2.1 Alternative A – No Action

Under this alternative no actions would be taken to reduce the impacts the gulls are currently having on the Caspian tern colony. Existing hazing efforts as described in Chapter 1 would continue on Rice Island, Miller Sands Spit and Pillar Rock Island, and these efforts would end as scheduled on June 15th. Periodic boat-based and aerial surveys of these islands would continue to determine if terns are roosting or initiating nesting attempts. Monitoring of the East Sand Island colony will continue with field personnel observing the colony's behavior and productivity during the 2013 nesting season. Hazing of terns on East Sand Island outside of the designated colony area would occur to prevent satellite colonies from forming.

2.2.2 Alternative B – Integrated Management of Gulls with Non-Lethal and Lethal Methods (Proposed Action)

Alternative B relies on a combination of non-lethal and lethal methods to haze gulls away from the Caspian tern colony to prevent/minimize depredation on tern eggs and chicks. Decoys would be placed on the colony to socially attract the terns back to the colony and reduce the time they spend away from their nests and chicks. This alternative would allow personnel currently monitoring the colony to haze gulls with green laser lights, dispersing the gulls away from the colony before they begin depredating on Caspian tern eggs and chicks.

Lethal removal of up to 150 glaucous-winged/western gulls would occur from between mid-May to no later than June 15th. Gulls would be shot on the Caspian tern colony should the frequency and intensity of bald eagle disturbance be such that it causes substantial egg consumption and chick mortality from glaucous-winged/western gulls, and the colony is at a risk of failure commensurate with the past three years (see Figure 3 above). Removal of gulls would be limited to those individuals observed to have depredated on tern eggs and/or those individuals that display predatory behavior.

Shooters would use high-powered pellet guns with non-toxic pellets. Glaucous-winged/western gull carcasses may be collected if opportunities present themselves, typically at times when the

colony is absent from disturbance events. Upon collection and if opportunity presents itself, carcasses would be used to create effigies (carcasses put on stakes) on the colony. This alternative would require approval from the USFWS for migratory bird depredation permit prior to the lethal removal and approval for use of toxic shot and non-standard disposition of carcasses.

No additional infrastructure is needed to to accommodate the shooters. The existing observation blinds (Figure 2 above) used to monitor the colony would be used to conduct the shooting. Shooters would travel via boats from the Port of Chinook, approximately 1 mile away and access the blinds travelling on foot.

2.2.3 Alternative C – Increase Hazing Efforts on Rice Island and Miller Sands Spit.

This alternative would implement the additional measures (use of dogs and all terrain vehicles) from the Caspian Tern Plan and increase the level of effort in hazing the birds off of Rice Island and Miller Sands Spit. This alternative would only be necessary if terns on East Sand Island were to abandon the colony in large numbers and seek out Rice Island or Miller Sands Spit. The current efforts to haze terns off these islands would enable the Corps to determine if additional hazing is necessary. This alternative would extend the current Corps contract deadline from June 15 to August 1st to have continuous hazing on Rice Island and Miller Sands Spit with increased number of hazers on hand to flush the birds from the islands, using dogs and all-terrain vehicles to cover the distance. Based on previous years of hazing on Rice Island and Miller Sands Spit, the tern’s use of the island drops substantially by mid to late June. Roosting on Rice Island occurs primarily from the mud flats on the beaches.

2.3 Comparison of Alternatives

The following is a comparison of the alternatives under consideration and their associated environmental impacts and estimated costs.

Table 1. Comparison of Alternatives

ACTIONS TAKEN UNDER EACH ALTERNATIVE			
	Alternative A No Action	Alternative B- (Proposed Action) Integrated Management Non- Lethal and Lethal Gull Control on East Sand Island Caspian Tern Colony	Alternative C Increase Hazing Efforts on Rice Island and Miller Sands Spit
Hazing	Yes, hazing of terns on East Sand Island outside of the designated colony to prevent satellite colonies. Hazing of terns off Rice Island, Miller Sands and Pillar Rock Islands to June 15 th .	In addition to Alternative A, hazing would occur to glaucous-winged/western gulls on East Sand Island. Use of decoys, green-light lasers and gull effigies.	In addition to Alternative A, Increased presence of human hazers, use of dogs and all-terrain vehicles to cover the distance on islands, extension of timeframe to August 1 st .

Lethal Removal of Gulls	No	Yes, up to 150 gulls beginning mid-May and ending June 15 th .	No
Caspian Tern Egg Collection	Yes, up to 100 Caspian tern eggs may be collected under permit at Rice Island, Miller Sands Spit and Pillar Rock Island only. When limit of eggs collected is reached no additional hazing would occur.	Yes, as described under Alternative A.	Yes, as described under Alternative A
Monitoring	Yes, ongoing monitoring is done as part of the Caspian Tern Plan. Monitors observe the colony through observation blinds.	Yes, as described under Alternative A	Yes, as described under Alternative A. Boat based and pedestrian surveys are done to determine if Caspian terns are exhibiting behavior that may lead to nesting.
ANTICIPATED ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES			
Caspian Terns	Colony experiences increased pressure from natural predators, has little success for 4 th consecutive year and may abandon East Sand Island colony for nearby islands (e.g. Rice Island or Miller Sands Spit).	Benefits to the colony from increased productivity. If number of fledglings per pair is sufficient to maintain colony fidelity, colony can be expected to continue to nest on East Sand Island.	Same as Alternative A but temporary disturbance to terns if they are nesting or roosting on Rice Island or Miller Sands Spit. Terns may roost in greater numbers on Rice Island or Miller Sands Spit until habitat is available and they can be successful.
Gulls	No impact	Minor and temporary impact to glaucous-winged/western gulls, existing colony size is nearly 3,400 pairs. Therefore there would be no impacts to the overall populations.	Temporary disturbance to gulls that may be nearby during hazing efforts but hazing would concentrate on terns, and gulls would experience minor disruption if they are nearby.
Other Birds	No impact	No Impact	Temporary disturbance to other birds that may be nearby during hazing efforts. Hazing would concentrate on terns, and other birds would experience only minor disruption if they are nearby.
Juvenile Salmon	Average annual level of consumption from terns on juvenile salmonids from 2008 to 2012 was approximately 5 million. This could possibly increase to 10-15 million if terns abandon colony and	If colony stays on East Sand Island, consumption on juvenile salmon would likely be similar to previous year's average of ~5 million, fluctuating dependent on other factors that influence predation (river flows and availability of other forage fish).	Similar to Alternative B, through successful hazing of terns off Rice Island and Miller Sands Spit may help reduce predation on juvenile salmonids if the terns stay nesting and roosting on East Sand Island.

