Technical Memorandum

Date:	January 19, 2012
To:	Heather Griffin City of Everett Public Works Department 3200 Cedar Street Everett, WA 98201
From:	Torrey Luiting, Project Manager and Wetland Biologist Scott Spooner, Wildlife Biologist
Subject:	**Year 5 Fall Wildlife Monitoring—Smith Island/Union Slough Restoration Project**

The purpose of this memo is to present the results of Year 5 fall wildlife monitoring conducted to meet the requirements of the 2002 *Smith Island Habitat Restoration and Dike Maintenance Project Wetland Mitigation Plan* and related project permits, as described below.

Background

The City of Everett Water Pollution Control Facility (EWPCF), which treats wastewater from the City of Everett and southwest Snohomish County, is located on Smith Island along Union Slough. Smith Island is located in the Snohomish River estuary, east of downtown Everett and Interstate 5. Everett Public Works Department (EPWD) was required by the U.S. Army Corps of Engineers (Corps) and the Washington State Department of Ecology (Ecology) to develop a wetland mitigation plan with associated long-term monitoring to compensate for wetland impacts associated with raising and/or widening dikes around the EWPCF and along the Snohomish River. Construction of a dike-breach restoration project was proposed in the *Smith Island Habitat Restoration and Dike Maintenance Project Wetland Mitigation Plan* (wetland mitigation plan) (Jones & Stokes 2002). The project was to be constructed on an approximately 58-acre site (mitigation site) on Smith Island to the east of the EWPCF. Restoration would be accomplished by breaching the dike along Union Slough and reestablishing tidal inundation to the diked freshwater wetlands present throughout most of the mitigation site. The primary goals of the wetland mitigation plan were to reestablish intertidal wetlands on the mitigation site and improve salmonid rearing habitat in the Snohomish River estuary by tidally reconnecting the mitigation site to the river.

Specifically, the mitigation plan identified the following goals and performance standards to measure achievement of those goals (Jones & Stokes 2002). Achievement of performance standards is required for successful mitigation and compliance with Corps and Ecology permits.

Goal Number 1. Provide 58 acres of intertidal habitat available for salmonid rearing and feeding.

> *Performance Standard for Goal Number 1.* The as-built configuration must be presented to USACE and Ecology to document the actual mitigation area. As-built conditions will be determined by either a ground survey or aerial photography (scaled plan view). The total

mitigation acreage will be based on the area between the toes of the dikes that surround the mitigation area.

Goal Number 2. Provide 37 acres as potential mitigation area for future City of Everett projects, 13.1 acres of mitigation for dike maintenance project impacts, and 7.9 acres of mitigation for conversion of freshwater wetlands to intertidal wetlands in the mitigation site.

Performance Standard for Goal Number 2. As-built drawings will be used to determine the actual acreage available for future projects based on the total mitigation area minus the mitigation acreage required to compensate for the dike project (21 acres).

***Goal Number 3*.** Create intertidal habitat by breaching the Union Slough dike and developing alternating periods of inundation and exposed ground surface.

Performance Standard for Goal Number 3. The mitigation site must be inundated by tidal action on a daily frequency as observed in Union Slough. Water elevations in the mitigation site at high tide will be equivalent to those in Union Slough. To document tidal exchange as complete, no more than 5% of the site should support small isolated pools of water. In addition, the timing of high tide in the mitigation site should be similar to that in the adjacent Union Slough.

Goal Number 4. Minimize fish stranding in isolated ponds during low tides.

Performance Standard for Goal Number 4. The mitigation site will be visually inspected each month at low tide during the first 12 months of operation and then quarterly thereafter. If shallow (less than 18 inches) isolated ponds are observed at low tides to be stranding fish, outlet channels that will drain at low tide will be established to ensure drainage and fish egress.

Goal Number 5. Maintain the mitigation site to control establishment of nonnative, invasive cordgrass (*Spartina* spp.) and purple loosestrife (*Lythrum salicaria*).

Performance Standard for Goal Number 5. Cordgrass and purple loosestrife will be prevented from exceeding 1% and 5% total cover, respectively, in the mitigation site throughout the 10-year monitoring period.

Goal Number 6. Establish vegetation on breach slopes and dikes surrounding the EPWD mitigation site and document a positive trend in the development of native intertidal species on the site.

