



US Army Corps
of Engineers®
Portland District

PUBLIC NOTICE

DRAFT ENVIRONMENTAL ASSESSMENT

Double-crested Cormorant Dissuasion Research on East Sand Island in the Columbia River Estuary Clatsop County, Oregon

CENWP-PM-E-12-01

Issue Date: February 02, 2012

Expiration Date: March 03, 2012

30-Day Notice

Interested parties are hereby notified that the U.S. Army Corps of Engineers, Portland District (CENWP), proposes to construct an eight foot tall privacy fence and utilize human presence as a means to dissuade double-crested cormorants (*Phalacrocorax auritus*, DCCO) from nesting on a portion of East Sand Island (ESI) near the mouth of the Columbia River, which is described in the draft Environmental Assessment (EA) title *Double-crested Cormorant Dissuasion Research on East Sand Island in the Columbia River Estuary*. In addition, the draft EA addresses continuation of ongoing diet and fish consumption studies of the large DCCO colony at ESI.

The purpose of the proposed action is to study a specific technique to dissuade DCCOs from nesting on a portion of East Sand Island and determine if these methods can be used as a potential relocation strategy for a portion of the large DCCO colony on ESI. The research results will help formulate long term solutions for reducing consumption of juvenile salmonids by DCCO in the Columbia River estuary (CRE)

A management plan is currently being written by a multi-agency working group to help guide the CENWP in developing effective alternatives to reduce salmonid consumption by the double-crested cormorant colony at East Sand Island. The proposed actions of this draft EA are needed to better refine alternatives of the double-crested cormorant management plan and to provide information that might be useful to the adaptive management plan, a secondary, important outcome of the cormorant management plan.

In accord with the Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) regulations [Federal Register, 40 C.F.R. 1508.9(a)], an EA is prepared by a federal agency when a proposed action is not covered by a categorical exclusion or otherwise exempt from NEPA. Federal agencies use an EA to determine whether the proposed action has the potential to cause significant environmental effects.

Completion of this EA will involve consideration of all public comments. Upon completion of the EA, the Corps will determine if a decision can be made under a finding of no significance (FONSI) and thereby conclude the NEPA process.

Environmental Documents: The draft EA addressing the impacts associated with the activity can be viewed on the Web at <http://www.nwp.usace.army.mil/environment/home.asp> and is also listed on our main page at <http://www.nwp.usace.army.mil> under "new public notices."

Additional Information and Comments: Questions or comments regarding the enclosed document can be directed to Paul Schmidt, Environmental Resources Branch, (503) 808-4772, or via e-mail at paul.a.schmidt@usace.army.mil or at the address below. Mailed comments on this notice must be postmarked by the above closing date and sent to:

District Engineer
U.S. Army Corps of Engineer District, Portland
Attn: CENWP-PM-E/Paul Schmidt
P.O. Box 2946
Portland, Oregon 97208-2946

In your response, please refer to the above public notice number, title and date.

Should no response be received postmarked by the above closing date, a "no comment" response will be assumed.

**Draft Environmental Assessment
Double-crested Cormorant Dissuasion Research on East Sand
Island in the Columbia River Estuary
Clatsop County, Oregon**



**Project Number CENWP-PM-E-12-01
February 2012**



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ACRONYMS

BO.....	Biological Opinion
BPA.....	Bonneville Power Administration
CRE.....	Columbia River estuary
DCCO.....	Double-crested cormorant
EA.....	Environmental Assessment
ESA.....	Endangered Species Act
EIS.....	Environmental Impact Statement
FEIS.....	Final Environmental Impact Statement
FONSI.....	Finding of No Significant Impact
NEPA.....	National Environmental Policy Act
NMFS.....	NOAA's National Marine Fisheries Service
OSU.....	Oregon State University
ROD.....	Record of Decision
USACE.....	United States Army Corps of Engineers
USFWS.....	United States Fish and Wildlife Service

1.0 PROPOSED PROJECT

1.1 Purpose and Need for Proposed Action

This draft Environmental Assessment (EA) addresses a proposal for constructing an eight foot tall privacy fence and utilizing human presence as a means to dissuade double-crested cormorants (*Phalacrocorax auritus*; DCCO) from nesting on a portion of East Sand Island (ESI) near the mouth of the Columbia River (See figure 1.1). In addition, this draft EA addresses continuation of ongoing diet and fish consumption studies of the large double-crested cormorant colony at ESI.

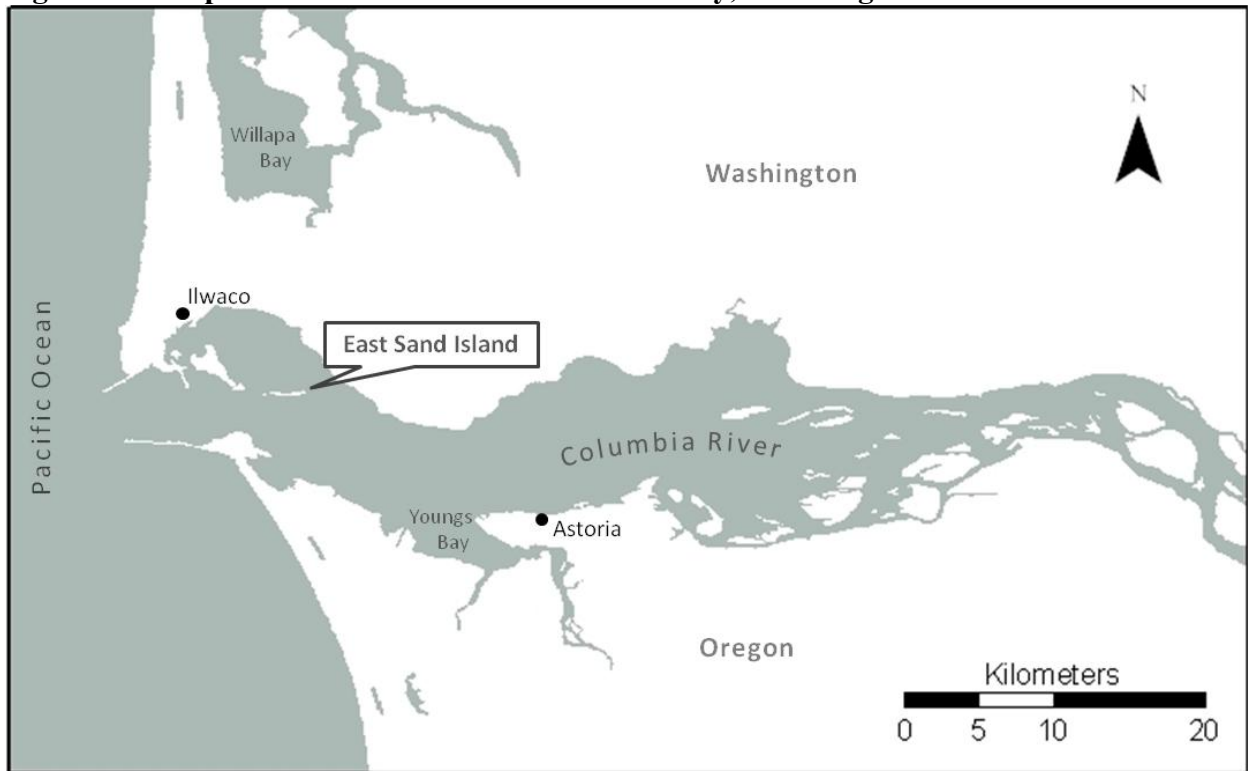
The purpose of the proposed action is to study a specific technique to dissuade DCCO from nesting on a portion of East Sand Island, and determine if these methods can be used as a potential relocation strategy for a portion of the large DCCO colony on ESI. The research results will help formulate long term solutions for reducing consumption of juvenile salmonids by DCCO in the Columbia River estuary (CRE). In 2011, the DCCO colony at East Sand Island consumed 22.6 million out-migrating juvenile salmonids (BRNW unpubl. data). Thirteen Endangered Species Act (ESA) listed salmonid Evolutionary Significant Unit (ESUs) or Distinct Population Segments (DPSs) are included in the fish that may be consumed by DCCO nesting on ESI.

A management plan is currently being written by a multi-agency working group to help guide the Portland District, Army Corps of Engineers (USACE) in developing effective alternatives to reduce salmonid consumption by the DCCO colony at East Sand Island. The draft management plan titled *Double-crested Cormorant Management to Reduce Predation on Juvenile Salmonids in the Columbia River Estuary*, is expected to be available for public review by May 2012. The plan is necessary to comply with the 2008 Federal Columbia River Power System (FCRPS) Biological Opinion (BiOp; NOAA Fisheries 2008), the Reasonable and Prudent Alternatives (RPAs) included in the 2008 BiOp, and the 2010 FCRPS Supplemental BiOp (NOAA Fisheries 2010) to facilitate achievement of adult escapement goals identified for ESA-listed salmonids in the Columbia Basin. Three RPAs pertinent to the draft management plan are included in the 2008 BiOp and are to be implemented through 2018 with Comprehensive Evaluation Reports completed in 2013 and 2016 for all three RPAs.

- RPA 38 requires the development and implementation of a piling and pile dike removal program to increase access to productive habitat for and to reduce avian predation on juvenile salmonids
- RPA 47 requires the development of a management plan for double-crested cormorants in the Columbia River estuary and implementation of warranted actions in the estuary
- RPA 67 requires that the double-crested cormorant population in the Columbia River estuary and its impact on outmigrating juvenile salmonids will be monitored and a management plan will be developed and implemented to decrease predation rates, if warranted

The proposed actions of this draft EA are needed to better refine alternatives of the double-crested cormorant management plan and to provide information that might be useful to the adaptive management plan, a secondary, important outcome of the cormorant management plan. In addition, evaluation of diet and consumption of DCCOs at East Sand Island is necessary to comply with RPA 67 as stated above.

Figure 1.1. Map of the lower Columbia River estuary, including East Sand Island



1.2 Project Authority

The proposed action is authorized under Section 906(b)(1) of the Water Resources Development Act of 1986. This document is in compliance with the National Environmental Policy Act (NEPA) (40 CFR part 1500-1508, November 29, 1978) as amended on May 27, 1986 (40 CFR part 1502).

1.3 Agency Cooperation

The proposed project has been coordinated between the USACE, Portland District, Bonneville Power Administration (BPA), the United States Fish and Wildlife Service (USFWS), Region 1, the Oregon Department of Fish and Wildlife (ODFW), and the Washington Department of Fish and Wildlife to investigate solutions for future management of double-crested cormorants in the Columbia River Estuary.

1.4 Background Information and Proposed Project Description

A recent status assessment of double-crested cormorants in western North America (Adkins and Roby 2010) was completed; this document defined the Western Population of double-crested cormorants as extending along the Pacific Coast from southern British Columbia to the U.S.-Mexico border, and from the Pacific Coast eastward to the Continental Divide and includes cormorants nesting in the Columbia River estuary.

The breeding distribution of the Western Population of double-crested cormorants has changed dramatically over the past 50 years, with increases at some known colonies and formation of many new colonies concurrent with declines in other areas; the largest increase has been on East Sand Island in the Columbia River estuary, where the number of breeding pairs increased by 1,400% between 1989 and 2007.

Double-crested cormorants were first documented to nest on East Sand Island in the Columbia River estuary in 1989. Since then, their numbers have increased from less than 100 breeding pairs to a peak of 13,770 pairs in 2007, the largest recorded cormorant colony in the Western Population and possibly all of North America (Adkins and Roby 2010).

Columbia Basin fisheries managers have raised concerns over the potential impact of predation from the large number of double-crested cormorants nesting in the Columbia River estuary on survival of juvenile salmonids. From 2000 to 2010, double-crested cormorants on East Sand Island ate an average of 8.2 million juvenile salmonids per year, including ESA-listed salmonids (Collis et al. 2002a, 2002b, 2003, 2005, 2006, 2007, and 2009, Roby et al. 2004, 2008, 2010, and 2011). During this time period, the number of juvenile salmonids consumed annually by cormorants at East Sand Island was highest in 2010 (19.2 million; Roby et al 2010) and was lowest in 2005 (2.4 million). In 2011, 22.6 million juvenile salmonids were consumed by DCCOs at ESI, the highest consumption estimate to date (BRNW, unpubl. data).

In 2008, the USACE contracted Oregon State University to conduct pilot studies to investigate methods to deter or dissuade double-crested cormorants from small test plots on ESI. Methods tested to date include; flashing green lasers at the birds during low light hours, placement of pond liner on portions of their nesting habitat, and using human presence in short intervals (popping up from tunnels) to flush birds off the potential nesting sites.