	overwhelm current hazing efforts on Rice Island, Miller Sands Spit and Pillar Rock Island		
ANTICIPATED COST OF ALTERNATIVES			
Contract	No new dollar cost-activities covered under existing contracts.	\$10,000-\$20,000- modifying existing contract.	\$10,000-\$15,000- modifying existing contract, or issue new contract.

2.4 Relationship to Federal, State and Local Policies and Plans

USACE- Columbia River Estuary Dredged Material Management Plan

The proposed action does not require a change or supplement to Corps planning documents. The Corps has a *Columbia River Estuary Dredged Material Management Plan (2002)* in which East Sand Island is identified as a possible dredged material disposal site. East Sand Island is identified with two discrete disposal sites with a total capacity for disposal of dredged material of ~ 1,500,000 cubic yards. This plan precedes the Caspian Tern Plan, described in Chapter 1. The Corps Navigation Program has no plan to use East Sand Island for the disposal of dredged material but does plan to use Rice Island, Miller Sands Spit and Pillar Rock Islands, see Section 3.3 for more information on reasonably foreseeable future actions.

Oregon Coastal Management Program- Clatsop County Comprehensive Plan

Congress enacted the Coastal Zone Management Act (CZMA) (16 U.S.C. 1451 et seq.) to protect the coastal environment from growing demands associated with development. In accordance with Section 304(a) of the Act, all federal lands, owned, leased, held in trust or whose use is otherwise subject solely to the discretion of the federal government are excluded from the coastal zone. However, if the federal agency conducts the action on federal lands, and the action does affect coastal uses or resources off of federal lands, then a state may review the action for consistency with the state's enforceable policies

The state of Oregon has a federally approved coastal management program, which defines, through its land use planning process. enforceable policies that apply to activities proposed in a coastal zone. These policies are generally found in the statewide planning goals and the approved city or county comprehensive plan and implementing land use regulations. Federal agencies must follow the federal consistency provisions as delineated in 15 Code of Federal Regulations (CFR) Part 930.

2.5 Permits and Approvals Needed

The following is the only permit required prior to the implementation of the alternatives:

MIGRATORY BIRD DEPREDATION PERMIT Migratory Bird Treaty Act (MBTA) 50 CFR 21.41

A Federal Migratory Bird Depredation Permit from the USFWS is required to trap or kill migratory birds for depredation control purposes. The USFWS has statutory authority and responsibility for enforcing the Migratory Bird Treaty Act (MBTA) (16 United States Code or U.S.C. 703–711). A depredation permit can authorize lethal removal for the safety of the bird, human health and safety, protection of threatened/endangered species, and certain types of property damage. No permit is required merely to scare or herd depredating migratory birds other than endangered or threatened species and bald or golden eagles. Conditions of the permit may require the integration of non-lethal techniques when implementing lethal measures. Lethal take is not to be the primary means of control. Active hazing, harassment or other non-lethal techniques must continue in conjunction with any lethal take of migratory birds.

US Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS)-Wildlife Services have a formal role in recommending the use of lethal methods on Migratory Bird Depredation Permits.

Chapter 3. Affected Environment and Environmental Consequences

3.1 Introduction

The affected environment chapter of a NEPA document should “...succinctly describe the environment of the area(s) to be affected by the alternatives under consideration...” (40 CFR 1502.15). The geographic scope of analysis for this draft EA is East Sand Island, and more specifically, the designated Caspian tern colony and the nearby Rice Island and Miller Sands Spit. Rice Island and Miller Sands Spit are the two most likely places Caspian terns may seek out for roosting or nesting as relatively recent dredged disposal events there have created some suitable habitat. The last placement of dredged material on Pillar Rock Island occurred in 2001.

This chapter also discusses the environment consequences (impacts) that may occur from implementing the three alternatives. Impacts may be direct, indirect or cumulative. Impacts can be adverse or beneficial. Only those environmental resources that are likely to be affected (directly and indirectly) as a result of implementation are discussed in this section. Cumulative Impacts are discussed in Section 3.3.

3.2 Biological Environment

East Sand Island is in the state of Oregon (Clatsop County) near the mouth of the Columbia River, approximately one mile west of Chinook, WA and 10 miles northwest of Astoria, Oregon. The island, approximately 50 acres in size, was once connected to Sand Island, just to the northeast in Baker Bay. The islands have separated over time due to erosion. In 1954 the Island was transferred to the Corps for the Sand Island Channel Improvement Project.

Currently a variety of breeding seabirds and waterbirds overlap with the Caspian tern colony. Because of the large numbers and diversity of birds using the island, the American Bird Conservancy and the National Audubon Society recognize it as an Important Bird Area.

Miller Sands Spit and Rice Island are used regularly for disposal of dredged material and are characterized by large expanses of bare sandy ground with areas of sparse grasses, forbs and small shrubs. These islands are a unique, almost desert-like habitat in the estuary (USFWS 2010). The lack of vegetation and relative absence of mammalian predators make the islands an attractive nesting location for colonial waterbirds such as glaucous-winged/western gulls (hybrids), Caspian terns and double-crested cormorants. Canada geese and streaked horned lark also nest on these islands (USFWS 2010). The off-channel edges of the islands slope into shrubby willows and cottonwoods near the water's edge and then into tidal marsh and shallow flats. These shallows attract large numbers of wintering ducks, as well as migrating shorebirds and juvenile salmonids (USFWS 2010).