Performance Standards for Goal Number 6. More than 80% of the shrubs that are planted on the dike slopes must be alive at the end of the second year after planting and will cover at least 50% of the planted area after the fifth year. Survivability means those plants that are alive as evidenced by living leaves or green bark cambium tissue (as determined by a small thumbnail nick on the bark of the main stem).

A positive trend in the development of intertidal plant communities will be achieved by increasing either the cover of native intertidal species or the number of native intertidal plant species in the mitigation area.

Goal Number 7. Increase the database of scientific information relative to restoring the Snohomish River estuary.

Performance Standard for Goal Number 7. Monitoring reports will be prepared and submitted to Corps, Ecology, and other agencies identified for each element that is monitored.

The performance standard for Goals Number 1 and 2 were met with the submittal of the *As-Built and Year 1 Monitoring Report* (ICF Jones & Stokes 2009) to the Corps and Ecology in April 2009. Assessment of the other performance standards is based on the results annual monitoring. Wildlife monitoring supports Goal Number 7 and is met by reporting data and submitting the related report to USACE and Ecology.

Site Conditions

In October 2007, the dike along the joint eastern border of the mitigation site and the adjacent Corps Section 1135 restoration site was breached in three locations to reconnect the mitigation site to Union Slough, thereby reestablishing tidal influence and providing additional off-channel rearing habitat for salmonids across the combined sites.

To meet local shoreline permit requirements, concrete bridges were installed across the breaches to maintain public access along the shoreline trail. The North Bridge spans the northern-most breach and is located on the mitigation site; the Central Bridge and South Bridge are located on the USACE Section 1135 restoration site. Connection channels were installed in 2007 from the breaches to connect with the short channels excavated in 2004 to facilitate the natural formation of dendritic tidal channels.

The original design intent was to create a tidal regime that mimicked Union Slough, with 95% or more of the total surface area of the mitigation site exposed at low tide (Jones & Stokes 2002). However, annual monitoring during the 3 years since 2007 project construction was completed has documented that the mitigation site drains significantly less than intended (ICF Jones & Stokes 2009; ICF International 2010, 2011). The incomplete drainage leaves a significant area of the mitigation site inundated with water during low tide. Continuous inundation reduces the ecological benefits of the site for juvenile salmonid rearing by preventing sediment exposure at low tide, which prevents desirable intertidal marsh vegetation from establishing on exposed sediments. Continuous inundation has also been associated with water quality conditions that can be detrimental to juvenile salmonids if they persist (ICF Jones & Stokes 2009; ICF International 2010, 2011) (e.g., elevated water temperatures and reduced dissolved oxygen concentrations during periods of seasonally warm temperatures).

EPWD is currently working with the Corps to improve drainage at the mitigation site and increase the area of sediment surface exposed during low tide through removal of the three bridges and related grading to improve the elevation of the breaches relative to Union Slough. Demolition of the North Bridge was completed in early November 2011; demolition of the Central and South Bridges and finish grading is expected to be completed between July and October 2012.

Methods

The purpose of monitoring wildlife use of the mitigation site is to document changes in species composition and use of the site over time as a result of the ecological changes anticipated by the dike breaching. Following the monitoring protocol described in the wetland mitigation plan, wildlife monitoring is to be conducted within the mitigation site during both fall and spring seasons in years 1, 2, 3, 5, 8, and 10 following breaching of the dikes.

Wildlife monitoring dates were selected to coincide with low tide. It was necessary for the surveys to be conducted at low tide, because the mitigation site is completely inundated at high tide. Extensive areas of inundation extend across the mitigation site even at low tide, and ebbing tidal waters in the channels are too deep to safely cross on foot.

Year 5 wildlife monitoring was conducted on October 15 and 16 and November 9, 2011. Fall wildlife monitoring was coordinated prior to and around demolition and removal of the North Bridge and was conducted despite bridge removal work to attempt to gather documentation of the shorebird migration and related wildlife use prior to/at the start of the bridge removal process. All excavation related to removal of the North Bridge will have been completed by Year 5 spring monitoring (spring 2012).

The wildlife monitoring conducted on October 15 and 16, 2011, included point count surveys during high tide conditions. Construction activities associated with bridge removal had not yet started. The wildlife monitoring conducted on November 9, 2011, included transect surveys across the majority of the mitigation site. Construction activities associated with the North Bridge removal, i.e., construction vehicle movement on the dikes, were occurring during these transect surveys. The disturbance was localized; however, it may have caused some fall shorebirds and wildlife to avoid the mitigation site.