The green laser experiments were effective initially at dissuading DCCOs, but the birds habituated to the lights and the method quickly became ineffective. Disturbances ceased as soon as evidence of egg-laying was detected in the immediate area. The pond liner experiments conducted in 2009 and 2010 showed promise as a method to treat the habitat in a manner that would dissuade DCCO from nesting. The DCCO avoided the pond liner material for nesting and only minimally used the material for temporary loafing. A small plot of pond liner was used in 2009 and a larger experiment was deployed in 2010 (See Figures 1.2 and 1.3)

Figure 1.2 Pond liner deterrence deployed in 2009



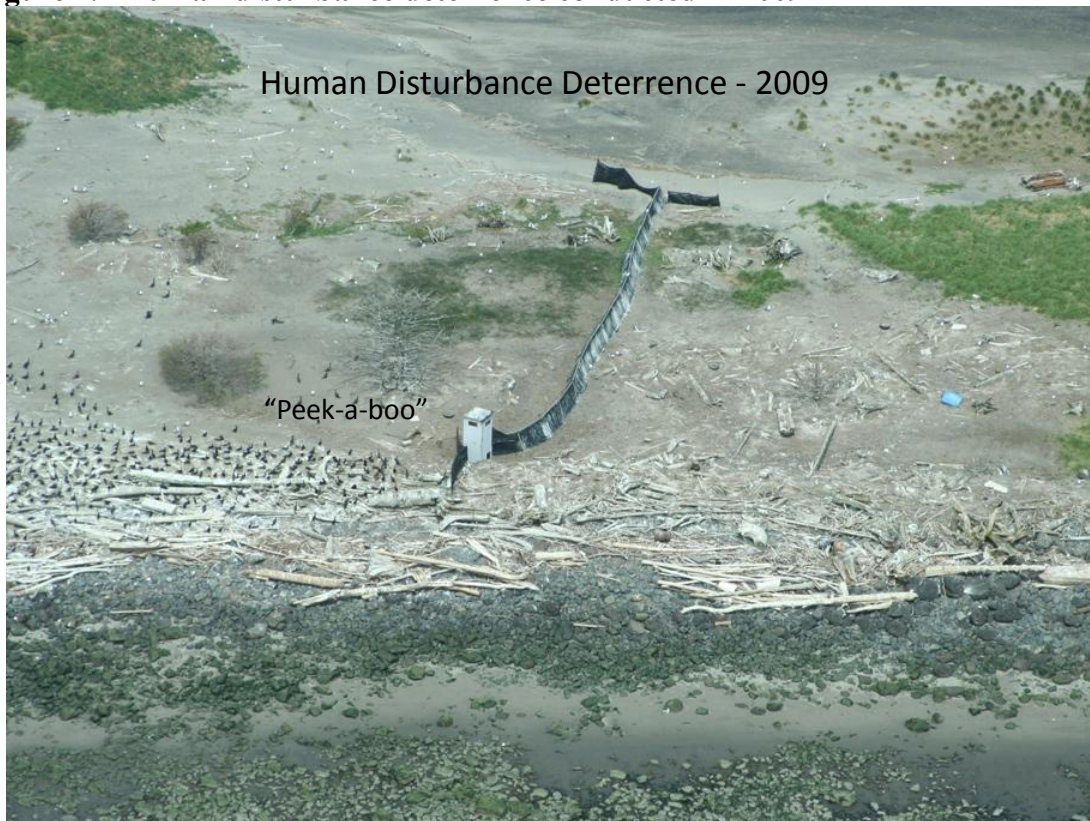
Figure 1.3 Pond liner deterrence deployed in 2009 and 2010



There are several issues related to large scale deployment of pond liner. A combination of high cost and difficulty of deployment are a problem with this method. Logistically, the most important consideration is the weight of the pond liner. With one roll weighing over 100 kilograms, the logistics of transport and installation are difficult. Additionally, due to the harsh environment on East Sand Island, the pond liner must be removed at the conclusion of the breeding season, thus adding to transport difficulties. Before any increase in the use of pond liner for dissuasion of nesting cormorants on East Sand Island is implemented, transportation capabilities must be enhanced and improved.

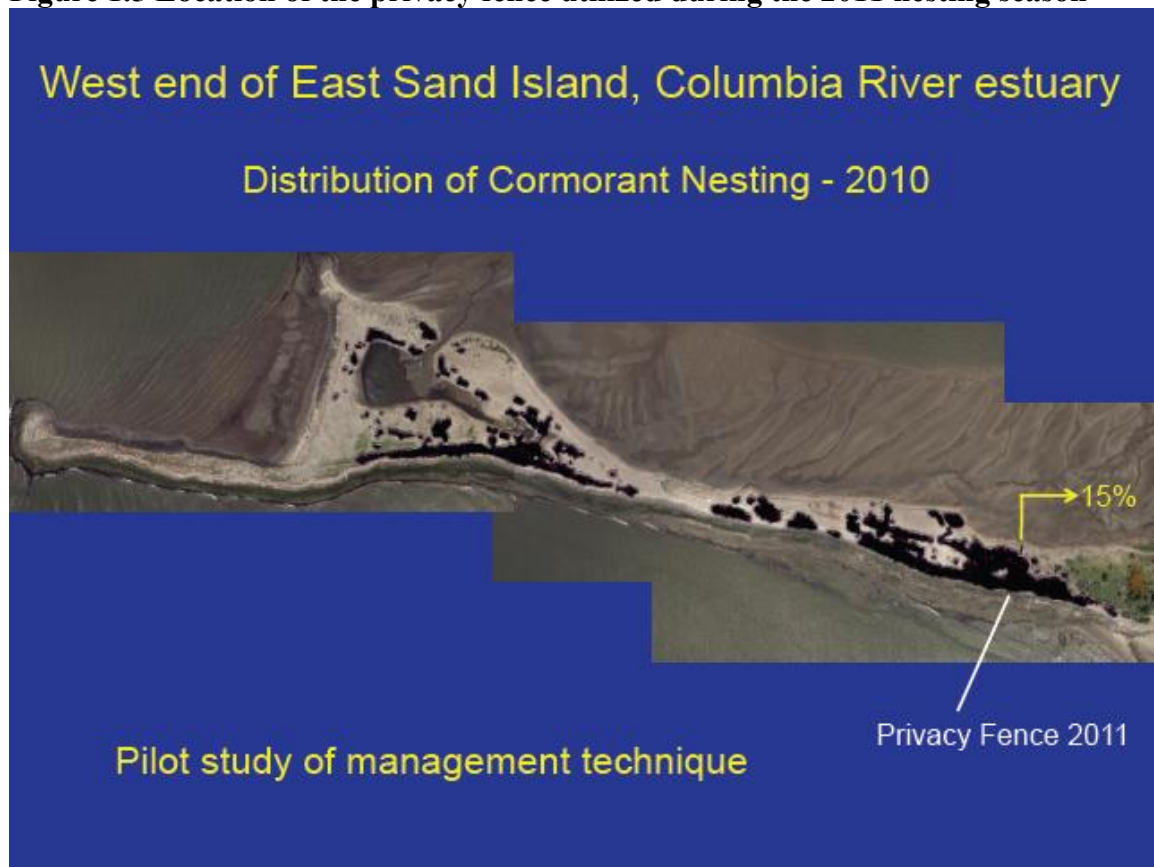
The third method tested to deter or dissuade DCCOs from nesting on a portion of ESI involved the elaborate construction of tunnels and blinds and used human disturbance to flush birds from a small area (See Figure 1.4). This method was used intermittently prior to egg-laying to deter birds from nesting near the tunnels and blinds and affected about 7% of the area used for nesting during the 2008 nesting season. In an attempt to keep birds from nesting in the dissuasion area, protocols were altered to focus on techniques that were determined to be most effective. Over the course of the study, the daily frequency and temporal intensity of the disturbances increased in response to the cormorants' apparent habituation to the methods of dissuasion. Disturbances ceased as soon as evidence of egg-laying was detected in the targeted dissuasion area.

Figure 1.4 Human disturbance deterrence conducted in 2009



Using the concept from the “Peek-a-boo” or human disturbance method, a similar method with new design criteria, over a larger area, was tested during the 2011 nesting season. This new method involved construction of an eight foot tall privacy fence, located on the eastern end of the nesting area as determined from the 2010 nesting season. The fence was constructed at the point in which 15% or ca. 2000 pairs of DCCOs nested in 2010 (See figure 1.5).

Figure 1.5 Location of the privacy fence utilized during the 2011 nesting season



The privacy fence and base camp were constructed in March 2011 (See figure 1.6). DCCOs were allowed to roost on the area east of the fence immediately after construction. As DCCOs became acclimated to the fence, a capture plan was set forth to catch DCCOs at night with hand nets and attach short range VHF radio tags to 60 individual birds. All 60 radios were deployed in four nights of capture. The radio marked birds were tracked during the nesting season to determine if they relocated to another part of ESI or left the island. Following capture and radio deployment, human disturbance was used to dissuade DCCOs from roosting and nesting in the area east of the privacy fence. Over the course of the study, the daily frequency and temporal intensity of the disturbances increased in response to the apparent habituation of the cormorants to the methods of dissuasion. Results of this experiment are still being synthesized into the 2011 annual report (BRNW, in prep), but initial results determined that most of the radio marked birds stayed on ESI but relocated west of the privacy fence. Many relocated very close to the fence.

Figure 1.6. Photo depicting the proposed dissuasion arrangement (privacy fence and dissuasion camp) at the double-crested cormorant colony on East Sand Island. Note the presence of double-crested cormorants to the left (west) of the fence and the absence of cormorants to the right (east).



The results of the 2011 dissuasion research provided valuable insight and credence to using human presence as means to dissuade DCCO from a portion of their habitat. These methods are likely to be utilized in future management actions to reduce consumption of salmonids of DCCO at East Sand Island. To further enhance our knowledge about how well human dissuasion methods work, the proposed action in this EA will test the method over a larger area.

The proposed action entails relocation of the privacy fence west of the 2011 location and placement at a natural isthmus of the western portion of ESI (See figure 1.7). Radio telemetry studies would be conducted in conjunction with human dissuasion on the area east of the privacy fence. Diet and consumption studies would be conducted to determine consumption of salmonids by the East Sand Island DCCO colony.

1.5 Proposed Project Location

East Sand Island is located in the Columbia River at about River Mile 5, in Clatsop County, Oregon, and is approximately one-half mile from the boat basin (Chinook harbor) in Chinook, Washington. East Sand Island is federally owned lands administered by the USACE, Portland District. The proposed project would be located on the west end of the island as depicted in Figure 1.5.

2.0 SCOPE OF ANALYSIS

The scope of analysis under NEPA will consider direct, indirect, and cumulative environmental factors occurring within the project footprint, direct effects to double-crested cormorants, and indirect effects that may occur later in time and/or further removed from the project area. Actions within the scope of analysis include the construction of the privacy fence, the use of human presence to dissuade cormorants east of the fence, capture of double-crested cormorants to place VHF and satellite radio tags on individual birds, collection of cormorants for diet and consumption studies, and monitoring of individual birds and the colony at East Sand Island. The geographical scope of analysis includes East Sand Island, and the Columbia River estuary. Radio marked birds may be monitored outside of the Columbia River estuary if dissuasion causes individual birds to leave the estuary.

3.0 PROPOSED ACTION

To accomplish the stated purpose and need, USACE proposes to construct a visual barrier (fence) on the East Sand Island double-crested cormorant breeding colony and, in combination with dissuasion measures (i.e., targeted human disturbance), preclude cormorants from nesting in a specific area of the colony.

Additionally, prior to the onset of dissuasion measures, 162 adult cormorants would be captured from the dissuasion area and outfitted either with high-power VHF radio telemetry tags or a satellite telemetry tags in order to track some of the individuals displaced from the East Sand Island colony to new areas of use. These individuals would also be marked with field-readable alphanumeric leg bands.

Diet and consumption studies would continue with the objective of quantifying the level of predation by DCCOs nesting on ESI on juvenile salmonids. In order to estimate how many salmonids are consumed by these birds, precise estimates of diet composition are needed. In order to appropriately quantify diet composition, up to 180 adult cormorants would be lethally collected to obtain stomach contents, which can be analyzed to determine precise diet composition.

