

United States Government

Department of Energy  
Bonneville Power Administration

# Memorandum

DATE: March 20, 2006

REPLY TO  
ATTN OF: KEC-4

SUBJECT: Avian Predation on Juvenile Salmonids in the Lower Columbia River Research Project  
Supplement Analysis (DOE/EA-1374-SA-05)

to: Dorie Welch - KEWU-4  
Project Manager

**Proposed Action:** Avian Predation On Juvenile Salmonids in the Lower Columbia River  
Research Project - Modifications to Original Proposal

**Project No:** 1997-02-400

**Location:** Columbia and Snake Rivers

**Proposed by:** Bonneville Power Administration (BPA), USGS-Oregon Cooperative Fish and  
Wildlife Research Unit, Oregon State University, and U. S. Army Corps of Engineers.

**Introduction:** The Bonneville Power Administration prepared a multi-year Environmental  
Assessment (EA) and Finding of No Significant Impact (FONSI) on this project in April of 2001  
and a Supplement Analysis (SA) to that EA in 2002, 2003, 2004 and 2005.

- The project involves multi-year research on Caspian terns, double-crested cormorants,  
and glaucous-winged gulls begun in 1997.
- The activities examined in the EA focused on measuring the salmonid smolt  
consumption rate of tern, cormorant, and gull populations in the lower Columbia River.
- Additionally, this project measures the impacts of this research on brown pelicans  
roosting in the area. Additional changes are being proposed to the project in 2006, thus a  
fifth SA has been prepared to determine if a supplemental EA is needed to analyze the  
environmental impacts of the proposed changes to the program since the Final EA and  
FONSI were completed.

**Description of Action and Analysis:** The proposed changes for 2006 to the program and an  
analysis of their environmental impacts are described in the attached SA.

**Findings:** The project falls within objectives listed in Section 5 “Juvenile Salmon Migration”  
(5.7B.20, 5.7B.21, 5.7B.22) in the Northwest Power Planning Council’s Columbia River Basin  
Fish and Wildlife Program (NPPC 1994). This Supplement Analysis finds 1) that the proposed  
actions are substantially consistent with the Avian Predation on Juvenile Salmonids in the  
Lower Columbia River Research Project Environmental Assessment (DOE/EA-1374) and

Finding of No Significant Impact, 2) that there are no new circumstances or information relevant to environmental concerns and bearing on the proposed actions or their impacts. Therefore, no further NEPA documentation is required.

/s/ Colleen A. Spiering  
Colleen A. Spiering  
Environmental Project Lead

CONCUR:

/s/ Katherine S. Pierice  
Katherine S. Pierce  
NEPA Compliance Officer

DATE: March 20, 2006

Attachment  
Avian Predation on Juvenile Salmonids in the Lower Columbia River Research Project  
Supplement Analysis

cc: (w/ attachment)  
Mr. Daniel Roby, Oregon State University  
Ms. Kim Collis, Real Time Research Inc.  
Mr. Gary Dorsey, U. S. Army Corps of Engineers  
Ms. Sarah Dunmire, U. S. Army Corps of Engineers  
Mr. Jeff. Leier, U. S. Army Corps of Engineers

**Avian Predation on Juvenile Salmonids in the  
Lower Columbia River Research Project**

**Supplement Analysis**

DOE/EA-1374-SA-05

Prepared by the Bonneville Power Administration

March 2006

# **Avian Predation on Juvenile Salmonids in the Lower Columbia River Research Project**

## **Supplement Analysis**

March 20, 2006

### **1. Introduction**

The Bonneville Power Administration (BPA) and the U.S. Army Corps of Engineers are funding ongoing research on Caspian terns, double-crested cormorants, and several species of gulls (glaucous-winged, western, California, and ring-billed) begun in 1996. BPA analyzed environmental impacts of the research in an Environmental Assessment (EA) completed in 2001 (DOE/EA-1374). The purpose of this Supplement Analysis (SA) is to determine if a supplemental EA is needed to analyze additional research activities proposed as part of that project.

