

Objective 1. Monitor and evaluate the effects of experimental habitat modification and nest dissuasion actions on the double-crested cormorant colony at East Sand Island.

Task 1.1 - Implement experimental habitat modification and dissuasion. Method: *In 2013, **NEW** DCCO nesting habitat will be restricted to 4.5 acres (compared to 11 acres in 2012) between the two privacy fences. This level of displacement and restriction of excess nesting habitat is expected to encourage a greater number of individual DCCO to prospect for alternative nest sites away from ESI, providing a better opportunity to observe the potential effects of a large scale management action of this type. Habitat modification features (i.e., privacy fences) may be removed and/or cormorant dissuasion measures (i.e., hazing nesting birds) reduced or terminated if the size of the DCCO colony on ESI is less than 8,000 active nesting pairs on or around 21 May 2012.*

2014 - NA

Task 1.2 – Monitor and evaluate DCCO colony at ESI. Method: *boat-based, land-based, and aerial surveys.*

Task 1.3 – Monitor and evaluate DCCO colony in the LCRE. Method: *boat-based and aerial surveys.*

Task 1.4 – Monitor and evaluate movement and dispersal patterns. Identify and characterize alternative colony sites within and outside the LCRE. Method: *Re-sight banded birds; remote interrogation of satellite tags.*

Task 1.5 - Identify the presence and geographic distribution of ESA-listed salmonid populations and other fish of conservation concern in areas where double-crested cormorants from East Sand Island are likely to recruit. Method: *In 2013, **NEW** estimate potential impacts to fisheries by developing and applying a regional bioenergetics model based on colony size and available prey resources.*

Objective 2. Evaluate diet composition, smolt consumption, and stock-specific predation rates on juvenile salmon and other fish species by double-crested cormorants nesting at the East Sand Island colony.

Task 2.1 - Estimate diet composition. Methods: *lethal take of adults, n = 135*

Task 2.2 - Estimate ESU/DPS-specific predation rates on juvenile salmonids. Method: *PIT recovery.*

Task 2.3 – Estimate and relate cormorant predation on salmonids to availability of other forage fishes in the LCRE. Method: *purse seine at MCR. * Not likely to be funded in 2013.*

Task 2.4 – Estimate impacts on juvenile salmonids by double-crested cormorants nesting on East Sand Island using a bioenergetics model. Method: *bioenergetics estimation. Key input variables: # adults, # chicks, diet (% biomass).*

Objective 3. Monitor and evaluate changes in the numbers and distributions of other non-target waterbird species (i.e., Brandt's cormorants, glaucous-winged/western gulls, California brown pelicans) on East Sand Island during experimental habitat modification and dissuasion measures.

Task 3.1 – Monitor the numbers (roosting and nesting individuals) and distributions of other non-target bird species on East Sand Island. Method: *boat-based, land-based, and aerial surveys*

Task 3.2 - Compare the numbers and distributions of non-target bird species in 2013 to data collected in previous years to establish baseline status and trend information. Method: *analysis*

Objective 4. Provide analytical and technical support at a program level. Develop and improve methods to collect, analyze, summarize, report, disseminate, and store project data.

Task 4.1 - Coordinate tasks under this study with other related research on double-crested cormorants in the Columbia River basin. *Method: Participate in meetings and site visits, and provide supporting materials.*

Task 4.2 - Develop and update mobile data collection methodologies. *Product: Update software*

Task 4.3 - Maintain and manage in-season and historical data for double-crested cormorants. *Method/product: development of a (a) **web-based data-portal** and (b) **web-based geospatial database**.*

(a) Web-based data-portal - Project personnel web access with access to project data; real-time upload and download protocols.

(b) Web-based geospatial database - Primary analytics include: Map of colony location, scaled to colony size (range); Map of foraging range (25km) and scaled to intensity based on colony size; Map of DCCO pattern of movement. Route of individual birds; Map of suitable habitats that DCCO might recruit to; Map of forage fish distribution (and species of concern); In 2013, NEW map energetic demand based on DCCO colony size and available forage fish. In 2013, NEW develop input portal for banded birds.

Task 4.4 - Maintain a project website. *Product: <http://www.birdresearchnw.org>*

Task 4.5 - Disseminate project information and results. *Product: Annual Report, Technical Memo and GIS Layers characterizing prior biological conditions at ESI, Technical Memo summarizing prior experimental measures and the effects, present findings to AFEP.*

FY13 AVS-P-08-02

Objective 1. Research, monitor, and evaluate Caspian tern nesting colonies at Corps-constructed Caspian tern sites (islands) outside the Columbia River basin.