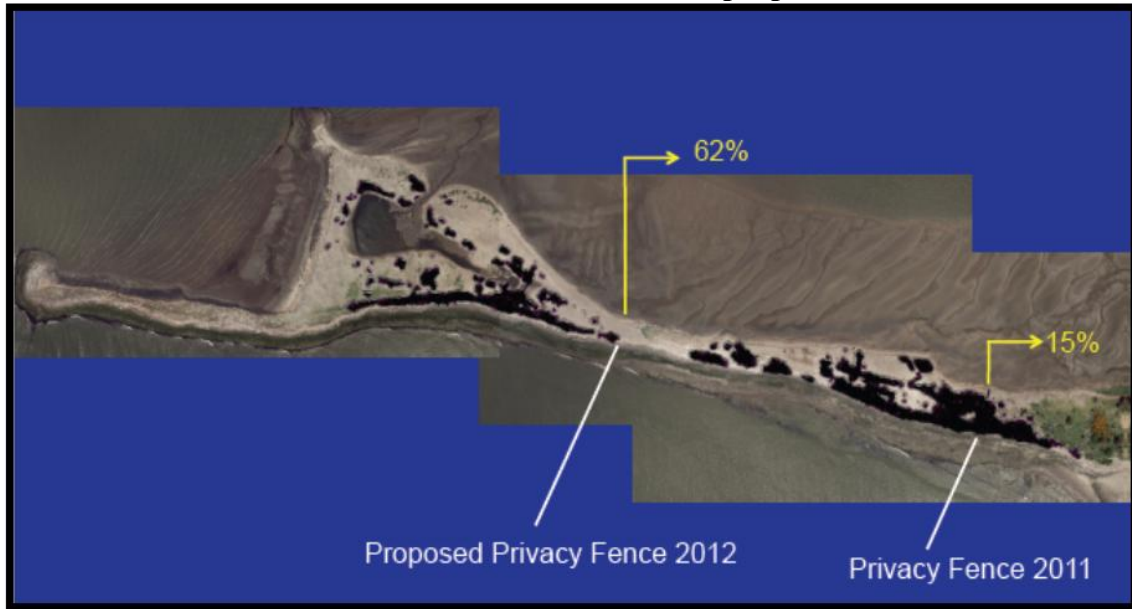
3.1 Timing of Project

Fence construction and the dissuasion camp installation is proposed to begin in March 2012 and be completed by April 1, 2012, prior to the onset of the cormorant breeding season. Cormorant capture will occur throughout April with dissuasion of cormorants east of the privacy fence starting immediately following deployment of radios. Dissuasion will continue until cormorants no longer show nesting behavior on the east side of the privacy fence. The privacy fence will be dismantled in September following all cormorant fledging. Diet collections can occur from April 15 to July 31. Colony monitoring occurs from April to September yearly.

3.2 Dissuasion Area Construction

A privacy fence will be constructed prior to the cormorant breeding season that will act as a visual barrier to separate the easternmost 62% of the 2010 nesting area (ca. 8400 nests) from the remaining core colony area (Figure 3.1).

Figure 3.1 Privacy fence proposed at the 62% isthmus of west end of East Sand Island, dissuasion of DCCOs would occur east of the proposed fence.



The visual barrier will be an eight-foot tall chain link fence with vinyl privacy strips to reduce visibility, but allow flexibility in the wind (Figure 3.2). The fence will be positioned at a narrow isthmus of the island (Figure 3.1) and will be approximately 80 feet long. Fence posts will be sunk in concrete approximately 3 feet into the substrate.

Construction of the fence will be done in a manner similar to fence construction in 2011. Fence construction materials (cement, fence posts, rails, privacy chain link fabric) would be delivered to the west end of East Sand Island by barge, tractor, and ATV. Holes for the fence posts and cement would be dug by breaking up the substrate (rock underlying sand) with a jackhammer and removing the material with a tractor-mounted auger. Fence posts would be placed in the cement footings poured into the holes. Once the cement is dry and the fence posts secure the rails and chain link would be attached to the fence posts. Final construction plans and methods will be supplied to the USACE by the selected contractor in March 2012.

Figure 3.2. Detail of privacy fence construction



Temporary structures would be installed east of the fence to house the dissuasion personnel (hazers) and to accommodate DCCO capture activities in the dissuasion area. The dissuasion camp would be configured similarly to that depicted in Figure 1.6. Above-ground tunnels may also be built in order to access the dissuasion area with minimal disturbance to cormorants nesting west of the fence. Above-ground tunnels, if built, would consist of approximately three-foot tall wooden A-frames enclosed in silt fence, and placed on sand.

3.3 Maintenance Methods

Minimal maintenance of the fence is expected in-season. Vinyl privacy strips may need to be replaced due to damage from wind and weather and could be completed from the east side of the fence with minimal disturbance to birds nesting to the west of the fence.

3.4 Capture, Tagging and Dissuasion Activities

Once the fence and dissuasion camp are in place, hazers would be present on the east side of the fence from early April through mid-June (when cormorant nest initiation has concluded in the Columbia River estuary).

3.4.1 Cormorant Capture and Tagging in Dissuasion Area

Prior to the onset of regular hazing activities, contracted personnel would capture roosting cormorants in the dissuasion area for tagging and marking studies. During this period cormorants would be allowed to roost east of the fence during the day to facilitate nighttime capture. Capture would consist of using spotlights to disorient cormorants and dipnets to secure one or more birds at a time (Anderson et al. 2004). If possible, the goal would be to capture and tag individuals that are more likely to leave East Sand Island (e.g., cormorants attempting to nest at the east end of the dissuasion area that would have to move the farthest to nest in the undisturbed portion of the colony).

High-power VHF radio telemetry tags would be attached to 150 adult cormorants and satellite telemetry tags would be attached to 12 other adult cormorants. The VHF tags weigh 11 g (<1% of body mass) and would be attached to the central tail feathers of cormorants using glue and zip-ties (Anderson et al. 2004). Satellite telemetry tags weigh 50g (<3% of body mass) and would be attached using a backpack harness configuration (Courtot et al. in press). All captured cormorants would be marked with field-readable alphanumeric leg bands as well as USGS-Bird Banding Lab metal bands. Any cormorants captured beyond the 162 for tagging purposes would be banded and released. All captured birds will be released at East Sand Island following processing.

3.4.2 Dissuasion and Monitoring

Once cormorant capture, tagging, and banding are complete, hazers would dissuade cormorants that display pre-laying breeding behavior on the east side of the fence using targeted human disturbance. Other hazing methods (e.g., eagle effigies, human or canine mannequins) may be employed if necessary.

Hazers would monitor the response of pre-laying double-crested cormorants to human disturbance; and track hazed pre-laying cormorants using standard radio telemetry techniques to monitor whether hazed individuals (1) relocate to an undisturbed portion of the ESI colony and nest there, (2) relocate to an undisturbed portion of the ESI colony but do not nest, or (3) leave the area. Hazers would monitor the efficacy of their dissuasion activities and would maintain a log of all observations, even when dissuasion is not warranted. During each observation, hazers would scan all birds present for any combination of leg bands and/or radio tag frequencies. Hazers would also monitor non-target species (Brandt's cormorants, gulls, California brown pelicans) for potential impacts from DCCO dissuasion.

The visual barrier method of dissuasion would allow for an adaptive response or scaling back of the pilot study if warranted. Contract researchers would provide in-season weekly updates on the effects of dissuasion on cormorants at ESI to resource managers and other interested parties. If unacceptably large numbers of DCCOs quit using ESI and attempt to relocate to undesirable locations (e.g., Rice Island or other upper estuary sites), as determined by resource managers, then dissuasion activities at ESI can be terminated so that DCCOs might return to nest there.

3.5 Diet and Consumption Studies

As in previous years, adult DCCOs would be lethally collected at ESI for stomach content analysis. An average of 143 adult cormorants per year were collected for diet and consumption studies during 1997-2011 (range: 88 to 205 individuals per year; BRNW, unpubl. data). Annual diet studies are necessary because of large year-to-year variations in cormorant diet. Juvenile salmonids have made up quite a variable proportion of the East Sand Island cormorant diet (2-28% by biomass), resulting in large swings in consumption of salmonid smolts (bioenergetically estimated smolt consumption ranged from 1.0 – 23 million smolts per year during 1998-2011). Factors such as climate-induced changes in ocean conditions and Columbia River flows appear to greatly influence the availability of marine forage fish and other alternative prey for cormorants, resulting in a dependency on salmonids that is difficult to predict.

Lethal collection for the purposes of diet collection is designed, for each sampling situation, to both identify all major prey types included in the diet and to allow statistically valid comparisons of diet between sampling situations (i.e., predator populations). The contract researchers have standardized sample size of 40 for each sampling situation. After the Monte Carlo simulation analysis of Trites and Joy (2005), and assuming a linear probability of occurrence distribution, this provides an ability to detect prey items in at least one sample with 95% confidence for all prey types with at least a 5-10% probability of occurrence. This also provides an adequate sample size to detect differences between two sampling situations, using standard contingency table analysis and assuming a diet of 8-10 or more prey species (typical for the predators we study), with an effect size of 0.3 (“moderate” sized differences; Cohen 1977), a type I error rate (α) of 0.05, and statistical power ($1 - \beta$) of 0.80 (values typically used in wildlife diet composition studies; Trites and Joy 2005). The goal is to identify all major cormorant prey types and estimate prey consumption by DCCOs (particularly juvenile salmonids). Researchers intend to make inter-annual comparisons between diet and prey consumption but also comparisons between four distinct sampling periods within the annual cycle: (1) early salmonid outmigration, (2) peak salmonid outmigration, (3) late salmonid outmigration, and (4) post salmonid outmigration. Each of these sampling periods stretch over approximately 4-5 weeks and dramatic changes between periods in salmonid species composition and abundance and also large differences in the availability of marine prey species such as anchovy and herring have been observed. Within each of these time periods, sampling would be spread across multiple weeks to better represent the diet for the entire period. Researchers propose to use their conventional sampling for one population ($n = 40$) for each time period, plus a buffer ($n = 5$) for each time period, for a potential maximum collection of $n = 180$ cormorants.

Double-crested cormorants would be collected by professional shooters under the supervision of senior project personnel in the field. Shooters would use a 12 gauge shotgun and, with the assistance of project personnel, would target DCCOs returning to the breeding colony on ESI. Cormorants would be collected from a boat over water near the island but at a sufficient distance to avoid disturbance to birds nesting or roosting on the island. Within 30 minutes of being shot, the collected cormorant would be delivered

to field personnel on ESI whereupon birds would be dissected and stomach contents removed and placed on ice. Collection by shotgun is considered “conditionally acceptable” by the American Veterinary Medical Association’s (AVMA) “Guidelines for Euthanasia” (June 2007). For diet sampling that requires stomach contents collected across the breeding season, collection using shotguns is used because other methods (e.g., live capture and gastric lavage) cannot be used to attain the required sample sizes. A 12 gauge shotgun is the most effective weapon for collection of waterfowl in the size range of adult double-crested cormorants.

4.0 ALTERNATIVES

4.1 No Action Alternative

Under the No Action Alternative no privacy fence would be constructed and cormorants would not be dissuaded from any portion of East Sand Island. Thus, no effects to the physical or biological environment are expected. Nesting success by double-crested cormorants would depend on natural environmental conditions and disturbance. Monitoring of the cormorant colony would still occur under this alternative, which includes colony size estimates for DCCO and Brandt's cormorants (i.e., numbers of nests or breeding pairs), productivity estimates, disturbance/predator observations, and band resighting. However, it would not meet the stated purpose and need to research dissuasion methods needed to formulate long term management strategies.

4.2 Diet and Consumption Only Alternative

This alternative would focus studies on diet and forage consumption of double-crested cormorants at East Sand Island. No privacy fence would be constructed and cormorants would not be dissuaded from any portion of East Sand Island. Diet and consumption studies would continue as described in the proposed alternative, and as required by RPA 67 described above, will help to determine the impact of DCCOs on outmigrating juvenile salmonids in the Columbia River estuary. Monitoring of the cormorant colony would still occur under this alternative, which includes colony size estimates for DCCO and Brandt's cormorants (i.e., numbers of nests or breeding pairs), productivity estimates, disturbance/predator observations, and band resighting. This alternative would only meet part of the stated purpose and need, and would not provide information about dissuasion methods needed to formulate long term management strategies.

5.0 IMPACT ASSESSMENT

Potential impacts of the proposed alternative are assessed in relation to the No-Action Alternative and include considerations of the privacy fence and dissuasion camp construction, capture and handling of cormorants, and dissuasion methods to discourage cormorants from nesting on habitat east of the privacy fence. Also considered are potential impacts from the diet and consumption studies on double-crested cormorants at ESI.

Potential Impacts

Water

Sand placed on East Sand island from past dredging activities is the only substrate affected by installation of the privacy fence. Concrete will be placed in small holes dug into the sand about one foot wide and three feet deep, but occur above the normal high water, and would not be deep enough to reach the top of the water column. Therefore no impacts to water resources or substrate in the water are expected from the proposed action.