3.2.1 Caspian Terns

The Caspian tern's migration from Rice and East Sand Island has dramatically changed distribution of the regional population in the Pacific Flyway. Approximately 60% of the regional population currently resides on East Sand Island (M. McDowell, USFWS pers. comm). Caspian terns nest on the eastern end of the island, separated from the cormorant colony on the western portion of the island by dense upland shrub habitat. The number of adult terns on the East Sand Island colony peaks in mid-May, which corresponds to a peak period of migration for juvenile salmonids (many released from upriver hatcheries) through the estuary. A large number of terns use East Sand Island for nighttime roosting.

The number of breeding tern pairs on East Sand Island peaked in 2008 and has been trending downward (Figure 5). In the past three years, the colony has experienced very low nesting success. In 2011, the colony did not produce any young; this is the first time that a complete breeding failure has been recorded at this colony (Roby et al. 2012). The factors responsible for the decline in productivity and colony size is attributed to intense disturbance by bald eagles and associated gull predation on tern eggs and chicks. Climate conditions associated with a very strong La Niña and the resultant exceptionally high river flows also apparently contributed to

the lack of nesting success through their effects on marine forage fish availability (Roby et al. 2012).

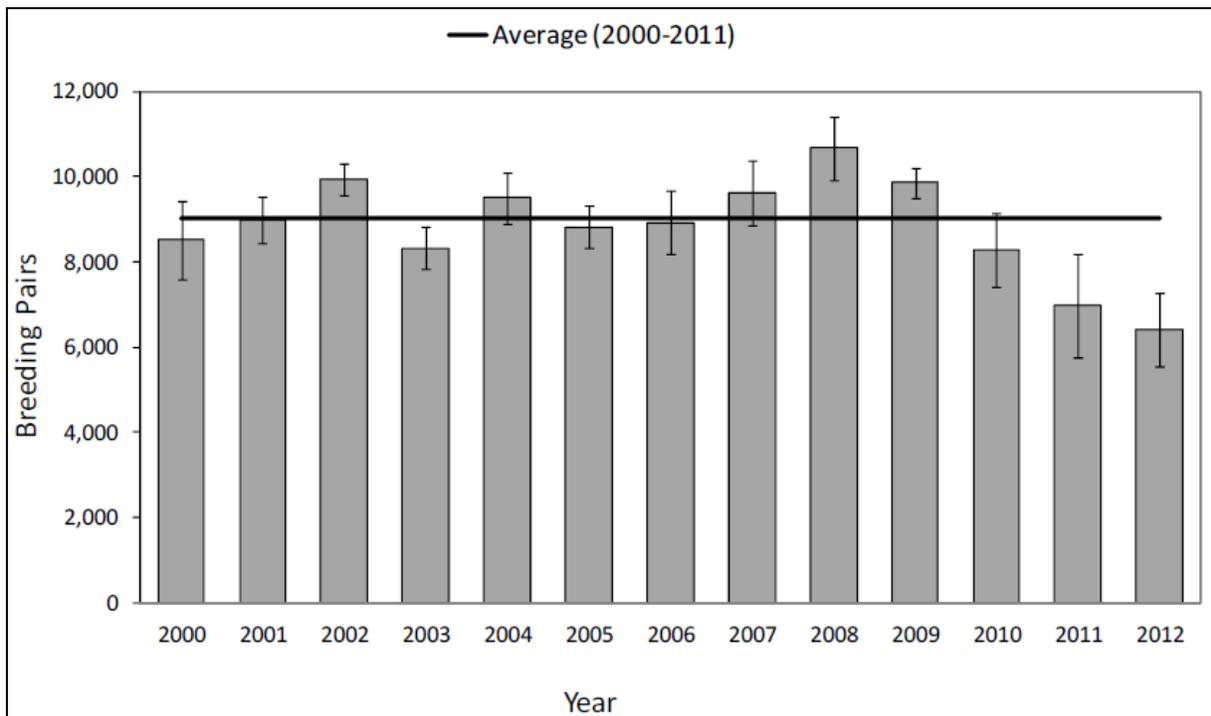


Figure 5. Number of Caspian Tern Breeding Pairs on the East Sand Island Colony (Roby et al. 2013)

3.2.2 Effects to Caspian Terns

The following identifies potential direct and indirect impacts resulting from the alternatives. For all alternatives, current monitoring efforts would continue and the results would be reported.

Alternative A- No Action

If no actions were taken and disturbances to the terns from bald eagles and subsequent eggs and chick mortality caused by gulls continued at the current rate, it is very likely that for the fourth consecutive year, the productivity on the colony would be extremely limited, and the colony may experience another season of no productivity. This would mean that the colony is no longer effectively reproducing at a rate that is replacing itself, somewhere around 0.32-0.74 fledglings per breeding pair (Suryan et al. 2004), and the colony would continue to decrease. Because the colony on East Sand Island comprises approximately 60% of the regional population, this decrease could lead to a decreasing regional population.

It is also possible that the birds may abandon the designated colony area and prospect for new nesting areas elsewhere on East Sand Island as they have attempted to do so in the last few years. The terns may also prospect for new nesting locations on Rice Island or Miller Sands Spit or leave estuary for other locations including the newly constructed islands.

Alternative B- Integrated Management of Gulls using Non-Lethal and Lethal Methods (Proposed Action)

Access to the observation blinds would have no impact to the Caspian terns. Shooters would approach the colony by following the water's edge along the shore of the island. Above-ground tunnels (already in place) would allow for access to the blinds without disturbing the terns. Shooting would only occur when gulls are depredating on tern eggs and chicks. Under this alternative it is anticipated that benefits to terns would be realized in increased nesting success and a colony that could be more productive under less pressure. Should the colony experience increased productivity they may be less likely to abandon the colony.