Task 1.1. Determine nesting chronology, colony size, colony attendance, nesting success, foraging habitat use, factors limiting colony size and nesting success, diet composition, and impact on ESA-listed suckers and other fish species of conservation concern by Caspian terns nesting at the Corps-constructed Caspian tern sites in interior Oregon and northeastern California. **Methods:** *social attraction, land-based surveys, gull dissuasion, bill counts (diet), PIT recovery, identify foraging range, resight banded adults and fledglings.* **Locations:** *Crump Lake tern island, Summer Lake Wildlife Area tern islands (East Link, Gold Dike), Tule Lake NWR tern island (Sump 1B), Lower Klamath NWR tern islands (Sheepy Lake, Orems Unit) and Malheur NWR tern island (Malheur Lake).*

Task 1.2. Install and maintain remote video recorders as a means to monitor and collect data on predator and competitor activities on nesting habitat at Corps-constructed Caspian tern sites, both prior to and after tern colony formation. **Locations:** *Malheur NWR (Malheur Lake island), Lower Klamath NWR (Sheepy Lake island), Tule Lake NWR (Tule Lake Sump 1B island), and Crump Lake island*

Task 1.3. Identify locations other than on Corps-constructed islands where Caspian terns dispersing from East Sand Island may be prospecting for or establishing new nest sites. **Method:** *aerial surveys, land-based surveys (pending), query re-sighting survey data (mybandedtern.org).* **Locations:** *Coastal Washington, interior Oregon, northeastern California, and other sites as needed.*

Objective 2. Provide analytical and technical support at the program level for implementation of the Caspian Tern Management Plan for the Columbia River Estuary; develop and improve methods to collect, store, analyze, summarize, report, and disseminate project data.

Task 2.1 - Coordinate tasks under this study with other related avian research in the Columbia River basin and elsewhere to better understand inter-related and inter-dependent effects. Participate in meetings and site visits, and provide supporting material as requested by the Corps.

Task 2.2. Maintain and manage in-season and historical project data via a “**web-based data-portal**”. Product: project personnel web access with access to project data; real-time upload and download protocols.

Task 2.3. Maintain project websites (www.birdresearchnw.org, with both in-season and historical information on Caspian terns and other species of piscivorous colonial waterbirds nesting at various islands built by the Corps. Product: <http://www.birdresearchnw.org>

Task 2.4 – Disseminate information and results; make research findings accessible to resource managers. Product: *Annual Report, present findings to AFEP.*

Funding Contribution by Agency (adapted from Table 1, 2012 DRAFT Annual Report, Roby et.al)

	Funding Contribution by Agency		
	BPA	USACE PDX District	USACE WW District
Caspian Terns			
Preparation and Modification of Nesting Habitat			
Columbia River Estuary		x	
Interior Oregon and Northeastern California		x	
Colony Size and Productivity			
Columbia River Estuary	x		
Columbia Plateau			x
Coastal Washington		x	
Interior Oregon and Northeastern California		x	
Diet Composition and Salmonid Consumption			
Columbia River Estuary	x		
Columbia Plateau			x
Coastal Washington			
Interior Oregon and Northeastern California		x	
Predation Rates Based on PIT Tag Recoveries			
Columbia River Estuary		x	
Columbia Plateau			x
Coastal Washington			
Interior Oregon and Northeastern California		x	
Color Banding and Band Resightings			
Columbia River Estuary	x		
Columbia Plateau			x
Coastal Washington			
Interior Oregon and Northeastern California		x	
Double-crested Cormorants			
Nesting Distribution and Colony Size			
Columbia River Estuary	x	x	
Columbia Plateau			x
Coastal Washington		x	
Interior Oregon and Northeastern California		x	
Nesting Success			
Columbia River Estuary	x	x	
Columbia Plateau			x
Coastal Washington			
Interior Oregon and Northeastern California			
Diet Composition and Salmonid Consumption			
Columbia River Estuary	x	x	
Columbia Plateau			x
Coastal Washington			
Interior Oregon and Northeastern California			
Predation Rates Based on PIT Tag Recoveries			
Columbia River Estuary	x	x	
Columbia Plateau			x

Funding Contribution by Agency

	BPA	USACE PDX District	USACE WW District
Color Banding		x	
Evaluation of Management Techniques			
Techniques to Encourage Nesting		x	
Techniques to Discourage Nesting		x	
Other Piscivorous Waterbirds			
Distribution			
Columbia River Estuary	x		
Columbia Plateau			x
Coastal Washington			
Interior Oregon and Northeastern California		x	
Diet Composition			
Columbia River Estuary			
Columbia Plateau			
Coastal Washington			
Interior Oregon and Northeastern California			
Predation Rates Based on PIT Tag Recoveries			
Columbia River Estuary	x		
Columbia Plateau			x
Steelhead Susceptibility Study			x
Distribution of Piscivorous Waterbirds in McNary Pool			x