- Substrate: N/A**
- Quality - temperature, salinity patterns and other parameters: N/A**
- Turbidity, suspended particulates: N/A**
- Currents, circulation or drainage patterns: N/A**
- Flood control functions: N/A**
- Storm, wave and erosion buffers: N/A**
- Erosion and accretion patterns: N/A**
- Aquifer recharge: N/A**
- Base flow: N/A**
- Water supplies, conservation: N/A**

Aquatic Habitat

- Geomorphology: N/A**
- Vegetation: N/A**
- Organisms: N/A**

Fish

Endangered or Threatened Species:

Consumption of juvenile salmonids by East Sand Island DCCOs has been well documented. From 2000 to 2010, double-crested cormorants on East Sand Island ate an average of 8.2 million juvenile salmonids a year (the annual estimates ranged from 2.4 to 22.6 million), including ESA-listed salmonids (Collis et al. 2002a, 2002b, 2003, 2005, 2006, 2007, and 2009, Roby et al. 2004, 2008, 2010, and 2011). During this time period, the number of juvenile salmonids consumed annually by cormorants at East Sand Island was highest in 2010 (19.2 million) and was lowest in 2005 (2.4 million). The full list of ESA-listed resident and migratory fish that occur within the foraging range of the DCCO colony at East Sand Island is attached as Appendix C.

It is difficult to predict how many DCCO might be displaced from East Sand Island due to the hazing activities in the dissuasion area proposed for the 2012 nesting season. It is

expected that many DCCO would remain on ESI but would relocate to the area west of the dissuasion fence where no hazing is planned.

Predicting how proposed actions will have an effect on consumption of ESA-listed fish is even more challenging than predicting where DCCOs will relocate. There are many variables that determine consumption for any given year including, but not limited to, timing of out-migrating juvenile salmonids, availability of marine forage fish, river and ocean condition, disturbance to the DCCO colony and nesting success.

It is possible that some DCCOs may forgo nesting as a result of the dissuasion experiment at ESI or would relocate to another part of the CRE. Diet studies of DCCO colonies at channel markers upstream of East Sand Island have generally shown a higher proportion of salmonids in the diet compared to the diet of DCCOs at ESI. Available habitat at the channel marker colonies is limited and would not allow for a significant increase in the number of DCCO breeding pairs at the colonies. Relocation of some DCCO to nest on the channel markers likely would not significantly change overall consumption rates of DCCO using the CRE.

The proposed dissuasion project is not expected to cause a disproportionate change in predation rates, but rather would be consistent with consumption rates that would result from natural factors during the 2012 season. For the reasons stated above, unless an unexpectedly large proportion of DCCO leave the CRE, it is predicted that consumption of ESA-listed fish would not differ from normal or natural predation rates for the season as a result of the proposed action.

Other Fish

For similar reasons stated above regarding ESA-listed fish, marine forage fish (e.g., northern anchovy, sardine and herring) and other fish of management concern (e.g. sea run cutthroat trout) by DCCOs during the 2012 breeding season would not be expected to differ from normal or natural predation rates as a result of the proposed action. A reduction in overall consumption of fish would only be realized if a significant proportion of DCCOs relocate outside of the Columbia River estuary.

Wildlife

A variety of breeding seabirds and waterbirds overlap with the double-crested cormorant colony at ESI. Glaucous-winged/western gulls, Caspian terns, Brandt's cormorants, ring-billed gulls and California brown pelicans are known to frequent the island. A variety of songbirds also use the vegetated habitat on the upland areas. Few mammals are known to use ESI, where avian species dominate.

Avian Species.

Double-crested Cormorants

Construction of the privacy fence and dissuasion camp:

These activities are expected to have minimal impacts on DCCO at ESI, as these efforts are expected to conclude prior to the initiation of breeding activity at the DCCO colony.

Cormorant Adult Banding and Tagging:

Double-crested cormorant adults will be captured at night using spotlights to disorient cormorants and dipnets to secure one or more birds at a time (Anderson et al. 2004). Individuals will be processed immediately following capture; when multiple individuals are captured those waiting processing will be briefly held in pheasant crates or pet carriers. All individuals will be leg banded with a numbered federal band and a plastic leg band with a unique alphanumeric code. All cormorants captured will be released at the capture site.

Prior to radio or satellite marking birds, a brief physical examination will be performed on each animal to ensure there are not any clinically apparent problems. Birds that are not in good health will not be marked. Prior to the attachment of the radio or satellite tag, the bird will be weighed to ensure that the tag and all attachment material will weigh less than 3% of the bird's body weight.

The radio tags are cylindrical and are 11 mm x 36 mm with a 4 inch flexible antenna and weigh 7 g. Adult DCCOs will be fitted with radio transmitters using a tail-mount attachment. Tags will be attached to tail feathers of adult terns using a cable tie and a small amount of glue. This mount is the same as that used for VHF tags on cormorants at East Sand Island in past years (Anderson et al. 2004). This device falls off during the natural molt of the birds.

Satellite tags will be attached to DCCOs using a harness made of Teflon ribbon which will degrade over time and the transmitters will fall off individuals (expected life ~ 1 year). Harness attached transmitter units will weigh less than 60 grams, with dimensions < 3 x 2 in x 2 in. Harnesses will be constructed following Dunstan (1972) as modified by King et al. (2000); this harness construction design has been used successfully for attaching radio and satellite tags on dozens of DCCOs, including cormorants from East Sand Island (Courtot et al. in press). Harnesses will have two loops, one that will encircle the body just below the neck and one that will encircle the body at the abdomen. A strap will connect the two loops on the ventral side of the individual. The transmitter will sit on the dorsal side of the individual with the anterior end positioned to be centered between the scapula with the two harness loops passing through built-in tubes at the anterior and posterior end of the transmitter. Each harness will be fitted for individuals so that a 4 mm diameter rod can fit between the harness and the skin.

After radio or satellite marking a bird, we will also mark it with a metal band and a color band as detailed in the banding section above. Following banding, to determine gender of

a subsample of the tagged individuals, a small amount of blood (~0.2 ml) will be collected from the brachial vein using a small needle (26g or smaller). Average mass of adult double-crested cormorants is 2,500 g. The amount of blood we propose to sample from each adult is well under the limits recommended by The Ornithological Council Guidelines to the Use of Wild Birds in Research (Fair et al. 2010).

Capture, banding, and tagging operations are low risk to the animals and adverse consequences are not expected.

Dissuasion methods:

We expect up to 8400 breeding pairs of DCCO will be displaced from the nesting area of past years as a result of dissuasion (hazing) activities. In 2010, approximately 8400 breeding pairs used the nesting area proposed for dissuasion in 2012 (approximately 62% of the total breeding pairs). It is difficult to predict how many of these displaced cormorants will actually be exposed to hazing activities in the dissuasion area.

Individual cormorants arriving early in the breeding season will be hazed from the dissuasion area whenever they are observed there, until they either nest elsewhere on the island (i.e., west of the privacy fence), depart the area, or hazing activities are terminated. Later arriving cormorants may be attracted to nest alongside already nesting individuals elsewhere on the island, rather than attempting to utilize the empty space of the dissuasion area. Nesting habitat on East Sand Island is not limiting, thus most hazed birds will likely attempt to nest elsewhere on the island. Also see section 6.1.1 for discussion on the indirect impacts of DCCOs displaced from East Sand Island and predictive behavior if they leave the CRE.

The west end of ESI above normal high water is approximately 16.9 acres. During the 2010 nesting season, a total of 13,600 pairs of DCCOs at East Sand Island occupied 2.6 acres, in 2011, 13,000 pairs occupied 2.8 acres. Even though the proposed privacy fence will be located to dissuade 62% of the 2010 nesting colony, the habitat west of the fence where no dissuasion will take place is 11.1 acres.

Hazed birds that relocate to nest west of the privacy fence alongside already nesting individuals could be exposed to more bald eagle (*Haliaeetus leucocephalus*) disturbance and associated gull (*Larus* spp.) nest depredation. In past years, bald eagle and gull disturbance has been more frequent on the west side of the DCCO colony compared to the east end of the colony. Double-crested cormorants have a much higher tolerance to eagle predation than species like Caspian terns. Increased nesting density in the unhazed area (resulting from displaced cormorants joining those cormorants with a history of nesting in that area) however, could offer individuals more protection from predators.

Hazed birds that disperse from ESI might 1) attempt to nest at an established colony site, 2) attempt to nest at a new colony site, or 3) not attempt to nest in 2012. Also see section 6.1.1 for discussion on the indirect impacts of DCCOs displaced from East Sand Island and predictive behavior if they leave the CRE.

Diet and consumption studies:

As in previous years, adult DCCOs would be lethally collected at ESI for stomach content analysis. An average of 143 adult cormorants per year were collected for diet and consumption studies during 1997-2011 (range: 88 to 205 individuals per year; BRNW, unpubl. data).

This level of lethal collection compares to the current East Sand Island colony size of ca. 13,000 pairs, or 26,000 individuals (BRNW 2011). The corresponding annual mortality rate due to collection would be 0.55% ($= 143/26000$) for the East Sand Island local breeding population. The East Sand Island colony more than doubled in size from 5,000 breeding pairs in 1997 to 12,500 pairs in 2004. Since 2004, the population has remained stable at ca. 13,000 pairs. Thus, the East Sand Island colony has been stable or increasing across the study period.

This level of lethal collection is also small compared to the fledgling productivity of the East Sand Island double-crested cormorant colony. More than 15,000 chicks per year have been estimated to survive to fledging age in recent years (2006 – 2011). The lethal collection of adults potentially limits less than 1% of this annual production.

The western population of double-crested cormorants has recently been estimated to be 31,500 breeding pairs (Adkins and Roby 2010), of which East Sand Island represents ca. 41%. Over the last two decades, the western population has grown at an average annual rate of 3% per year (Adkins and Roby 2010).

Given the high intrinsic productivity of the East Sand Island cormorant colony, and the growth in colony size during a portion of the study period when the colony was substantially smaller than current levels, it appears that lethal collection has not acted as a significant limiting factor. It is possible, though unlikely, that colony growth might have been greater over the course of the study period had lethal collection not occurred. In recent years, density-dependent factors such as bald eagle disturbance and associated gull nest depredation have likely limited further colony growth at East Sand Island.

Cormorant populations are also likely limited by overwinter climate conditions and prey availability during the breeding season (Lyons 2010). In the context of these other factors, continuing the scientific collection at levels practiced during 1997 – 2011, as proposed, appears unlikely to have any measureable effect on cormorant populations at the local (East Sand Island) or regional (western population) level. If the size of the cormorant colony at East Sand Island substantially changes in the future, due to management or other factors, then it may be appropriate to revisit this conclusion.

Other Birds

Caspian tern (*Hydroprogne caspia*):

The Caspian tern breeding colony is located at the eastern end of ESI, 900 m from the most eastern boundary of the cormorant colony (in 2010). The portion of the island

between the two colonies is covered in shrubs and trees which effectively isolate the two colonies from one another. For example, birds from either colony do not detect (respond to) natural disturbances (e.g., bald eagle disturbance) at the other colony. Caspian terns on their colony did not detect DCCO dissuasion activities at the east (near) end of the cormorant colony in 2011, and over the course of the study, terns have never responded to DCCO research activities including cormorant collection for diet studies. The tern colony is primarily made up of bare sand substrate bordered by tall grass, not the preferred nesting habitat for DCCO at ESI. Additionally, visibility of researchers accessing observations blinds at the perimeter of the tern colony may act as a deterrent to cormorants utilizing the area surrounding the tern colony. After accounting for the constriction of DCCO nesting habitat by the proposed 2012 privacy fence and hazing activities, there remains sufficient available nesting habitat for DCCO on the western end of ESI. It would be extremely unlikely that DCCO displaced by 2012 dissuasion activities would attempt to nest on or near the current tern nesting area. No adverse impact to Caspian terns or the tern breeding colony is expected from DCCO research or dissuasion activities at ESI.

Glaucous-winged/western gull (*Larus glaucescens/occidentalis*):

Glaucous-winged/western gulls nest throughout ESI, including the 2011 and proposed 2012 DCCO dissuasion areas. Despite 2011 hazing activities, glaucous-winged/western gulls in the dissuasion area were observed to have similar nesting chronology as gulls nesting away from the dissuasion area (BRNW, unpubl. data). Anecdotal observations also suggested that gulls nesting in the dissuasion area had similar productivity to gulls nesting in other areas of the island (BRNW, unpubl. data). Because of the 2011 observations and the apparent ability of glaucous-winged/western gulls to habituate to human presence, it is not anticipated that glaucous-winged/western gulls nesting at ESI would be adversely impacted by the proposed 2012 DCCO dissuasion activities.

Ring-billed gull (*L. delawarensis*):

A ring-billed gull breeding colony is located at the eastern end of ESI, near the Caspian tern colony. Like the tern colony, the ring-billed gull colony is isolated from the DCCO colony, DCCO research, and DCCO dissuasion activities. Ring-billed gulls are not expected to be adversely affected by DCCO activities at ESI.