Alternative C- Increase Hazing Efforts on Rice Island and Miller Sands Spit

Impacts would be similar to Alternative A. If terns do abandon the East Sand Island colony site this year and roost or attempt to nest on Rice Island or Miller Sands Spit, hazing would have to be constant and once the allowable egg take (100 eggs) was met, hazing would need to end in order to avoid any unauthorized take under the Migratory Bird Treaty Act. Increased hazing efforts on Rice Island and Miller Sands spit would further disrupt the already stressed colony and potentially limit productivity for another year. Terns would experience lack of suitable nesting habitat until they disperse throughout their breeding range; or go through a population reduction.

3.2.3 Glaucous-Winged/ Western Gulls

Glaucous-winged and western gulls (*Larus glaucescens/occidentalis*) is a hybrid species whose populations are increasing throughout the Pacific Coast of North America with an estimated regional population is approximately 73,000 individuals (USFWS 2005b). A large gull colony is located on East Sand Island at the eastern end of the island near the tern colony. These gulls also have established colonies on Rice Island and Miller Sands Spit. In 2012, the population of glaucous-winged/western gulls on East Sand Island was estimated to be about 3,400 individuals (Roby et al. 2013). In 2012, the populations on Rice Island was estimated to be about 1,000 individuals and on Miller Sands Spit about 200-500 individuals. These numbers are similar to 2009 when a more comprehensive survey was conducted on their presence, with the exception of East Sand Island where approximately 6,200 adults were counted on the colony (Roby et al. 2012)

3.2.4 Effects to Glaucous-Winged/ Western Gulls

The following identifies potential direct and indirect impacts resulting from the alternatives

Alternative A- No Action

No impacts to glaucous-winged/western gulls are anticipated from this alternative. Monitoring of the gulls on islands in the lower Columbia River Estuary would continue, but this monitoring would be non-invasive and rely on boat based surveys and aerial photography.

Alternative B- Integrated Management of Gulls using Non-Lethal and Lethal Methods (Proposed Action)

This alternative would have direct adverse impacts to a small number of gulls (relative to their population). These impacts would be short term, occurring during the nesting season (May to August) and would be limited by the permitted number for lethal removal. Removal of 150 adult gulls would constitute about 0.04% of the local population on East Sand Island (3,400 individuals) and 0.002% of the regional population (73,000 individuals). Thus this level of removal would not adversely affect the existing gull populations, directly or indirectly.

Alternative C- Increase Hazing Efforts on Rice Island and Miller Sands Spit

If glaucous-winged/ western gulls were in the vicinity of the increased hazing efforts - increased presence of humans, use of dogs and all-terrain vehicles, there would be minor and short term displacement to them during these events. The gulls are generally more adaptable, and it is expected that they may seek other locations to roost or nest. Therefore, there would be no long term adverse impacts.

3.2.5 Other Birds

Ring-billed Gulls- (*Larus delawarensis*)

Ring-billed gulls, which previously nested on Miller Sands Spit (Collis et al. 2002a), now nest on East Sand Island (1,500 adults counted on colony), and several hundred adults were counted on colony on the beaches on the western portion of Rice Island. The numbers of ring-billed gulls in the Lower Columbia River Estuary have increased since 1998; 2,550 ring-billed gulls were counted on colonies in the Columbia River estuary during a comprehensive count of the birds in the 2009 nesting season compared to less than 100 in 1998 (Collis et al. 2002a).

Streaked Horned Larks- (*Eremophila aipestris strigata*)

The streaked horned lark, a candidate for listing under the Endangered Species Act (ESA), breeds and winters in Oregon and Washington and is associated with bare ground or sparsely vegetated habitats. Nesting streaked horned larks have been documented on Rice Island and Miller Sands Spit in the Columbia River estuary (Figures Pearson and Altman 2005, Pearson et al. 2005).

At East Sand Island, streaked horned larks have only occasionally been observed on the eastern end of the island, in the vicinity of the Caspian tern colony, but no nesting has been suspected or confirmed. The larks are commonly present at Rice Island and Miller Sands Spit. The disposal of dredged material support the sparsely vegetated habitat preferred by streaked horned larks (Pearson and Hopey 2005).

American White Pelicans- (*Pelecanus erythrorhynchos*)

The first nesting record of American white pelicans in the Columbia River Estuary occurred at Miller Sands Spit during 2010. In 2010 and 2011 approximately 100 adults were counted on a colony in July. In 2012, the colony size was estimated to be 122 breeding pairs based on counts of attended nests visible on aerial photographs taken of the colony near the peak of the incubation period. While estimates of nesting success are unavailable, American white pelicans were successful in raising young at the Miller Sands Spit colony in 2010-2012.

Waterfowl-

Mallards (*Anas platyrhynchos*) and western Canada geese (*Branta canadensis moffitti*) are probably the most abundant breeding waterfowl on the islands in the Lower Columbia River Estuary. Non-breeding brant (*Branta bernicla*) are observed on East Sand Island during the summer. Nesting waterfowl mainly occur in vegetated areas on the east end of East Sand Island.

3.2.6 Effects to Other Birds

The following identifies potential direct and indirect impacts resulting from the alternatives

Alternative A- No Action

No impacts to other birds are anticipated from this alternative. Monitoring of the ring-billed gulls and American white pelicans on islands in the lower Columbia River Estuary would continue, but this monitoring would be non-invasive relying on boat based surveys and aerial photography.

Alternative B- Integrated Management of Gulls using Non-Lethal and Lethal Methods (Proposed Action)

Access to the observation blinds would have no impact to the other birds listed above, but ring-billed gulls are expected to be in the vicinity. Shooters would approach the colony by following the water's edge along the shore of the island. Above-ground tunnels constructed (already in place) would allow for access to the blinds without disturbing ring-billed gulls nearby.

Alternative C- Increased Hazing Efforts at Rice Island and Miller Sands Spit

If other birds were in the vicinity of the increased hazing efforts, the increased presence of humans, use of dogs and all-terrain vehicles would result in a minor and short term displacement to them during these events.