The survey stations and monitoring transects were the same as those used in previous years' wildlife monitoring (Figure 1).

Point Counts

Thirty-minute point-count wildlife surveys were conducted at the two fixed survey stations, including station WL-1 near the southern end of the mitigation site and station WL-2A[1] at the northern end. Stations were selected along opposite ends of the mitigation site to provide the most expansive views of the site. Between the two stations, the entire site was visible (Figure 1). Year 5 surveys included the use of a Bausch and Lomb 20x-60x zoom wildlife spotting scope. The wildlife biologist documented both audible and visual detections during the point count surveys.

[1] Station WL-2A is used, except when the red-tailed hawk nest adjacent to it is active; in these cases station WL-2B is used.

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ICF INTERNATIONAL

Figure 1
Monitoring Locations
Smith Island/Union Slough Restoration Project

All point-count surveys at fixed stations WL-1 and WL-2A were completed before 8:30 a.m. Specific survey times are shown in Table 1. Times shown for fall 2011 point count surveys are Pacific Daylight Time.

Table 1. Point-Count Fall Wildlife Monitoring Survey Times—Year 5

Survey Date	Station Number	Start Time (a.m.)	End Time (a.m.)
10/15/2011	WL-2A[1]	6:45	7:15
10/15/2011	WL-1	7:55	8:25
10/16/2011	WL-2A[1]	7:50	8:20
10/16/2011	WL-1	6:45	7:15

[1] Survey is performed at station WL-2A except when the red-tailed hawk nest adjacent to that point is active, in which case the survey is performed at station WL-2B.

Transects

The wetland mitigation plan anticipated that the mitigation site would drain at low tide, providing a sufficient window of time for a wildlife biologist to transect the site in the morning following the point-count surveys. However, the prolonged inundation of the mitigation site has created conditions that make this approach impractical.

Instead, areas of the mitigation site were selected where a variety of wildlife were considered most likely to be seen or detected (Figure 1). The wildlife biologist walked the dike along the east, north, and west sides of the mitigation site, and entered the mitigation site at selected locations that could be easily walked without causing unnecessary disturbance to wildlife and that provided access to several different vegetation communities.

Wildlife monitoring transect surveys were completed on November 9, 2011. The wildlife biologist traversed the mitigation site using the transects shown on Figure 1. The transect surveys began in the northeastern portion of the mitigation site. The wildlife biologist completed transects between 10:15 a.m. and 1:15 p.m., while the tidal water was at its lowest daylight levels. The wildlife biologist documented audible and visual detections, in addition to any other evidence of use such as scat and tracks.

Other Wildlife Observations

In addition, the wildlife biologist walked the perimeter of the mitigation site on the existing dikes, after the point-count surveys were completed on October 15 and 16, to gain additional data regarding wildlife use across the entire mitigation site. Species detected by this method are indicated in Table 2 as “Transect” under the “Location of Evidence” column.

Results

Conditions during the fall surveys were as follows:

- October 15, 2011: Extremely dense fog with low visibility; sight distance approximately 100 feet; no rain; approximately 45° F; sunrise at 7:28 a.m.; lowest tide during daylight hours at 1:42 p.m.
- October 16, 2011: High clouds but good visibility; no rain; approximately 45° F; sunrise at 7:29 a.m.; lowest tide during daylight hours at 2:26 p.m.
- November 9, 2011: Overcast with good visibility; no rain; approximately 50° F; sunrise at 7:06 a.m.; low tide during daylight hours at approximately 9:57 a.m.

Table 2 identifies the species and indicates whether they were observed during the point-count and/or transect surveys. A total of 55 wildlife species (including birds, mammals, and amphibians) were detected at the mitigation site during the fall surveys. Detections included audio and visual detections, in addition to evidence of use such as scat and tracks.