Brandt's cormorant (*P. penicillatus*):

A small colony of Brandt's cormorants consisting of 44 breeding pairs became established on ESI amidst the DCCO colony in 2006. This colony grew to 288, 508, 684, and 985 breeding pairs in 2007, 2008, 2009, and 2010 respectively (Roby et al. 2011). In 2011, the East Sand Island Brandt's cormorant colony continued to grow and was estimated at 1491 breeding pairs (BRNW, unpubl. data). No Brandt's cormorants attempted to nest in the 2011 DCCO dissuasion area prior to the onset of hazing activities; however, a small number of roosting Brandt's cormorants (ca. 30) were displaced due to 2011 DCCO dissuasion activities, but like DCCO were able to nest elsewhere on the island (BRNW, unpubl. data).

Approximately 21% (309 breeding pairs) of the 2011 Brandt's cormorant nests were located within the proposed 2012 DCCO dissuasion area (i.e., east of the proposed 2012 location of the privacy fence). It is difficult to predict the number of breeding pairs that might prospect in the proposed 2012 DCCO dissuasion area and would actually be exposed to hazing activities. As in 2011, however, it is anticipated that Brandt's cormorants would not attempt to nest prior to the onset of hazing activities. Like DCCO, later arriving Brandt's cormorants may be attracted to nest alongside already nesting individuals elsewhere on the island, rather than attempting to utilize the empty space of the dissuasion area. Nesting habitat for Brandt's cormorants on ESI does not appear to be limiting, thus most hazed birds will likely attempt to nest elsewhere on the island.

Hazed birds that are attracted to nest west of the privacy fence alongside already nesting individuals could be exposed to more bald eagle disturbance and associated gull nest depredation. In past years, bald eagle and gull disturbance has been more frequent on the west side of the DCCO and Brandt's cormorant nesting area compared to the east end of the nesting area. Increased nesting density in the unhazed area (resulting from displaced cormorants joining those cormorants with a history of nesting in that area) however, could offer individuals more protection from predators.

Pelagic cormorant (*P. pelagicus*):

At least 96 breeding pairs of pelagic cormorants nested on the Astoria–Megler Bridge in 2011 (BRNW unpubl. data). This is the only site in the Columbia River estuary where pelagic cormorants are known to nest. Pelagic cormorants have been observed nesting on the underside of the southern portion of the Astoria-Megler Bridge since surveys began in 1999 (Roby et. al 2011).

Double-crested cormorants also nest near the pelagic cormorants on the Astoria-Megler Bridge. In 2011, at least 62 breeding pairs of DCCOs nested on the underside of the bridge, similar to 2010 (BRNW unpubl. data, Roby et. al 2011).

It is possible that DCCO displaced by 2012 dissuasion activities could attempt to nest on the Astoria-Megler Bridge near the pelagic cormorant colony. After accounting for the constriction of DCCO nesting habitat by the proposed 2012 privacy fence and hazing activities, however, there remains sufficient available nesting habitat for DCCO on the western end of ESI. We would predict that most DCCO from the dissuasion area would attempt to nest in the available habitat at ESI and would not attempt to nest on the Astoria-Megler Bridge. No adverse impact to pelagic cormorants is expected from DCCO research or dissuasion activities at ESI.

California brown pelican (*Pelecanus occidentalis californicus*):

East Sand Island is the largest known post-breeding nocturnal roost site for California brown pelicans, which were removed from the Endangered Species list in 2009, and the only known night roost for this species in the Columbia River estuary (Wright 2007). Pelicans typically begin arriving at ESI in mid-April and the number of roosting individuals peaks sometime during late July to early September (Collis et al. 2009, Roby et al. 2008, 2010, 2011). California brown pelicans roost throughout the island during the

day, however, pelican numbers, in particular nocturnal roosting numbers are concentrated at the western end of ESI, adjacent to the DCCO colony.

In 2011, the first roosting pelicans were observed in late April. During dissuasion activities (29 April to 12 May), ca. 50 California brown pelicans were routinely flushed from the dissuasion area with a maximum of ca. 100 individuals flushed at one time. Hazing targeted at DCCO had no sustained impact on the use of the dissuasion area as a roost by pelicans, however, and once dissuasion was completed pelicans roosted throughout the dissuasion area and on the adjacent beaches. In August 2011, over 14000 California brown pelicans were counted roosting island-wide, the second highest peak number of pelicans counted on ESI to date (BRNW, unpubl data).

2012 DCCO dissuasion activities will likely disturb pelicans attempting to roost in the dissuasion area at ESI. We do not expect 2012 dissuasion activities to have a sustained impact on California brown pelicans, however, because 1) roosting habitat is not limiting away from the dissuasion area at ESI, 2) hazing activities will end before the peak number of pelicans arrive at ESI, and 3) pelicans are expected to use the dissuasion area as a roost site once hazing is completed.

Streaked horned lark (*Eremophila aipestris strigata*):

The streaked horned lark, a candidate for listing under the 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 islands in the Columbia River estuary (Rice Island, Miller Sands, Pillar Rock; Pearson and Altman 2005, Pearson et al. 2005).

At ESI, streaked horned larks have occasionally been observed by BRNW researchers on the eastern end of the island, in the vicinity of the Caspian tern colony, but no nesting has been suspected or confirmed. Streaked horned larks have not been observed on the western end of the island where the DCCO colony and dissuasion area are located. The western end of ESI is partially densely vegetated and the DCCO colony area is made up of large rip rap boulders along the southern shore, and includes bare sand and drift wood substrates in the central area and along the western boundary. The northern boundary of the cormorant nesting area is formed by a series of sand berms; tall grass and willows form the eastern edge of the nesting area. While there is some bare sand substrate that might be suitable nesting habitat for streaked horned larks on the western end of ESI, it is located amongst nesting DCCO and Glaucous-winged/western gulls, and roosting California brown pelicans and/or is inundated with water during the breeding season. It is unlikely that streaked horned larks would nest near large colonial birds, such as DCCO (S. Pearson, WDFW pers. comm. to L. Kerr, BRNW). It is possible that streaked horned larks would utilize the dissuasion area after successful dispersal of DCCOs and after dissuasion activities have ceased, but again the presence of other large colonial birds would likely discourage nesting by the larks.

After accounting for the constriction of DCCO nesting habitat by the proposed 2012 privacy fence and hazing activities, there remains sufficient available nesting habitat for

DCCO on the western end of ESI. It would be extremely unlikely that DCCO displaced by 2012 dissuasion activities would attempt to nest near streaked horn larks that might be nesting at ESI. No adverse impact to streaked horned larks is expected from DCCO research or dissuasion activities at ESI.

Waterfowl:

Mallards (*Anas platyrhynchos*) and western Canada geese (*Branta canadensis moffitti*) are probably the most abundant breeding waterfowl on the island. Non-breeding brant (*Branta bernicla*) are observed on the island during the summer. Nesting waterfowl mainly occur in vegetated areas on the east end of the ESI. Because the proposed action will occur on the west end, no adverse impact to waterfowl is expected from DCCO research or dissuasion activities at ESI.

Amphibians and Reptiles. Amphibians and reptiles occur in very low abundance on East Sand Island. The proposed project activities will not occur in known habitat of amphibians and reptiles, and therefore, no effects are expected to these animals from the proposed action.

Mammals. Non-native mammals resident on East Sand Island and found on other islands in the estuary include nutria (*Myocastor coypus*), some species of mice (muridae), and Norway rats (*Rattus norvegicus*). Native mammals found on East Sand Island include voles (cricketidae), raccoons (*Procyon lotor*), and river otters (*Lutra canadensis*); black-tailed deer (*Odocoileus hemionus*) and harbor seals (*Phoca vitulina*) occasionally visit the island. Seas lions have not been observed on ESI. No effects to mammals or their habitat are expected from the proposed action.

(X) Special aquatic sites (wetlands, mudflats, coral reefs, pool and riffle areas, Shallows, sanctuaries and refuges, other): There would be temporary impacts to the mudflat on the north side of East Sand Island. Impacts would be from delivery of a tractor and fence materials by barge during low tide in March. Two trips to the island are required, one for delivery and one for removal of the tractor. The barge (landing craft) would be placed on the mudflat for about one hour during delivery and five to ten minutes for pick up of the tractor. All impacts to the mudflat would be naturally restored during the next high tides when water and wave action moves soil over the impact area.

Terrestrial Habitat

() Geomorphology: N/A

() Endangered or Threatened Species: Except for streaked horned larks, ESA-listed terrestrial species and/or designated critical habitat do not occur on East Sand Island and therefore there would be no effect as a result of the proposed action. Streaked horned larks, a Candidate species, are occasionally seen at ESI but are not known to nest on the island. For a full list of ESA-listed fish, wildlife and plants that could occur in the project area see Appendix D.

(X) Air Quality: Air pollution sources include small amounts of concrete dust while preparing mix during fence installation. This impact is limited to the immediate work site and does not affect air quality.

(X) Geology and Soils: Sand placed on East Sand Island from past dredging activities and underlying small rock is the only substrate affected by installation of the privacy fence. Concrete will be placed in small holes dug into the sand about one foot wide and three feet deep, but occur above the normal high water and would not be deep enough to reach the top of the water column. The concrete would be left permanently in place and is not expected to impact the geology. Soil or sand dug from the holes would be left on site and would disburse naturally from wind, rain and storm action.

() Mineral Resources: N/A

(X) Noise: Construction of the privacy fence would occur for about four days. A tractor-powered auger to prepare the holes for post installation is the only substantial noise expected from the proposed project, and would occur during one day. Construction would occur before the start of the breeding season when very few birds are using the island, so noise impacts to wildlife would also be minimal. Since the impact of noise is limited to East Sand Island which is non-human occupied lands in the Columbia River, there would be no impacts to the human environment.

(X) Recreation: There would be not impacts to recreational activities by the proposed project. Only authorized access to East Sand Island is permitted and the area is closed year round to the general public.

(X) Land use classification: East Sand Island is federally owned and administered by the U.S. Army Corps of Engineers, Portland District. The island is managed for fish and wildlife protection, but is reserved as an upland site for dredge deposition.

() Public Services and Utilities: N/A

() Transportation and traffic: N/A

(X) Navigation: Small boats and a small landing craft are used to access East Sand Island from the nearby Chinook Harbor. Boating activity to access ESI would occur from March to September. Boating to and from ESI requires temporary use of Chinook channel where project activity does not interfere with navigation of public or commercial boating activity. There would no effect to the main navigation channel of the Columbia River from the proposed action since it would not be used during the project.

(X) Aesthetics/visual impact: The privacy fence when constructed would be visible from the Columbia River but only by boats traveling very close to the west end of East Sand Island. The fence feature is temporary in nature and would only be in use from late March to September 2012. The fence would be removed in September following the completion of nesting season.

- () **Public facilities, utilities and services: N/A**
- () **Public health and safety: N/A**
- () **Hazardous and toxic materials: N/A**
- () **Energy consumption or generation: N/A**

() **Historic monuments, parks, national seashores, wild and scenic rivers, Wilderness area, research sites, etc:** East Sand Island has been designated as a regional and international important bird area by the American Bird Conservancy and the Audubon Society. The proposed action does not affect the designation and allows for several thousand DCCOs to continue using ESI.

(X) **Archaeology:** Compliance with Section 106 of the National Historic Preservation Act: A search of the Washington and Oregon state cultural resources databases by Corps professional staff archeologists showed no cultural resources recorded within one-half mile of the proposed project. The proposed project is located on a landform that has been formed within the last 30 years from dredged materials. As such it cannot contain any potential unrecorded historic properties eligible for the National Register of Historic Places. The agency archeologists have made a determination of No Effect for the undertaking.

(X) **Socio-economic:** No impacts are expected from the proposed dissuasion research project. Implications and research findings could be used for future decisions that may positively impact fisheries important to industry and recreation.

() **Growth inducing impacts - community growth, regional growth: N/A**

(X) **Conflict with land use plans, policies or controls:** Research and management activities at East Sand Island are coordinated between the Planning, Operations, Navigation, and Environmental sections of the USACE Portland District.

() **Other anticipated changes to non-jurisdictional areas that have been determined to be within the Corps' NEPA scope of analysis: N/A**

() **Irreversible changes, irretrievable commitment of resources:** All actions are temporary in nature and can be scaled back or eliminated at any time.

(X) **Other Cumulative effects not related to the proposed action:**

1. Occurred on-site historically: Management of Caspian tern habitat at ESI has been ongoing since 1999. Since 2008, the habitat has been reduced incrementally to dissuade a portion of the colony permanently from ESI. A minimum of one acre of habitat is expected to be managed annually for continued use by Caspian terns.