3.2.7 Columbia River Basin Juvenile Salmonids

There are five species of Pacific salmon and steelhead (sockeye, chum, Chinook and coho salmon, and steelhead trout) referred to in this document as the Columbia River Basin salmonids, which use the lower Columbia River Estuary in their life cycle. They are listed under the Endangered Species Act (Table 2). The juvenile salmonids migrate through the Columbia River estuary to the Pacific Ocean with peak migration of juveniles in the lower estuary from

April to July, coinciding with the nesting season of piscivorous birds on East Sand Island (USFWS 2005a).

Consumption of juvenile salmon from Caspian terns is well documented. Predation on juvenile salmonids from avian predators is listed as one of the factors potentially limiting the recovery of Lower Columbia River Chinook, steelhead and coho and Upper Willamette River Chinook and coho (NOAA, 2008).

Table 2 Thirteen ESA-listed Columbia River Basin salmonid ESUs.

Species, Evolutionarily Significant Unit (ESU)	Status	Juvenile Migration Strategy*
CHINOOK		
Upper Columbia River Spring-run	Endangered	Yearling
Lower Columbia River	Threatened	Sub-yearling
Upper Willamette River	Threatened	Yearling
Snake River Spring/Summer-run	Threatened	Yearling
Snake River Fall-run	Threatened	Sub-yearling
COHO		
Lower Columbia River	Threatened	Yearling
CHUM		
Columbia River	Threatened	Sub-yearling
SOCKEYE		
Snake River	Endangered	Yearling
STEELHEAD		
Upper Columbia River	Threatened	Yearling
Middle Columbia River	Threatened	Yearling
Lower Columbia River	Threatened	Yearling
Snake River	Threatened	Yearling
Upper Willamette River	Threatened	Yearling

Despite complete colony failure, Caspian terns nesting at the East Sand Island colony consumed about 4.8 million juvenile salmonids in 2011 (Roby et al. 2012). In 2012 it was estimated that the total juvenile salmonid consumption by Caspian terns nesting on East Sand Island was 4.9 million, this number is slightly below the average of the previous 12 years for the second consecutive year (Roby et al. 2013). From 2000 to 2011, the average number of juvenile salmonids consumed by Caspian terns nesting on East Sand Island was 5.3 million per year. This is less than half the annual consumption of juvenile salmonids by Caspian terns in the Columbia River estuary prior to 2000, when the breeding colony was located on Rice Island in the upper Columbia River estuary.

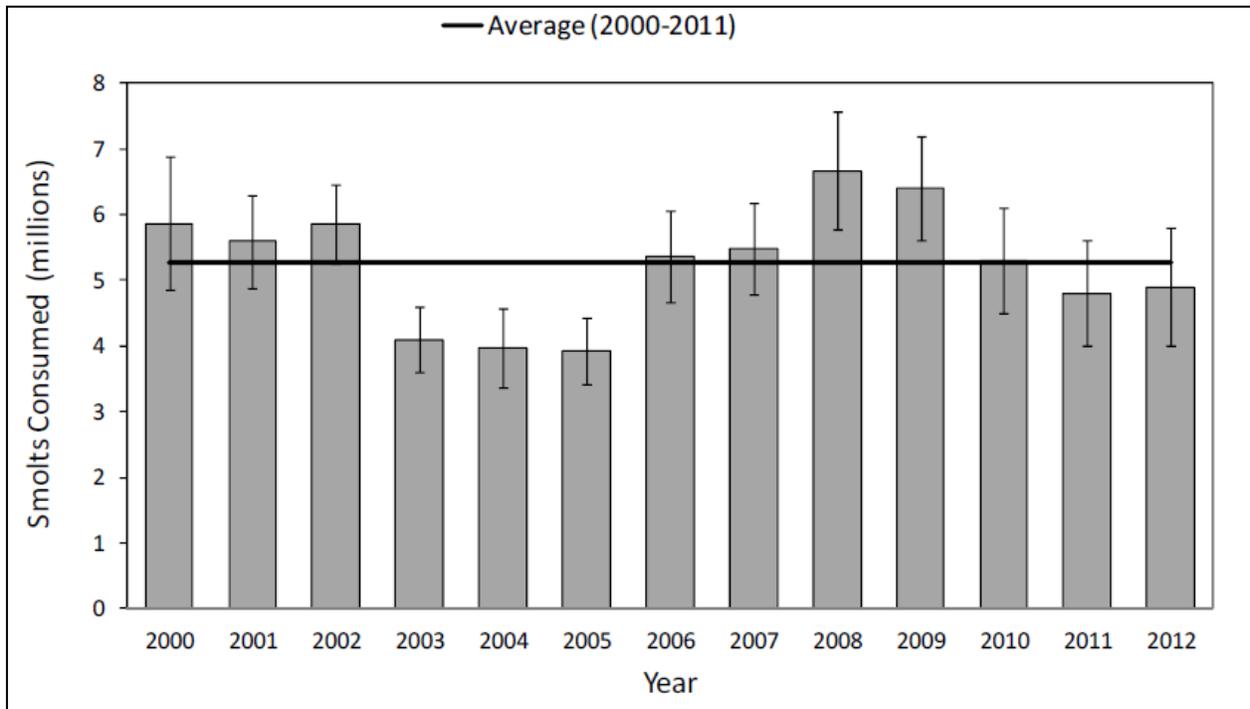


Figure 6. Estimated total annual consumption of juvenile salmonids by Caspian terns nesting on East Sand Island in the Columbia River estuary during the 2000-2012 breeding seasons (Roby et al. 2013).

Of the 4.9 million juvenile salmonids consumed by Caspian terns in 2012, it was estimated that 1.6 million were coho, 0.9 million were steelhead, 1.3 million were sub-yearling Chinook, 1.0 million were yearling Chinook, and 0.02 million were sockeye (Roby et al. 2013). Juvenile salmonids continued to be a large part of the diet of Caspian terns nesting on East Sand Island, comprising 36% of the diet (percent of prey items) in 2011, somewhat higher than the average during 2000-2010 (30%).