### **2. NEPA Analysis to Date**

The Avian Predation on Juvenile Salmonids in the Lower Columbia River Research Project EA (DOE/EA-1374) analyzed impacts of undertaking research on the effects of piscivorous birds on survival of juvenile salmonids in the lower Columbia River to aid in potential future Federal Columbia River Power System (FCRPS) predator management. To determine their impact, the project involved the following activities: (1) survey the managed Caspian tern colonies in the Columbia River estuary and along the nearby Washington coast, (2) study the food habits, energy requirements, and smolt consumption rates of managed adult and pre-fledging Caspian terns nesting in colonies in the Columbia River estuary, (3) determine foraging distribution, foraging range, and habitat use of managed Caspian terns in the Columbia River estuary and along the Washington coast, (4) survey unmanaged double-crested cormorant and glaucous-winged/western gull nesting colonies in the Columbia River estuary and unmanaged Caspian tern nesting colonies on the lower Columbia River above John Day Dam, and (5) study the food habits, energy requirements, and smolt consumption rates of unmanaged double-crested cormorants and Caspian terns.

Based on the analysis in the EA, BPA determined that the proposed action is not a major Federal action significantly affecting the quality of the human environment, within the meaning of the National Environmental Policy Act (NEPA) of 1969. Therefore, the preparation of an Environmental Impact Statement (EIS) was not required, and BPA issued a Finding of No Significant Impact (FONSI) on April 5, 2001. An SA was also prepared for activities in 2002, 2003, 2004, and 2005.

### **3. Description of the Proposed Action**

Ten specific actions were analyzed in the 2001 EA. They are listed below and described in more detail in sections 2.2.1 through 2.2.10 of the EA.

1. Survey managed Caspian tern colonies in the Columbia River estuary and along the nearby Washington coast.
2. Study the food habits, energy requirements, and smolt consumption rates of managed adult and pre-fledging Caspian terns nesting in colonies in the Columbia River estuary.
3. Determine foraging distribution, foraging range, and habitat use of managed Caspian terns in the Columbia River estuary and along the nearby Washington coast.
4. Survey unmanaged double-crested cormorant and glaucous-winged/western gull nesting colonies in the Columbia River estuary and unmanaged Caspian tern nesting colonies on the lower Columbia River above John Day Dam.
5. Study the food habits, energy requirements, and smolt consumption rates of unmanaged double-crested cormorants nesting in the Columbia River estuary and unmanaged Caspian terns nesting on the lower Columbia River above John Day Dam.
6. Determine foraging distribution, foraging range, and habitat use of unmanaged double-crested cormorants nesting in the Columbia River estuary and unmanaged Caspian terns nesting on the lower Columbia River above John Day Dam.
7. Study the food habits of double-crested cormorants nesting in Grays Harbor.
8. Monitor effects of this research on endangered California brown pelicans roosting on East Sand Island.
9. Under the direction of the Working Group, ensure tern colony restoration by removing predatory birds from the East Sand Island Caspian tern colony.
10. Provide technical assistance to the Interagency Caspian Tern Working Group.

### **4. New Activities and Circumstances Since the Earlier NEPA Document**

Techniques for collecting the required data in 2006 would not differ from those described in the 2001 EA. Breeding colonies surveyed, number of birds collected, and locations of bird collections would, however, differ slightly from 2001.

Changes in 2006 activities from 2001 would include:

Section 2.2.2 Collection of adult Caspian terns at East Sand Island for food habits analysis would be increased from 160 to 180 birds. The larger number of Caspian terns collected for diet analysis would be used to increase the sample size of juvenile salmonids collected for diet composition analysis. As in 2001, this

activity will be accomplished during a 16-week period from April through July, encompassing the entire Caspian tern nesting season on East Sand Island.

Up to 60 breeding adult terns will be captured on the East Sand Island colony late in the incubation period or early in the chick-rearing period using noose-mat traps and banded with auxiliary bands to measure adult survival. Thirty of these adults will be force-fed fish containing PIT tags. These terns will be held for a short period to ensure that the fish has been ingested (i.e., not regurgitated after being force fed) and then released back onto the colony. Terns will also be marked to facilitate post-release observations of behavior. Following the breeding season and after all the terns have left the colony, East Sand Island will be scanned for PIT tags by NOAA Fisheries and the proportion of force-fed tags that are detected on-colony will be determined. The detection rate of force-fed PIT tags will be used as an estimate of the on-colony deposition rate of ingested PIT tags. This information will be used to evaluate and adjust estimates of smolt predation based on PIT tags recovered from the East Sand Island tern colony.