2. Likely to occur within the foreseeable future:

Reducing cormorant predation in the estuary, in combination with other initiatives that aim to improve juvenile salmonid survival, is anticipated to occur in the foreseeable future in an effort to increase population growth rates of ESA-listed salmonids in the Columbia River basin. The long-term success of efforts intended to increase population growth rates of ESA-listed salmonids must be placed in the context of other sources of mortality subject to human intervention. Hydropower operations, harvest rates, habitat conditions, hatchery operations, and introduced species all have the potential to affect population growth rates of ESA-listed salmonids, and are subject in various degrees to management efforts to alleviate detrimental effects. Actions to address these effects have been implemented or proposed, and others are being or may be developed in the near future.

3. Contextual relationship between the proposed action and (1) and (2) above: See section 6.2 below.

6.0 SUMMARY OF INDIRECT AND CUMMULATIVE EFFECTS

6.1 Indirect Effects

6.1.1 Double-crested Cormorants

The principal indirect impacts possible from the proposed action would stem from the movement and potential relocation of a proportion of cormorants that currently breed on East Sand Island. Human dissuasion techniques would reduce the amount of available habitat at East Sand Island potentially causing disbursal of cormorants away from East Sand Island. If DCCOs leave East Sand Island, they would likely prospect for nesting habitat near the Columbia River estuary first, with a smaller proportion of birds prospecting farther from CRE. Although displaced cormorants may attempt to occupy known colony sites, there is the potential for double-crested cormorants to bypass traditional nesting sites in favor of artificial structures such as; bridges, electrical transmission towers, abandoned boats, navigational aids, and other artificial structures.

Some general predictions can be made about the prospecting behavior (i.e., the search for new breeding sites) of DCCOs dissuaded from nesting at East Sand Island. In response to disturbance, DCCOs may immigrate to nearby colonies or re-colonize historical breeding sites (Wires and Cuthbert 2006, Duerr et al. 2007). Similar to prospecting patterns in other colonial species (Aebischer 1995, Henaux et al. 2007), proximity of other breeding colonies may play a role in breeding site selection for cormorants dissuaded from East Sand Island.

Based on results from a recent satellite-tracking study of the movements of adult double-crested cormorants at East Sand Island (Courtot et al., in press), we can hypothesize that the upper Columbia River estuary, Gray's Harbor, and the northern Salish Sea, are the most likely areas for cormorants from East Sand Island to prospect for new breeding sites. This is based on the number of individuals that visited these areas and the occurrence of breeding colonies in these areas. Site-specific nesting history, distance

from East Sand Island, and regional variation in connectivity with the East Sand Island population, however, will likely result in variable prospecting rates.

Because unanticipated impacts from DCCO moving outside the CRE are important to resource management agencies, the USACE has contracted OSU to investigate where double-crested cormorants displaced from the East Sand Island colony are likely to nest. This information will be housed in a centralized database available online to project personnel. One objective is to identify and characterize alternative colony sites where cormorants displaced from East Sand Island might recruit into the breeding population. Studies will identify existing or former double-crested cormorant colony sites in coastal Washington and Oregon where suitable unoccupied nesting habitat is available for emigrants from the East Sand Island colony. Radio-tracking, satellite-tracking, and band re-sighting data will help inform this process. Additionally, locations of existing great blue heron rookeries in coastal areas of Washington and Oregon where emigrants from the East Sand Island cormorant colony might establish new cormorant breeding colonies will become part of the database as available. A GIS map showing potential areas of relocation will be used to help predict where displaced birds might relocate. This effort began in 2010 and is on-going in 2012.

6.1.2 Caspian Terns.

The proposed action is not expected to have indirect effects on Caspian tern colonies. DCCO have not attempted to nest on the east end of ESI where the tern colony is located, and are not expected to move to this area or utilize tern habitat. There are no other Caspian tern nesting colonies in the Columbia River estuary where DCCOs from ESI could displace terns. Impacts to Caspian terns outside the CRE are not anticipated.

6.1.3 Other Birds.

Adverse effects to other bird species on East Sand Island are not expected. Nesting gulls could benefit from increased nesting area not occupied by DCCOs. Songbirds could benefit from unoccupied space in the DCCO dissuasion area. Double-crested cormorants are also known to be attracted to nest at colonies with other colonial waterbirds, such as herons and egrets, and could displace herons from their nests (Hatch and Weseloh 1999). It is unknown if DCCOs that leave East Sand Island due to dissuasion activities will relocate and displace other nesting species. Monitoring of radio marked birds and weekly surveys conducted by researchers will provide insight to where DCCOs will disperse to if they leave ESI and if there are potential impacts to other birds.

6.1.4 Fishes.

Cormorants that forego nesting and leave East Sand Island as a result of the dissuasion actions could relocate to places where salmonids and other fish could be consumed by DCCOs. Cormorants are almost exclusively fish-eating birds so it is expected that fish will make up the majority of their diet wherever they are located. The indirect impacts to fish could be diffuse or concentrated depending on the number of birds present, size of area, and time of residency of both fish and DCCOs. Monitoring of radio marked birds

and weekly surveys conducted by researchers will provide insight to where DCCO will disperse to if they leave ESI and if there are potential impacts to fish.

6.1.5 Endangered and Threatened Species.

Cormorants that forego nesting and leave East Sand Island as a result of the dissuasion actions could relocate to places where salmonids might be consumed by DCCOs. The proposed dissuasion project is not expected to cause a disproportionate change in predation rates, but rather would be consistent with consumption rates that would result from natural factors during the 2012 season. For the reasons stated above, unless an unexpectedly large proportion of DCCO leave the CRE, it is predicted that consumption of ESA-listed fish would not differ from normal or natural predation rates for the season as a result of the proposed action.

6.1.6 Socioeconomic Effects.

The proposed project would not have impacts on socioeconomics in the short term, but results of the research are likely to be used to develop a long range strategy to reduce consumption of important harvest fish species.

Double-crested cormorants consume commercially and recreationally harvested fish species (e.g., salmonids, herring) in most coastal waters where fish occur. Effects to many species of salmonids is considered to be substantial because the current cormorant colony at ESI has been documented to consume up to 22.6 million juvenile salmonids in a single nesting season. DCCOs that forego nesting and leave East Sand Island as a result of the dissuasion actions could relocate to places where salmonids and other fish might be consumed by DCCOs. Consumption of harvest fish species would likely be mostly dispersed, but local impacts where cormorants congregate near localized fish populations could occur.

6.2 Cumulative Effects

Predation by double-crested cormorants should also be considered in the context of upstream investments that are implemented to improve survival of juvenile salmonids. Many of the measures taken to restore salmonids in the Columbia River basin have focused on improving survival of juvenile salmonids through the mainstem dams. These measures are associated with the operation and management of the Federal FCRPS and include research, development, and construction of mitigation measures under the Columbia River Fish Mitigation program of the U.S. Army Corps of Engineers.

Costs associated with the implementation of the 2008 BiOp (e.g., aggressive hydropower measures, increased spill, improved passage facilities, increased fish transportation; NOAA Fisheries 2008 and 2010), CRFM, and other salmonid recovery efforts are substantial. Double-crested cormorant predation on juvenile salmonids should be reduced to complement and protect benefits resulting from upstream efforts (as described above) to increase the number of juvenile salmonids reaching the ocean.

With similar purpose that led to the development of the Caspian tern management for the CRE, the 2002 Settlement Agreement required a management plan for double-crested cormorants in the Columbia River estuary which reduces resource management conflicts with ESA-listed salmonids while ensuring the conservation of double-crested cormorants in the Pacific Region of the Western Population.

The need for action has been driven by the recent increase of double-crested cormorants nesting in the Columbia River estuary and their associated predation on ESA-listed salmonids. Managing double-crested cormorants to address salmonid predation would add to larger recovery efforts (described below), contributing to the overall recovery of ESA-listed salmonids in the Columbia River Basin.

In November 2010, a multi-agency working group was formed to begin work on a cormorant management plan for the CRE. The USACE and the USFWS are leading this effort to address the issue of reducing predation of salmonids in the CRE through management of cormorants at ESI and the greater CRE. Actions implemented under an approved cormorant management plan will be additive to those action taken to disperse Caspian terns from the CRE, and therefore are anticipated to provide for a significant reduction of consumption on ESA listed salmonids.

Diet studies, through means of lethal collection and stomach content analysis of DCCOs, have been the primary method to determine consumption rates of salmonids by DCCOs nesting at ESI since 1997. An average of 143 adult cormorants per year were collected for diet and consumption studies during 1997-2011 (range: 88 to 205 individuals per year; BRNW, unpubl. data). These studies were performed under a scientific collection permit issued annually by the USFWS.

Additional mortality by means of lethal take of DCCOs occurs annually through depredation permits issued by the USFWS. These permits are issued to address specific conflicts between humans and wildlife. A Federal Migratory Bird Depredation Permit is required to capture or kill migratory birds for depredation control purposes. The permit authorizes certain management and control activities necessary to provide for human health and safety, protect personal property, or allow resolution of other injury to people or property (Migratory Bird Treaty Act 50 CFR 21.41).

An average of 255 cormorants per year was collected under depredation permits during 2000-2011 in Washington and Oregon (range: 41 to 639 individuals per year; USFWS, unpubl. data). The average number of cormorants collected per year was lower during 2003-2011 (183 individuals per year) compared to the 2000-2002 time period (471 individuals per year).

This level of lethal take compares to the 2009 DCCO population estimate for Washington and Oregon of ca. 17750 breeding pairs, or 35500 individuals (Adkins and Roby 2010). The corresponding annual mortality rate due to lethal take under depredation permits would be 0.72% ($= 255/35500$) for the Washington and Oregon population for the years 2000-2011. The cumulative annual mortality rate on the double-crested cormorant

population in Washington and Oregon due to depredation and scientific collection would be 0.92% ($= (183 + 143)/35500$) in the years since 2002.

Continuing scientific collection at ESI at 1997–2011 levels, as proposed, is unlikely to have a measureable effect on cormorant populations at the local (East Sand Island) or regional (western population) level, even considering the cumulative effect of this collection along with permitted depredation in the region. If the size of the cormorant colony at East Sand Island substantially changes in the future, due to management or other factors, then it may be appropriate to revisit this conclusion.

7.0 ENVIRONMENTAL COMPLIANCE

Statute	Status of Compliance
National Environmental Policy Act (NEPA) of 1969 (42 USC 4341 <i>et seq</i>)	This EA has been prepared for continuing compliance with NEPA. All agency and public comments will be considered and evaluated. If appropriate, a FONSI will be signed with a conclusion of no significant impacts which would complete compliance with NEPA.
Clean Air Act of 1970(42 U.S.C. 7401 <i>et seq</i>)	In coordination with the Department of Environmental Quality’s Air Quality Program, it has been determined the proposed action does not require a Clean Air Act conformity analysis based on the limited emissions associated with the activities.
Clean Water Act of 1972 (33 U.S.C. 1251 <i>et seq</i>)	The proposed action will not result in the discharge of any pollutant of any dredged or fill material into waters of the United States, therefore the proposed action <i>complies with</i> the Clean Water Act.
Coastal Zone Management Act 1972, (6 U.S.C. 1451 <i>et seq.</i>)	Because the proposed action will not affect water use in Oregon’s designated coastal zone the proposed action <i>complies with</i> the CZMA.
Executive Order 11990, Protection of Wetlands, 24 May 1977(42 FR 26961, 1977)	The proposed action does not occur within natural or created wetlands.
Executive Order 11988, Flood Plain Management, 24 May 1977	The proposed action would occur above normal high water within Columbia River estuary. East Sand Island is within the flood plain of the Columbia River, but the actions described in this EA are temporary and will not alter floodplain characteristics.
Executive Order 12898, Environmental Justice, 11 February 1994	No subsistence, low-income or minority communities will be affected by the proposed activities because the project area is uninhabited and therefore there will be no change in the populations, economics or other indicator of social well-being. Consequently, the proposed actions are in compliance with this Order because no environmental justice implications exist for this project area.
Comprehensive Environmental Response, Compensation and Liability Act of 1980 (42 U.S.C. 9601 <i>et seq.</i>)	The location of the proposed actions are not within the boundaries of a designated Superfund site as identified by the EPA or the State of Oregon for a response action under CERCLA, nor are the project sites part of the National Priority List.
Farmland Protection Policy Act of 1994 (7 U.S.C. 4201 <i>et seq.</i>)	The proposed actions are in compliance with this Act because the activities will not occur on lands utilized for agricultural purposes, nor will the landscape be converted to alternative land uses.
Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance, 5 October 2009	The proposed action activities are in compliance with this Order because no development will occur and all actions will be conducted in a manner as to prevent pollution and chemical spills.