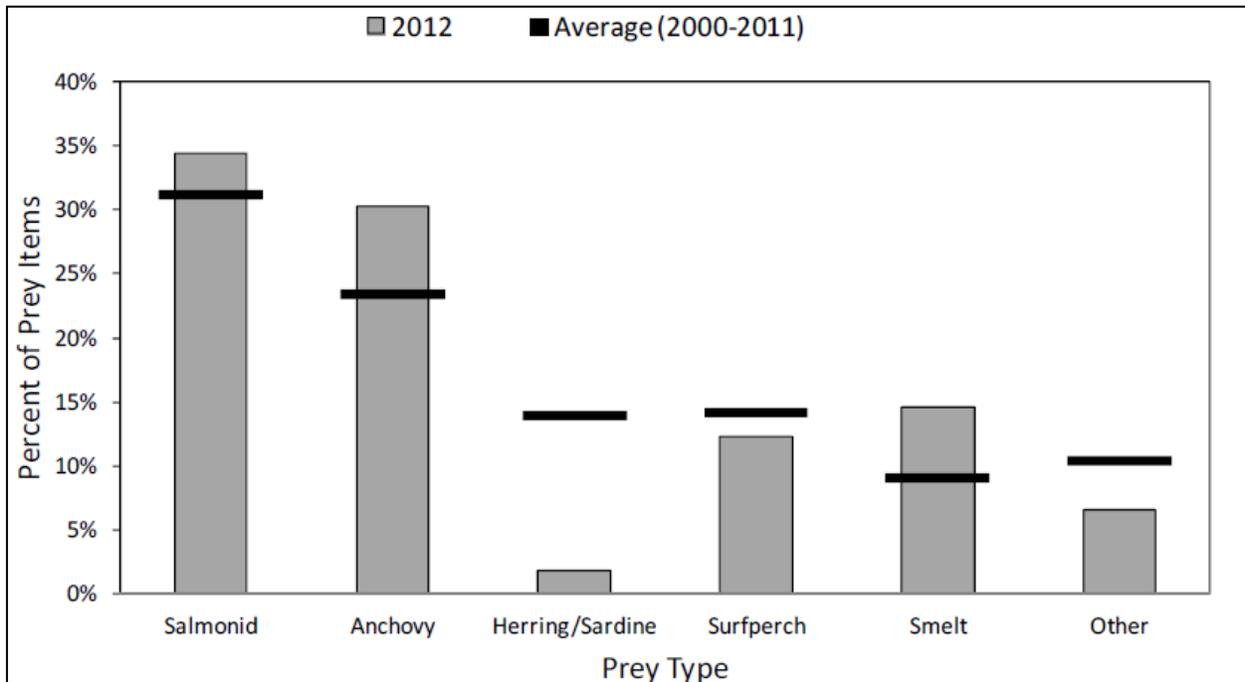


Figure 7. Diet composition of Caspian terns nesting on East Sand Island in the Columbia River estuary during the 2012 breeding season.

3.2.8 Effects to Columbia River Basin Juveniles Salmonids

The following identifies potential direct and indirect impacts resulting from the alternatives

Alternative A- No Action

If the tern colony stays on East Sand Island in spite of pressure from natural predators, their consumption of juvenile salmonids would likely be similar to previous year's average of 5.3 million, fluctuating dependent upon the other factors influencing predation (river flows and availability of other forage fish).

If the tern colony abandons East Sand Island and all/ or a majority of the nesting pairs move to Rice Island or Miller Sands Spit to nest, consumption of juvenile salmonids would likely double (based on previous diet studies of terns on Rice Island) with terns potentially consuming as many as 10-11 million juvenile salmonids per year until hazing or other responsive management actions are implemented.

If the colony abandons East Sand Island and a majority of the terns forgo nesting this season and roost or forage in large numbers mostly concentrated on Rice Island or Miller Sands Spit, consumption of juvenile salmonids would likely double, as the foraging range for non-nesting birds can increase because they are not tied to feeding their mates of chicks. Consumption under this alternative could be as high as 10-15 million juvenile salmonids per year until hazing or other responsive management actions are implemented.

If the tern colony site is abandoned, the terns will not be tied to the East Sand Island location. Without the need to feed mates or chicks they will likely forage a greater percentage of each day in the upper estuary.

If the colony abandons East Sand Island and the terns leave the estuary in large numbers, consumption of juvenile salmonids would decrease proportionally.

Alternative B- Integrated Management of Gulls using Non-Lethal and Lethal Methods (Proposed Action)

Impacts similar to Alternative A

Alternative C- Alternative C- Increased Hazing Efforts at Rice Island and Miller Sands Spit

Impacts similar to Alternative A however if increased hazing on Rice Island and Miller Sands Spit preclude roosting/foraging from these islands, impacts to juvenile salmonids may decrease slightly as the majority of terns currently roost on East Sand Island.

3.3 Cumulative Impacts

Cumulative effects result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7).

Past Actions

The Council on Environmental Quality (CEQ) issued a memorandum on June 24, 2005 regarding analysis of past actions. This memorandum states, "...agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions."

East Sand Island- This Island has been in federal ownership since 1863 when the military occupied the lands for training and defense purposes. As that time it was connected to the larger Sand Island. Because of the diversity of birds on the island, it is recognized as an Important Bird Area by the Audubon Society and American Bird Conservancy.

Rice Island – Rice Island is under state ownership but was created by dredged material the Corps has placed on it over numerous years. The northwestern portion of the island is in the state of Washington and is managed by the state. The southeastern portion is in the state of Oregon and managed by the state. People use the island recreationally, and some people bring all terrain vehicles out to the island and ride on the dredged disposal areas.

Miller Sands Spit- Miller Sands Spit is under state and federal ownership. The island is located in the state of Oregon and the lower portion is under USFWS jurisdiction as part of the Lewis and Clark National Wildlife Refuge (USFWS 2010). In 2010, the refuge finalized a Comprehensive

Conservation Plan which identified the management strategy for the Lewis and Clark National Wildlife Refuge. Miller Sands Spit is closed to waterfowl hunting.