Section 2.2.4 Unmanaged bird colonies surveyed would be expanded to include (1) a nesting colony of double-crested cormorants on Foundation Island in the up-river portion of the lower Columbia River study area, (2) colonies of Caspian terns on Rock Island in John Day Pool and in the Potholes Reservoir near Moses Lake, Washington, (3) an up-river colony of American white pelicans on Badger Island, (4) a colony of double-crested cormorants on Potholes Reservoir, and (5) an up-river colony of double-crested cormorants on the Mid-Columbia River at the mouth of the Okanogan River. Ground counts of breeding adults and their young would be carried out at each of these colonies to estimate breeding population size and productivity. These data will be used to determine population trends at each of these colonies by comparing colony censuses with earlier counts from censuses conducted previously.

Section 2.2.5 Studies of the food habits, energy requirements, and smolt consumption rates of unmanaged colonies of piscivorous waterbirds would not only include double-crested cormorant colonies in the Columbia River estuary and Caspian tern colonies on the lower Columbia River above John Day Dam, but would be expanded in 2006 to include any unmanaged Caspian tern or double-crested cormorant nesting colonies on the lower or mid-Columbia River above Bonneville Dam. During 2001-2005, hundreds of pairs of double-crested cormorants nested on Foundation Island above McNary Dam. Double-crested cormorant colonies also exist in Potholes Reservoir (within commuting distance of the mid-Columbia River) and at the confluence of the Okanogan and Columbia rivers. There was at least one breeding colony of Caspian terns on Potholes Reservoir as well, and these terns are known to commute to the mid-Columbia River to forage on juvenile salmonids.

The predation rates on various ESUs of juvenile salmonids by Caspian terns nesting on Crescent Island are currently measured by recovering smolt PIT tags on the surface of the tern colony once all the terns have left the colony at the end of the nesting season. Predation rates from PIT tag recoveries would be refined and adjusted for the proportion of ingested smolt PIT tags that are deposited off-colony by providing live PIT-tagged salmonids in net pens<sup>1</sup> for the terns to capture and consume. In 2006, two net pens would be stocked with hatchery-reared, sterile, certified disease-free rainbow trout, all of which had been marked with PIT tags. The proportion of PIT tags from fish removed from the net pens by Caspian terns that are subsequently recovered on the Crescent Island tern colony would provide an estimate of the rate at which ingested smolt PIT tags are deposited on the breeding colony. One trout net pen would be deployed in Burbank Slough and the other would be deployed near the mouth of the Walla Walla River.

Collection of adult double-crested cormorants at East Sand Island for food habits analysis would be expanded from 120 to 180 birds (10 each week for 18 weeks). As in 2001, adult cormorants would be collected as they transport fish in their stomach and esophagus back to the colony on East Sand Island. This activity would be accomplished throughout the 18-week nesting period from April to early August. The larger sample of adult cormorants that would be collected in 2006 is designed to compensate for the lack of collections of nestling regurgitations during the chick-rearing period. In 2001, all cormorant diet data from East Sand Island during the chick-rearing period (mid-June to late July) were obtained by collecting nestling regurgitations on the colony at night. This procedure involved some disturbance to endangered California brown pelicans that roost on East Sand Island at night during the cormorant nestling-rearing period. In order to avoid this disturbance of a listed species, no collection of cormorant nestling regurgitations on East Sand Island would occur in 2006; instead collection of adult cormorants for diet studies would continue through the nestling-rearing period.