Table 2. Wildlife Species Detected—Year 5 (Fall 2011)

Species[1]	Date	Location of Evidence	Evidence[2]
BIRDS			
Snow goose	10/15/2011 10/16/2011	WL-2A WL-1	H V V
Canada goose	10/15/2011 10/16/2011	WL-2A WL-1	H V H V
Trumpeter swan	11/9/2011	Transect (flying overhead)	H V
Gadwall	10/15/2011 10/16/2011 11/09/2011	Transect WL-1 Transect	V V H V
Eurasian wigeon	11/09/2011	Transect	V
American wigeon	10/16/2011	WL-1	V
Mallard	10/15/2011 10/16/2011 11/09/2011	WL-2A, WL-1 WL-1 Transect	H V H V H V
Blue-winged teal	10/16/2011	WL-2A	V
Cinnamon teal	10/16/2011 11/09/2011	WL-1 Transect	V V
Northern shoveler	10/15/2011 10/16/2011 11/09/2011	Transect Transect Transect	V V V
Northern pintail	10/15/2011 10/16/2011 11/09/2011	Transect Transect Transect	V V V

Species[1]	Date	Location of Evidence	Evidence[2]
Green-winged teal	10/15/2011	Transect	V
	10/16/2011	WL-1	V
Ring-necked duck	10/16/2011	Transect	V
Lesser scaup	10/16/2011	Transect	V
Bufflehead	10/15/2011	Transect	V
	10/16/2011	Transect	V
Common goldeneye	10/16/2011	Transect	V
Common merganser	10/15/2011	WL-2A, Transect	V
	10/16/2011	Transect	V
Ruddy duck	10/16/2011	Transect	V
Pied-billed grebe	10/15/2011	Transect	V
	10/16/2011	Transect	V
Horned grebe	10/15/2011	Transect	V
Double-crested cormorant	11/09/2011	Transect (flying overhead)	V
Great blue heron	10/15/2011	WL-1, WL-2A, Transect	H V
	10/16/2011	WL-1, WL-2A, Transect	H V
	11/09/2011	Transect	H V S
Bald eagle	10/15/2011	WL-2A	H
	10/16/2011	WL-1	H V
	11/09/2011	Transect	H V
Northern harrier	10/15/2011	WL-2A, Transect	V
	11/09/2011	Transect	V
Red-tailed hawk	10/15/2011	WL-1, WL-2A, Transect	H V
	10/16/2011	WL-1, WL-2A, Transect	H V
	11/09/2011	Transect	H V
Merlin	10/15/2011	WL-2A	V
	10/16/2011	WL-1 (viewed failed hunt)	V
	11/09/2011	Transect	V
American coot	10/15/2011	Transect	V
	10/16/2011	Transect	V
	11/09/2011	Transect	V
Killdeer	10/15/2011	WL-2A, Transect	H
	10/16/2011	WL-1, Transect	H
Unidentified Shorebird	11/09/2011	Transect	S
Bonaparte's gull	10/15/2011	Transect	H V
	10/16/2011	WL-2A, Transect	H V
	11/09/2011	Transect	H V
Western gull	10/15/2011	WL-1, WL-2A, Transect	H V
	10/16/2011	WL-1, WL-2A, Transect	H V
	11/09/2011	Transect	H V S

Species[1]	Date	Location of Evidence	Evidence[2]
Belted kingfisher	10/16/2011 11/09/2011	WL-1 Transect	H V H V
Downy woodpecker	10/15/2011 11/09/2011	WL-1 Transect	H V H V S
Northern flicker	10/15/2011 10/16/2011	Transect WL-2A	H H V
Pileated woodpecker	11/09/2011	Transect	H V S
American crow	10/15/2011 10/16/2011	WL-1, WL-2A, Transect Transect	H V H V
Black-capped chickadee	10/15/2011 10/16/2011	WL-2A WL-2A	H H
Bewick's wren	10/15/2011 10/16/2011	WL-1, WL-2A WL-1, WL-2A	H V H V
Marsh wren	10/15/2011 10/16/2011 11/09/2011	WL-1, WL-2A WL-1 Transect	H V H V H V
Golden-crowned kinglet	10/15/2011 10/16/2011 11/09/2011	WL-2A WL-2A Transect	H V H H
American robin	10/15/2011 10/16/2011 11/09/2011	WL-2A, Transect WL-1, WL-2A Transect	H V H V H V
European starling	10/15/2011 10/16/2011	Transect Transect	H V H V
Yellow-rumped warbler	10/15/2011 10/16/2011	WL-2A WL-2A	H V H V
Spotted towhee	10/15/2011 10/16/2011	WL-1, WL-2A WL-1, WL-2A	H V H V
Fox sparrow	11/09/2011	Transect	V
Song sparrow	10/15/2011 10/16/2011 11/09/2011	WL-1, WL-2A WL-1, WL-2A Transect	H V H V H V
White-crowned sparrow	10/15/2011 10/16/2011	WL-2A WL-2A	H H
Dark-eyed junco	10/15/2011 10/16/2011	WL-1, WL-2A WL-1, WL-2A	H V H V
Red-winged blackbird	10/16/2011	WL-1, WL-2A	H
Brewer's blackbird	10/15/2011	Transect	H V
American goldfinch	10/15/2011	WL-1, WL-2A	V
MAMMALS			