Present Actions on the Lower Columbia River Estuary Islands-

<i>East Sand Island</i>	<i>Rice Island</i>	<i>Miller Sands Spit</i>
In 2013 the Corps, BPA and Navy are funding research and monitoring of Caspian terns and cormorants	Boat based and pedestrian monitoring and hazing as described in Chapter 1. Recreational use of the island. No other actions identified on Rice Island.	Corps disposal of dredged material on shoreline late summer or fall. Boat based and pedestrian monitoring and hazing as described in Chapter 1. No other actions identified on Miller Sands Spit

Reasonable Foreseeable Future Actions on the Lower Columbia River Estuary Islands

<i>East Sand Island</i>	<i>Rice Island</i>	<i>Miller Sands Spit</i>
In 2014 the Corps, BPA and Navy likely would conduct additional research and monitoring on Caspian terns and cormorants	Later in 2013 or 2014 the Corps would place dredged material on the northeast portion of Rice Island.	Annually the Corps would place dredged material on the shoreline of Miller Sands Spit. This placement typically erodes within a year. The material is contoured to establish mounds that make the habitat less suitable for terns. The lower portion of Miller Sands Spit is included in the Lewis and Clark National Wildlife Refuge. This area is considered a waterfowl sanctuary and is separated from the disposal areas by densely vegetated uplands. This area is open to the public but limited to boat access.

Cumulative Impacts to Resources

Caspian Terns- Terns are highly managed on East Sand Island. They prefer a particular habitat (bare sand, free of vegetation) for nesting, and this makes them less adaptable to the increasing human development and subsequent loss of habitat. A beneficial impact on the regional population in the long term can be gained through a dispersed network of colonies that can greater respond to changes in the environment, including natural disasters. While being managed for reduced numbers on East Sand, the Caspian tern regional population may experience declines as habitat is limited via increased hazing efforts, however the Corps annually maintains and prepares suitable habitat for the terns on the island.

Glaucous-winged/ Western Gulls (Hybrids)- These gulls are highly adaptable, and their numbers are increasing throughout the Pacific region. While there would be direct and adverse impacts from the proposed action, there is limited impact to the population as a whole. Impacts beyond what is identified in Section 3.2 are not expected to accumulate with any impacts from the reasonably foreseeable future actions identified above.

Other Birds-

Increased hazing on Rice Island and Miller Sands Spit could temporarily flush non-target birds with impacts to ring-billed gulls being impacted most directly because of their proximity to the potential suitable habitat for terns. These impacts will be temporary, expanding the current efforts by a few months. Future placement of dredged disposal material creates suitable habitat for streaked horned larks on Rice Island and Miller Sands Spit, given their current sensitive status, these impacts are largely beneficial. Cumulative impacts to the other birds are not expected to accumulate with any impacts from the reasonably foreseeable future actions identified above.

Columbia River Basin Juvenile Salmonids-

Presently, juvenile salmonids experience substantial pressure as they migrate through the lower Columbia River Estuary. These pressures include degraded habitat for rearing, lack of forage opportunities and predation from piscivorous birds and other fish. Throughout the lower Columbia River Estuary predation from avian predators is a concern of numerous resource managers. Efforts to study the effects of avian predators are ongoing and the Corps is currently developing long term solutions to reduce this type of predation throughout the Columbia River.

Appendix A: References

Literature Citation

Collis, K., D.D. Roby, D.P. Craig, S. Adamany, J. Adkins, and D.E. Lyons. 2002. Colony size and diet composition of piscivorous waterbirds on the lower Columbia River: Implications for losses of juvenile salmonids to avian predation. *Transactions of the American Fisheries Society* 131:537–550.

Cuthbert, F. J. 1988. Reproductive success and colony-site tenacity in Caspian terns. *Auk* 105: 339–344

Danchin, E., T. Boulinier and M. Massot. 1998. Con-specific reproductive success and breeding habitat selection: implications for the study of coloniality. *Ecology* 79: 2415-2428.

NOAA Fisheries 2008. Consultation on Remand for Operation of the Federal Columbia River Power System, 11 Bureau of Reclamation Projects in the Columbia Basin and ESA Section 10(a)(1)(A) Permit for Juvenile Fish Transportation Program (Revised and reissued pursuant to court order, *NWF v. NMFS*, Civ. No. CV 01-640-RE [D. Oregon]). National Marine Fisheries Service, Northwest Region 137 pages.

NOAA Fisheries. 2000. Reinitiation of Consultation on Operation of the Federal Columbia River Power System, Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin. National Marine Fisheries Service, Northwest Region.

Pearson, S.F., and B. Altman. 2005. Range-wide Streaked Horned Lark (*Eremophila alpestris strigata*) Assessment and Preliminary Conservation Strategy. Washington Department of Fish and Wildlife, Olympia, WA. 25pp.

Roby, D.D., K. Collis, D.E. Lyons, J.Y. Adkins, P. Loschl, Y. Suzuki, D. Battaglia, T. Marcella, T. Lawes, A. Peck-Richardson, L. Bayliss, L. Faulquier, D. Harvey, E. Tompkins, J. Tennyson, A. Evans, N. Hostetter, B. Cramer, and M. Hawbecker. 2013. Research, monitoring, and evaluation of avian predation on salmonid smolts in the Lower and Mid-Columbia River: Draft 2012 Annual Report. Bird Research Northwest. Available on-line at www.birdresearchnw.org.

Roby, D.D., K. Collis, D.E. Lyons, J.Y. Adkins, P. Loschl, Y. Suzuki, D. Battaglia, T. Marcella, T. Lawes, A. Peck-Richardson, L. Bayliss, L. Faulquier, D. Harvey, E. Tompkins, J. Tennyson, A. Evans, N. Hostetter, B. Cramer, and M. Hawbecker. 2012. Research, monitoring, and evaluation of avian predation on salmonid smolts in the Lower and Mid-Columbia River: Final 2011 Annual Report. Bird Research Northwest. Available on-line at www.birdresearchnw.org.