Endangered Species Act of 1973 (16 U.S.C. 1531, as amended)	An inventory of listed and proposed endangered and threatened species and candidate species that may occur in the project area was investigated. A No Effect determination for the proposed actions will not affect any list species of plants, fish or wildlife.
Fish and Wildlife Coordination Act of 1958 (16 U.S.C. 661-666c)	The proposed action has been coordinated with the USFWS in compliance with this Act. The USFWS have been involved with project planning and will aid in future management and monitoring activities.
Magnuson-Stevens Fishery Conservation and Management Act Fishery Conservation Amendments of 1996, (16 U.S.C. 1801 <i>et seq</i>) – Essential Fish Habitat (EFH)	The proposed action will have no effect on fish species or their habitat covered by Fisheries Management Plans in the Columbia River estuary.
Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-711)	This project may have some negative impacts on double-crested cormorants, Brant's cormorants and potential impacts on gull species and brown pelicans. The impacts of which have analyzed in the EA. All impacts have been coordinated with Region 1 of the Fish and Wildlife Service. Depredation and scientific collection permits have been obtained to conduct the proposed research actions.
Executive Order 13186, Migratory Birds, 10 January 2011	Impacts to specific species of migratory birds occurring in the project area have been analyzed within this EA.
Bald and Golden Eagle Protection Act of 1940 (16 U.S.C 668 <i>et seq</i>)	No eagle nests occur near the proposed research area.
Marine Mammal Protection Act (MMPA) of 1972 (16 U.S.C. 1361 <i>et seq</i>)	No marine mammals (or their parts) will be impacted by the proposed actions.
National Marine Sanctuaries Act (16 U.S.C. 1431 <i>et seq</i>)	NA
Marine Protection Research and Sanctuaries Act of 1972 (33 U.S.C. 1401 <i>et seq</i>) Or Ocean Dumping Ban Act of 1988 (Public Law 100-688; § 2030)	NA
Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271-1287)	The Columbia River is not a designated Wild and Scenic River; as a result, this Act is <i>not applicable</i> to the proposed actions.
Antiquities Act of 1906, 16 (U.S.C. 431,432,433)	N/A
National Historic Preservation Act of 1966 (16 U.S.C. 470 and 36 CFR 800): Protection of Historic Properties	Pre-construction field and record cultural resource surveys have been completed and were provided to the Oregon State Historic Preservation Office. The potential impact areas are not listed or are eligible for listing on the National Register of Historic Places.
Protection and Enhancement of the Cultural Environment, Executive Order 11593 (36 FR 8921; May 13, 1971)	See NHPA above

Archaeological and Historic Preservation Act of 1960, (16 U.S.C. 469-469c)	Formal coordination with SHPO will be through review of the EA transmitted via mail to the Oregon SHPO who will comment, and it is anticipated, concur with the Corps determination of effect. No further Section 106 review should be needed.
American Indian Religious Freedom Act of 1978, (42 U.S.C. 1996)	N/A
Archeological Resources Protection Act of 1979, (16 U.S.C. 470aa-470mm)	See AHPA above
Native American's Graves Protection and Repatriation Act of 1990, (25 U.S.C. 3001)	N/A
Abandoned Shipwreck Act of 1987, (43 U.S.C. 2101 <i>et seq</i>)	None occur on site.
Submerged Lands Act, (Public Law 82-3167; 43 U.S.C. 1301 <i>et seq</i>)	None occur on site.

8.0 AGENCIES CONSULTED AND PUBLIC NOTIFICATION

The notification process includes mailing a project notice to agencies and other stakeholders regarding the availability of this EA. The following agencies are listed as placeholders; a summary of the comments will be entered after the comment period has ended. Comments and responses will be placed into Appendix A.

A. Federal agencies:

- 1) Bonneville Power Administration
- 2) Advisory Council – Historic Preservation
- 3) U.S. Fish and Wildlife Service
- 4) National Marine Fisheries Service

B. State and local agencies:

- 5) State Historic Preservation Officer
- 6) Oregon Department of Fish and Wildlife
- 7) Washington Department of Fish and Wildlife

9.0 MITIGATION MEASURES

The proposed 2012 hazing activity will likely force cormorants into areas of East Sand Island where higher levels of bald eagle disturbance and corresponding gull predation were documented in 2011. This could result in a situation that reduces productivity at the DCCO colony on the island. Other unanticipated circumstances could cause large scale colony abandonment or reduced productivity at the ESI colony. Some disturbances may be temporary and would not be cause for termination of the dissuasion activities. Therefore, we propose an adaptive management approach to determine if termination of dissuasion activities is necessary.

Adaptive management. The effects of the dissuasion activities on DCCOs will be monitored daily, as well as, all disturbance factors. The visual barrier method of dissuasion would allow for an adaptive response or scaling back of the pilot study if warranted.

Researchers would provide in-season weekly updates (or more frequent) on the effects of dissuasion and disturbance on cormorants at ESI to resource agency managers. If unacceptably large numbers of DCCOs quit using ESI and attempt to relocate to undesirable locations (e.g., Rice Island or other upper estuary sites), as determined by multi-agency resource managers, then dissuasion activities at ESI can be terminated so that DCCOs might return to nest there.

Bald eagle disturbance and associated gull predation could occur at levels that might undermine the ability of DCCO to successfully nest in the unhazed section of the colony area at ESI in 2012. If this occurs, the multi-agency resource managers will decide if scaling back or termination of dissuasion activities at ESI may be warranted to allow DCCOs to return to nest in the dissuasion area. The decision to scale back or termination could be made at anytime during the incubation and nestling period.

10.0 DETERMINATION AND STATEMENT OF FINDINGS

DRAFT Finding Of No Significant Impact (FONSI) Environmental Assessment Double-crested Cormorant Dissuasion Research on East Sand Island in the Columbia River Estuary Clatsop County, Oregon

The action is the authorized construction of an eight foot tall privacy fence to utilize human presence as a means to dissuade double-crested cormorants (*Phalacrocorax auritus*, DCCO) from nesting on a portion of East Sand Island (ESI) near the mouth of the Columbia River. In addition, the environmental assessment (EA) addresses continuation of ongoing diet and fish consumption studies of the large double-crested cormorant colony at ESI.

The purpose of the proposed action is to study a specific technique to dissuade DCCOs from nesting on a portion of East Sand Island, and determine if these methods can be used as a potential relocation strategy for a portion of the large DCCO colony on ESI. The research results will help formulate long term solutions for reducing consumption of juvenile salmonids by DCCO in the Columbia River estuary (CRE)

This project is described in the Environmental Assessment for *Double-crested Cormorant Dissuasion Research on East Sand Island in the Columbia River Estuary*, Clatsop County, which is incorporated herein (Attachment A).

Additional References. (1) The diet and consumption portion of the proposed action complies with the 2008 Federal Columbia River Power System (FCRPS) Biological Opinion (BiOp; NOAA Fisheries 2008), the Reasonable and Prudent Alternatives (RPAs) included in the 2008 BiOp, and the 2010 FCRPS Supplemental BiOp (NOAA Fisheries 2010) to facilitate achievement of adult escapement goals identified for ESA-listed salmonids in the Columbia Basin. (2) Specifically, the action complies with RPA 67 requiring double-crested cormorant numbers in the CRE and their impact on outmigrating juvenile salmonids be monitored and a management plan be developed and implemented to decrease predation rates, if warranted.

While acknowledging the impacts discussed in the EA and outlined above, the COE is required by the National Environmental Policy Act (NEPA) to make a determination of the significance of those impacts. A checklist of considerations that help in making the determination of whether impacts of a project rise to the level of *significantly affecting the quality of the human environment* is provided in 40 CFR 1508.27. Following is the checklist from (1) to (10).

1. Significant impacts include both beneficial and harmful impacts: Only minor disturbances are expected from the construction of the privacy fence. Disturbance to double-crested cormorant is expected to a tolerable level and in a manner which does not

cause a complete failure of the nesting colony due to proposed activities. Benefits to other migratory birds are expected where they can utilize the space vacated by DCCOs for nesting and roosting.

2. Public health and safety: All boating safety requirements will be followed to transport materials to East Sand Island from Chinook Harbor. A safety boat will be available during transport to reduce conflict between public and contracted boat traffic. A construction safety plan is in place and there will be no adverse impacts to public health and safety due to construction activities on the uninhabited island, which is closed to general public use year round.
3. Unique characteristics of geographical area: No unique geographical characteristics of the area were identified for the proposed project. There will be no impacts or changes to the geographical characteristics of the area with this project.
4. Are effects on quality of the human environment controversial? Based on public review, there is no controversy over the effects of the proposed project.
5. Are the risks uncertain or unique? The proposed dissuasion (hazing) activity will likely force cormorants into areas of East Sand Island where high levels of bald eagle disturbance and corresponding gull predation were documented in 2011. This could result in a situation that reduces productivity at the DCCO colony on the island. Other unanticipated circumstances could cause large scale colony abandonment or reduced productivity at the ESI colony. If this occurs, scaling back or termination of dissuasion activities at ESI may be warranted to allow DCCOs to return to nest in the dissuasion area.
6. Future Precedents: The action is designed to provide research results that will help formulate long term solutions for reducing consumption of juvenile salmonids by DCCO in the Columbia River estuary. Future management actions would be analyzed through independent NEPA action. This proposed action is for a one-time research experiment which would not have significant long-term impacts.
7. Cumulative Impacts: The effects of the proposed project have been considered along with other reasonably foreseeable future actions within and adjacent to the project area. The proposed project is expected to only minimally have indirect effects beyond the impacts to the DCCO colony at East Sand Island. Only minor impacts are expected from the construction of the privacy fence. Lethal take of cormorants for diet and consumption studies affect only 0.55% of the total breeding population.
8. National Register of Historic Places and other historical and culturally significant places: The proposed project has been coordinated with District Cultural Resources Specialist. Project actions do not contain any registered properties or properties determined to be eligible for inclusion in the National Register.
9. Endangered Species Act: *No Effect* determinations were made for all listed species and designated critical habitats under the jurisdiction of the U.S. Fish and Wildlife Service.

10. Other Legal Requirements: There are no known violations of any federal, state, or local laws in the proposed action. The project has been coordinated with federal, state and local agencies to address all applicable laws.

Factors Considered. The EA and this FONSI have listed all of the important considerations and their environmental impacts; these, both individually and cumulatively, are not *significant* as *significant* has been defined by NEPA regulations and case law.

Conclusion. Based on the information obtained in the preparation of the Environmental Assessment for this proposal, it is concluded the proposed action will not have a significant impact on the quality of the human environment. Therefore, the preparation of an Environmental Impact Statement is not required.

Date

John W. Eisenhower, P.E.
Colonel, Corps of Engineers
District Commander

Appendix A: Literature Cited

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Personal Communication:

Lauren (Reinalda) Kerr, Bird Research Northwest: personal communication

Scott Pearson, Washington Department of Fish and Wildlife: personal communication

Appendix B: Cultural Resources Examination

Will be place here when consultation is complete

Appendix C: ESA-listed Fish

Evolutionarily Significant Unit (ESU) or Distinct Population Segment (DPS)	Status	Life History Type
CHINOOK		
Upper Columbia River Spring-run	Endangered	Stream
Sacramento River Winter-run	Endangered	Stream
Puget Sound	Threatened	Stream/Ocean
Snake River Spring/Summer-run	Threatened	Stream
Snake River Fall-run	Threatened	Ocean
Lower Columbia River	Threatened	Ocean
Upper Willamette River	Threatened	Ocean
Central Valley Spring-run	Threatened	Stream
Central Valley Fall and Late Fall-run	Species of Concern	Ocean
COHO		
Central California Coast	Endangered	Stream
Southern Oregon/Northern California	Threatened	Stream
Lower Columbia River	Threatened	Stream
Oregon Coast	Threatened	Stream
Southwest Washington	Undetermined	Stream
Puget Sound/Strait of Georgia	Species of Concern	Stream
CHUM		
Hood Canal Summer-run	Threatened	Ocean
Columbia River	Threatened	Ocean
SOCKEYE		
Snake River	Endangered	Stream
Ozette Lake	Threatened	Lake
STEELHEAD		
Upper Columbia River	Threatened	Stream
Central California Coast	Threatened	Stream
Snake River Basin	Threatened	Stream
Lower Columbia River	Threatened	Stream
California Central Valley	Threatened	Stream
Upper Willamette River	Threatened	Stream
Middle Columbia River	Threatened	Stream
Northern California	Threatened	Stream
Puget Sound	Threatened	Stream
Oregon Coast	Species of Concern	Stream
BULL TROUT		
All DPSs	Threatened	Trout

^a Based on species lists referenced from NOAA Fisheries and USFWS websites, accessed 11 August 2011 and 27 September 2011, respectively.

Appendix D: Federally Endangered and Threatened Fish and Wildlife and Plants

The following list summarizes species lists from the USFWS and NOAA Fisheries websites. These are the species that could occur in the project area.