Food habits analysis at the up-river cormorant colony on Foundation Island would involve the collection of up to 200 regurgitations and up to 30 breeding adults for stomach contents analysis. The cormorant regurgitations would be collected by walking beneath trees where active nests are located and picking food samples up off the ground that are spontaneously regurgitated by adults and nestlings overhead. Regurgitation sample collections would be evenly distributed across the 16-week nesting period. The 30 breeding adults would be collected off-colony using shotguns early in the nesting season, when juvenile salmonids appear to be most prevalent in the diet.

---

<sup>1</sup> The placement of net pens was not covered in the original 2001 Environmental Assessment. NEPA coverage for the use of net pens with Categorical Exclusions (CX) will be completed by the US Army Corps of Engineers. They are contributing some funding for the Avian Predation research.

Up to 15 adult double-crested cormorants that are nesting in the Columbia River estuary (not on East Sand Island) and have been injected with doubly labeled water would be collected using firearms. This activity was planned for East Sand Island in 2001, but was curtailed because endangered California brown pelicans were roosting close to the portion of the cormorant colony where the activity was planned and would have been disturbed. Consequently, this research activity would be completed with cormorants nesting on pilings or channel markers elsewhere in the estuary, or on Rice Island or Miller Sands Spit; locations where no brown pelicans roost.

Finally, up to 60 breeding adult terns would be captured on the Crescent Island colony late in the incubation period or early in the chick-rearing period using noose-mat traps and banded with auxiliary markers to measure adult survival. Up to 30 of these adult terns would also be force-fed fish containing PIT tags. These terns would be held for a short period to ensure that the fish has been ingested (i.e., not regurgitated after being force fed) and then released back onto the colony. Terns will also be marked with dye to facilitate post-release observations of behavior. Following the breeding season and after all the terns have left the colony, Crescent Island will be scanned for PIT tags by NOAA Fisheries and the proportion of force-fed tags that are detected on-colony will be determined. The detection rate of force-fed PIT tags will be used as an estimate of the on-colony deposition rate of ingested PIT tags. This information will be used to evaluate and adjust estimates of smolt predation based on PIT tags recovered from the Crescent Island tern colony.

Section 2.2.6 An effort would be made to test habitat manipulation and social attraction techniques as methods to manage the breeding population of double-crested cormorants in the Columbia River estuary. Enhancement of nesting substrate and deployment of cormorant decoys and audio playback systems would be employed in an effort to attract double-crested cormorants to nest at sites on East Sand Island, Trestle Bay, Miller Sands Spit, and Rice Island where cormorants have not recently nested. Also, small areas ( $< 50 \text{ m}^2$ ) of the existing cormorant breeding colony on East Sand Island would be manipulated to determine whether cormorants could be dissuaded from using particular sites for nesting by altering the nesting substrate. Social attraction experimental sites on East Sand Island would also be lined with plastic material in an effort to recover all smolt PIT tags egested by cormorants nesting on these experimental plots. These studies would not only test the feasibility of non-destructive techniques for managing the very large and growing colony of double-crested cormorants on East Sand Island, it would also provide better data on the predation rates of double-crested cormorants on Columbia Basin juvenile salmonids.



## 5. Effects of Project Activities Not Previously Evaluated

Section 3.2.2 The EA for research in 2001 proposed collecting up to 160 adult Caspian terns for food habits studies, but only 112 adult terns were collected (0.6% of the breeding population). In 2006, the proposed research would collect up to 180 adult Caspian terns on East Sand Island (1.0% of the 2005 breeding population). Caspian tern nesting success on East Sand Island in 2001, 2002, 2003, and 2004 was high; a total of approximately 40,000 young terns were successfully raised and fledged from the island in those four years. Even if post-fledging survival was poor, this level of nesting success would be expected to result in the recruitment of at least 15,000 terns into the breeding adult population in the next 4-5 years. Caspian tern nesting success on East Sand Island in 2005 was only fair, but approximately 3,300 young Caspian terns were successfully raised and fledged last year. Consequently, the proposed level of take of adult terns in 2006 would have no detectable effect on the population trajectory over the next few years.