Roby, D.D., K. Collis, D.E. Lyons, J.Y. Adkins, P. Loschl, Y. Suzuki, D. Battaglia, T. Marcella, T. Lawes, A. Peck-Richardson, L. Bayliss, L. Faulquier, D. Harvey, E. Tompkins, J. Tennyson, A. Evans, N.

- Hostetter, B. Cramer, and M. Hawbecker. 2011. Research, monitoring, and evaluation of avian predation on salmonid smolts in the Lower and Mid-Columbia River: Final 2010 Annual Report. Bird Research Northwest. Available on-line at www.birdresearchnw.org.
- Roby, D.D., K. Collis, J.Y. Adkins, M. Correll, K. Courtot, B. Cramer, N. Hostetter, P. Loschl, D.E. Lyons, T. Marcella, Y. Suzuki, J. Tennyson, A. Evans, M. Hawbecker, J. Sheggeby, and S. Sebring. 2002. Research, Monitoring, and Evaluation of Avian Predation on Salmonid Smolts in the Lower and Mid-Columbia River: Final 2001 Annual Report. Bird Research Northwest. Available on-line at www.birdresearchnw.org.
- Strong, C. M., L. B. Spear, T. P. Ryan and R. E. Dakin. 2004. Forster's tern, Caspian tern, and California gull colonies in San Francisco Bay: Habitat use, numbers and trends, 1982-2003. *Waterbirds* 27: 411-423.
- Suryan RM, DP Craig, DD Roby, ND Chelgren, K Collis, WD Shuford, and D.E. Lyons. 2004. Redistribution and growth of the Caspian Tern population in the Pacific coast region of North America, 1981-2000. *The Condor* 106(4), 777-790.
- U.S. Army Corps of Engineers (Corps). 2006. Record of Decision Caspian tern Management to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary, Final Environmental Impact Statement
- U. S. Fish and Wildlife Service (USFWS). 2010. Lewis and Clark Comprehensive Conservation Plan and Environmental Impact Statement Wahkiakum County, Washington, and Clatsop and Columbia Counties, Oregon . Available online at <http://www.fws.gov/pacific/planning/main/docs/WA/jbh-lc/Final%20CCP%20EIS/LAC%20JBH%20Final%20CCPEIS.pdf>
- U. S. Fish and Wildlife Service (USFWS). 2005a. Caspian tern Management to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary, Final Environmental Impact Statement. Portland, OR.
- U.S. Fish and Wildlife Service (USFWS). 2005b. Regional Seabird Conservation Plan, Pacific Region. U.S. Fish and Wildlife Service, Migratory Birds and Habitat Programs, Pacific Region, Portland, OR.

Appendix B: Applicable Laws and Executive Orders

Law, Regulation, or Guideline	Description and Assessment of Compliance
<p>Migratory Bird Treaty Act of 1918 (MBTA), as amended, (16 U.S.C. 703-711)</p>	<p>The USFWS has the primary statutory authority to manage migratory bird populations in the United States.</p> <p>-The USFWS has final approval of the lethal removal of migratory birds. The Corps has coordinated with the USFWS on the proposed action</p>
<p>Endangered Species Act of 1973 (ESA), as amended (7 U.S.C. 136; 16 U.S.C. 460 et seq.)</p>	<p>It is federal policy, under the ESA, that all Federal agencies seek to conserve threatened and endangered species and utilize their authorities in furtherance of the purposes of the Act (Sec. 2[c]).</p> <p>-While numerous ESA listed salmonids species migrate past this area, there is no work being proposed that would affect a waterway or require in-water (below ordinary high) work. The proposed action will occur from a blind on an island. Transport will occur by boat to the island. The proposed action will have <i>no effect</i> to species listed under the ESA.</p>
<p>National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321-4347)</p>	<p>NEPA requires federal agencies to evaluate the potential environmental impacts of their actions.</p> <p>- This EA was prepared for compliance with NEPA.</p>
<p>Executive Order 13186 (EO), Responsibilities of Federal Agencies to Protect Migratory Birds</p>	<p>Directed federal agencies whose actions have a measurable negative impact on migratory bird populations to develop a Memorandum of Understanding (MOU) with the USFWS to promote conservation of migratory birds.</p> <p>The Department of Defense has executed an MOU with the USFWS (expires July 2013). The MOU is directed at conservation of migratory birds on DoD military lands, bases and installations. East Sand Island was transferred from the U.S. Army to the Civil Works Department of the Army Corps of Engineers, Portland District in 1954. The island is no longer considered military land and is not used for</p>

Law, Regulation, or Guideline	Description and Assessment of Compliance
	military purposes; therefore the MOU's conditions do not apply to activities on East Sand Island.
Coastal Zone Management Act (CZMA) of 1972, as amended (16 U.S.C. 1451-1464)	Protects environmental quality of coastal areas. -Section 304(a) of the CZMA excluded federal lands from the coastal zone. East Sand Island is federal land and there will be no off federal lands effects to a coastal resource from the proposed action.
National Historic Preservation Act (NHPA) of 1966	Requires the effects of a "federal undertaking" to be assessed for their potential to affect historic properties on, or eligible for listing on the National Register of Historic Places, and to consult with the State Historic Preservation Officer when warranted -Corps archaeologist determined that East Sand Island has formed from dredged materials over the past 30 years, and as such, the action has no possibility of impacting historic properties.
Executive Order 12898 (EO), Federal Actions to Address Environmental Justice in Minority and Low-Income Populations, 11 February 1994	The purpose of the order is to avoid disproportionately high or adverse environmental or economic impact on minority or low-income populations. All NEPA environmental analyses must include an evaluation of effects on these communities. No subsistence, low-income or minority communities will be affected by the proposed action as none currently access East Sand Island. The proposed action will not cause disproportionately high and adverse effects on any minority or low-income populations and is compliant with the Executive Order.
Executive Order 13175, Consultation and Coordination with Indian Tribal Governments	Provides a mechanism for establishing regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications. Consultation with tribal governments is ongoing.