Common Name	Scientific Name	Status
Birds		
Marbled murrelet	<i>Brachyramphus marmoratus</i>	T
Western snowy plover	<i>Charadrius alexandrinus</i>	T
Streaked horned lark	<i>Eremophila alpestris strigata</i>	C
Fish		
Chinook salmon	<i>Oncorhynchus tshawytscha</i>	*
Coho salmon	<i>Oncorhynchus kisutch</i>	*
Chum salmon	<i>Oncorhynchus keta</i>	*
Sockeye salmon	<i>Oncorhynchus nerka</i>	*
Steelhead salmon	<i>Oncorhynchus mykiss</i>	*
Lahontan cutthroat trout	<i>Oncorhynchus clarki ssp. henshawi</i>	T
Bull trout	<i>Salvelinus confluentus</i>	T
Borax Lake chub	<i>Gila boraxobius</i>	E
Hutton tui chub	<i>Gila bicolor ssp.</i>	T
Oregon chub	<i>Oregonichthys crameri</i>	T
Foskett speckled dace	<i>Rhinichthys osculus ssp.</i>	T
Tidewater goby	<i>Eucyclogobius newberryi</i>	E
Lost River sucker	<i>Deltistes luxatus</i>	E
Shortnose sucker	<i>Chasmistes brevirostris</i>	E
Warner sucker	<i>Catostomus warnerensis</i>	T
Modoc sucker	<i>Catostomus microps</i>	E
Green sturgeon (Southern DPS)	<i>Acipenser medirostris</i>	T
Pacific eulachon (Southern DPS)	<i>Thaleichthys pacificus</i>	T
Salish sucker	<i>Catostomus catostomus ssp.</i>	EC
Mammals		
Columbian white-tailed deer (Columbia River DPS)	<i>Odocoileus virginianus leucurus</i>	E
Salt marsh harvest mouse	<i>Reithrodontomys raviventris</i>	E
Riparian brush rabbit	<i>Sylvilagus bachmani riparius</i>	E
Pygmy rabbit (Columbia Basin DPS)	<i>Brachylagus idahoensis</i>	E
Steller sea lion (Western DPS)	<i>Eumetopias jubatus</i>	E
Reptiles		
Giant garter snake	<i>Thamnophis gigas</i>	T
Amphibians		
California red-legged frog	<i>Rana aurora draytonii</i>	T
California tiger salamander (Sonoma County DPS)	<i>Ambystoma californiense</i>	E
California tiger salamander (Central California DPS)	<i>Ambystoma californiense</i>	T
Columbia spotted frog (Columbia Basin DPS)	<i>Rana luteiventris</i>	C
Oregon spotted frog	<i>Rana pretiosa</i>	C

Invertebrates

Fender's blue butterfly	<i>Icaricia icarioides fenderi</i>	E
Lange's metalmark butterfly	<i>Apodemia mormo langei</i>	E
Callippe silverspot butterfly	<i>Speyeria callippe callippe</i>	E
Taylor's checkerspot	<i>Euphydryas editha taylori</i>	C
Conservancy fairy shrimp	<i>Branchinecta conservatio</i>	E
Vernal tadpole shrimp	<i>Lepidurus packardii</i>	E
Longhorn fairy shrimp	<i>Branchinecta longiantenna</i>	E
Vernal pool fairy shrimp	<i>Branchinecta lynchi</i>	T

Plants

Willamette daisy	<i>Erigeron decumbens</i> var. <i>decumbens</i>	E
Bradshaw's desert-parsley	<i>Lomatium bradshawii</i>	E
Contra Costa goldfields	<i>Lasthenia conjugens</i>	E
Presidio clarkia	<i>Clarkia franciscana</i>	E
Palmate-bracted bird's beak	<i>Cordylanthus palmatus</i>	E
Soft bird's beak	<i>Cordylanthus mollis</i> ssp. <i>mollis</i>	E
Showy Indian clover	<i>Trifolium amoenum</i>	E
Golden paintbrush	<i>Castilleja levisecta</i>	T
Water howellia	<i>Howellia aquatilis</i>	T
Kincaid's lupine	<i>Lupinus sulphureus</i> ssp. <i>kincaidii</i>	T
Pallid Manzanita	<i>Arctostaphylos pallid</i>	T

Key:

E = Endangered

EC = Endangered in Canada (not recognized as a subspecies in the U.S.)

T = Threatened

C = Candidate

* = see specific ESU or DPS listed-status of salmonids in Appendix C

APPENDIX E. 2012 Research Prospective from OSU

2012 DOUBLE-CRESTED CORMORANT RESEARCH AT EAST SAND ISLAND: SCALING METHODS OF HABITAT LIMITATION AND IDENTIFYING POSSIBLE CORMORANT RELOCATION SITES

August 9th, 2011

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RATIONALE AND BACKGROUND

Managers have expressed an interest in conducting pilot studies at the double-crested cormorant colony on East Sand Island near the mouth of the Columbia River. These pilot studies would be designed to assess potential methods for dissuading a portion of the cormorants from nesting at this colony and investigate where cormorants that leave East Sand Island might relocate. During the 2010 nesting season, the East Sand Island double-crested cormorant colony included about 13,600 breeding pairs (2011 data not yet available).

In 2011, an eight-foot tall chain-link privacy fence was constructed prior to the cormorant breeding season that separated the easternmost 15% of the 2010 nesting area (ca. 2000 nests) from the remaining core colony area (Figure 1). Ample habitat remained available west of this visual barrier to support historical nesting populations. Cormorants were successfully dissuaded from nesting east of the barrier using targeted human disturbance, primarily during the pre-laying and early-incubation periods. No eggs were laid by cormorants in the dissuasion area and after abandonment by cormorants, this portion of the island was used by nesting western/glaucous-winged gulls and roosting California brown pelicans. For a few days prior to the onset of human disturbance, cormorants were allowed to roost in the dissuasion area and 60 adult double-crested cormorants were captured and fitted with low-power VHF radiotelemetry tags. A large majority of tagged birds remained resident at East Sand Island throughout the breeding season and were regularly detected in areas west of the barrier fence in the core colony area. Preliminary field observations did not suggest a decline in the total number of cormorants attempting to nest at East Sand Island due to dissuasion, although further analysis to confirm this is ongoing. The results from 2011 demonstrate a method to controllably restrict the amount of suitable nesting habitat for cormorants at East Sand Island, at least at modest scales. Radio tagging studies indicated that small levels of habitat restriction are not likely to cause a measurable proportion of cormorants to disperse from East Sand Island.

PROSPECTIVE OBJECTIVE FOR 2012

Test habitat limitation methods at a larger scale, displacing a greater number of cormorants and providing greater encouragement for some cormorants to disperse from East Sand Island. Track dispersing cormorants using radio telemetry to identify alternative breeding sites.

TASK 1: ASSESS THE EFFICACY, COST, AND SCALABILITY OF METHODS TO REDUCE THE NUMBER OF DOUBLE-CRESTED CORMORANTS NESTING ON EAST SAND ISLAND BY LIMITING SUITABLE NESTING HABITAT

- Move the visual barrier (privacy fence) west to create a larger dissuasion area
 - Position fence at narrow isthmus of island (see Figure 2). About 62% of cormorants nesting in this area during 2010 (2011 nesting distribution data not yet available) would be in the proposed dissuasion area (ca. 8,400 nests).
 - Set up camp for hazers in the dissuasion area
- Haze cormorants on east side of visual barrier that display breeding behavior
 - Use human disturbance and other methods to haze cormorants
 - Test dissuasion techniques when less suitable habitat is available and cormorants are more motivated to use dissuasion area
 - Continue hazing until cormorant nest initiation is concluded in the Columbia River estuary (ca. June 15)
 - Allow for limited egg collection (up to 300) to support dissuasion
- Allow for an adaptive response or scaling back of pilot study if warranted
 - Provide in-season weekly updates on the effects of dissuasion on cormorants at East Sand Island to resource managers and other interested parties
 - If unacceptably large numbers of cormorants quit using East Sand Island and attempt to relocate to undesirable locations (e.g., Rice Island or other upper estuary sites), as determined by resource managers, then terminate dissuasion activities at East Sand Island so that cormorants might return to nest there.
- Monitor non-target species (Brandt's cormorants, gulls, pelicans) for potential impacts from double-crested cormorant dissuasion

TASK 2: TRACK ADULT CORMORANTS DISPLACED FROM THE EAST SAND ISLAND COLONY TO NEW AREAS OF USE

- Prior to onset of hazing activities, capture roosting cormorants in the dissuasion area for tagging and marking studies
 - If possible, tag individuals more likely to leave East Sand Island (e.g., cormorants attempting to nest at the east end of the dissuasion area who would have to move the farthest to nest in the undisturbed portion of the colony)
 - Attach high-power VHF radio telemetry tags to 150 cormorants
 - Attach satellite telemetry tags to 10 cormorants
 - Mark all captured cormorants with field-readable alphanumeric leg bands

- Track cormorants having VHF tags that disperse from East Sand Island
 - Aerial surveys in six distinct regions (14 survey flights total):
 - Lower Columbia (Bonneville Dam to river mouth) – 3 surveys
 - Upper Columbia Basin (above Bonneville Dam) – 2 surveys
 - Near Coast (Cape Lookout, OR north to Cape Flattery, WA) – 3 surveys
 - South and Central Oregon Coast – 2 surveys
 - Washington Inside Waters (Strait of Juan de Fuca, Puget Sound and north) – 2 surveys
 - Interior Basins (Summer Lake, Warner Valley, Upper Klamath, Malheur) – 2 surveys
 - Survey period from May 1 to July 31, depending on conditions
 - Each region will be surveyed at least twice during breeding season
 - Average of ~1 flight per week; timing will be dependent on conditions
 - Nine of these 14 flights could potentially be in combination with ongoing surveys (e.g., to determine the distribution and colony size of Caspian terns)
 - Survey design intended to identify potential cormorant nesting areas or areas of sustained use, assuming a low to moderate proportion of tagged birds disperse from East Sand Island. To identify areas of temporary use would require a higher frequency of sampling (aerial surveys). If a large proportion of tagged birds disperse, more frequent surveys might be warranted and will depend on the availability of funding.
 - Additional tracking would occur opportunistically at cormorant colonies where we are conducting regular field work (e.g., Foundation Island and North Potholes colonies)

- Track cormorants having satellite tags that disperse from East Sand Island
 - Program tags to collect nighttime location fixes every other day during breeding season (May 1 – July 31) and one location per week thereafter for as long as tag is operational
 - Satellite tag results may be used to adjust aerial surveys to track cormorants having VHF tags (e.g., if new areas of use are identified)

- Opportunistically collect resighting data from banded cormorants that disperse from East Sand Island
 - Conduct systematic band resighting at various locations where ongoing research and monitoring is being conducted (e.g., Foundation Island, Upper Klamath Basin)
 - Develop methods to collect band resighting information electronically to improve the efficiency of data collection and access to in-season resighting information
 - Appeal to agency personnel and general public (e.g., birders) to report resightings

- Assess cormorant abundance and behavior (e.g. breeding or loafing) at sites frequented by tagged and/or banded birds through site visits or consultations with local resource managers



Figure 1. Aerial photograph of the visual barrier (fence) during the 2011 East Sand Island double-crested cormorant breeding season. Cormorants are nesting to the west (left) of the fence, but not in the dissuasion area to the east. Temporary structures are in place to the east of the barrier to accommodate hazers and cormorant capture activities.

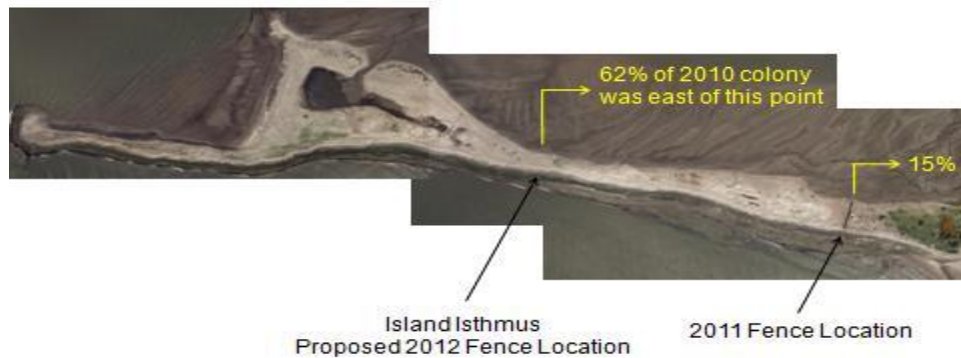


Figure 2. Aerial photograph of the 2011 East Sand Island cormorant colony indicating the proportions of nesting cormorants (in 2010, the most recent year for which nesting distribution data are available) that were east of the implemented 2011 visual barrier (fence) location and that were east of the proposed 2012 location.

Appendix F: Agency and Public Comments and Responses