To color-band adults and measure PIT tag deposition rates on East Sand Island, noose mats will be used to capture up to 60 breeding adult terns during the peak of incubation or early in the chick-rearing period. Half these terns would be force fed fish containing PIT tags and released after a brief (<1 hr) holding period. Each PIT-tagged fish will be 5–15 cm long and weigh approximately 10–30 g. All fish will be certified, disease-free triploid trout obtained from the Trout Lodge Hatchery, WA. Noose mats have been used to capture hundreds of breeding adult Caspian terns on the lower Columbia River; this method has not resulted in any detectable injury to captured adults. Egg damage/loss and nest abandonment as a result of this activity are possible; however, we expect this to be minimal.

Section 3.2.4 As in 2001, ground-based, boat, and fixed-wing aircraft surveys, and re-sightings of banded adults are not expected to disturb any birds in the area (see sections 3.2.1 and 3.2.3 of the 2001 EA). Fixed-wing aircraft fly at about 700 feet elevation above ground level (agl), high enough to not disturb birds in the area. Ground counts are conducted from blinds or from boats at a sufficient distance to not disturb the colony.

Section 3.2.5 The project proposes to collect up to 180 adult cormorants at East Sand Island for diet studies in 2006. Based on the colony size of 12,200 breeding pairs in 2005, if all 180 adult cormorants were collected it would represent 0.7% of the breeding population at East Sand Island. Nesting success of double-crested cormorants on East Sand Island in 2005 was good, and approximately 17,000 young cormorants were successfully fledged. Thus, the collection of up to 180 adult cormorants from this population would not have a detectable effect on

colony size. Collecting up to 60 more adult cormorants in 2006 compared to 2001 would allow the proposed research objectives to be accomplished without entering the cormorant colony at night and potentially disturbing endangered California brown pelicans, which use the East Sand Island cormorant colony as a communal night roost.

Up to 30 breeding adult double-crested cormorants and 200 cormorant regurgitations would be collected for diet analysis at the breeding colony on Foundation Island. This colony uses arboreal nest sites; nesting success has been good, and the colony size has increased over the last decade. Colony size was estimated at least 315 nesting pairs in 2005, so collection of up to 30 breeding adults would be less than 5% of the breeding colony and not have a significant effect on this colony. Adults would be collected off-colony, so no disturbance of breeding birds on-colony would occur.

A maximum of 15 adult double-crested cormorants would be collected from nesting areas in the estuary other than the East Sand Island colony as part of proposed research on cormorant energy expenditure rates using the doubly labeled water technique. Resightings of marked adult cormorants in the Columbia River estuary indicate that breeding adults move among several nesting colony sites in the estuary, including East Sand Island, Rice Island, and the Miller Sands channel markers, and none of these nesting areas represents a distinct breeding population. Conducting the proposed research at nesting areas away from East Sand Island would avoid disturbing endangered California brown pelicans, which use the East Sand Island cormorant colony as a communal night roost.

To band adult Caspian terns and measure PIT tag deposition rates on Crescent Island, noose mats will be used to capture up to 60 breeding adult terns during the peak of incubation or early in the chick rearing period. Thirty of these terns will be force fed fish containing PIT tags and released after a brief (<1 hr) holding period. Each PIT-tagged fish will be 5–15 cm long and weigh approximately 10–30 g. All fish will be certified, disease-free triploid trout obtained from the Trout Lodge Hatchery, WA. Noose mats have been used to capture hundreds of breeding adult Caspian terns on the lower Columbia River; this method has not resulted in any detectable injury to captured adults. Egg damage/loss and nest abandonment as a result of this activity are possible; however, we expect this to be uncommon.

## 6. Findings

**Findings:** The project falls within objectives listed in Section 5 “Juvenile Salmon Migration” (5.7B.20, 5.7B.21, 5.7B.22) in the Northwest Power Planning Council’s Columbia River Basin Fish and Wildlife Program (NPPC 1994). This Supplement Analysis finds 1) that the proposed actions are substantially consistent with the Avian

Predation on Juvenile Salmonids in the Lower Columbia River Research Project Environmental Assessment (DOE/EA-1374) and Finding of No Significant Impact, 2) that there are no new circumstances or information relevant to environmental concerns and bearing on the proposed actions or their impacts. Therefore, no further NEPA documentation is required