Species[1]	Date	Location of Evidence	Evidence[2]
Coyote	10/15/2011	Transect	S
	10/16/2011	Transect	S
	11/09/2011	Transect	S
Muskrat	11/09/2011	Transect	S
Raccoon	11/09/2011	Transect	S
AMPHIBIANS			
Pacific tree frog	10/15/2011	WL-2A	H
	10/16/2011	WL-2A	H

[1] Sequence of bird species follows the American Birding Association checklist, Version 7.2.
[2] H = audible detection; V = visual detection; S = sign (i.e., tracks, scat, or other diagnostic evidence)

Birds

A total of 51 bird species were detected at the mitigation site during the surveys. Many of the passerine bird species are principally associated with the forested habitats located north and east of the mitigation site, based on their life history characteristics and habitat requirements. These species include American crow, black-capped chickadee, golden-crowned kinglet, American robin, European starling, and American goldfinch. Some passerine birds are using the remaining shrub habitat of the mitigation site, including marsh wren and Bewick's wren, yellow-rumped warbler, spotted towhee, fox sparrow, song sparrow, white-crowned sparrow, dark-eyed junco, red-winged blackbird, and Brewer's blackbird. Over the past 5 years, the decay of those trees north of the Central Bridge has proceeded to the point where they are primarily used by woodpeckers such as pileated woodpeckers, downy woodpeckers, and northern flickers. These snags display evidence of heavy use by pileated woodpeckers, including many large foraging excavations.

Isolated trees and snags in the mitigation site, as well as the large conifers to the north, are commonly used as perches by raptors such as bald eagles and red-tailed hawks. A red-tailed hawk was perched in this Sitka spruce tree near point-count station WL-2A during the fall surveys, but it did not prevent the wildlife biologist from using this station. Fall wildlife monitoring occurred outside of the breeding season (spring) and the red-tailed hawk did not display signs of disturbance or distress. A merlin was detected perching on trees on the mitigation site on several occasions during the fall wildlife monitoring. While standing near station WL-1 on October 16, 2011, the wildlife biologist watched a failed hunting attempt by the merlin on ducks located in the central portion of the mitigation site. Northern harrier hawks were also visually detected flying over the mitigation site.

Fish-eating birds and water birds were common in the mitigation site during the fall surveys. Fish-eating birds observed included pied-billed grebe, double-crested cormorant, bufflehead, common goldeneye, common merganser, great blue heron, and belted kingfisher. The gradual establishment of intertidal marsh vegetation is creating productive habitat for the rearing of forage fish and juvenile salmon, which are preferred prey for all of these bird species. Many adult fish carcasses were located during the transect surveys conducted on November 9, providing a prey base for many bird species.

Mammals and Amphibians

Evidence of use by three mammal species was observed in the mitigation site during the fall wildlife monitoring. Regular use of the mitigation site by coyotes, raccoons, and muskrats was observed in the form of scat and tracks. Coyote scat was observed in several locations on the dike; it contained considerable hair, indicating predation on small mammals. Coyote, raccoon, and muskrat tracks were observed in the mud during low tide. Beaver and deer, which have been observed on the site in the past, were not encountered. The near absence of live woody vegetation on the site, coupled with the expansion of cattails and other marsh vegetation may be creating habitat that is more suitable for muskrats than beavers.

One amphibian (Pacific tree frog) was heard calling at a variety of locations around the mitigation site, including the interior of the wetland and around the perimeter of the mitigation site in adjacent forested habitats. Although the hydrology of the site is now tidal, the low salinities recorded may not be high enough to preclude use by amphibians.

Discussion

Table 3 summarizes species-habitat relationships observed on the mitigation site. Many different habitat types exist across the mitigation site and adjacent lands, and the mitigation site is located in a landscape context that affords it an excellent opportunity to provide valuable year-round habitat to species that are permanent residents in western Washington. The habitats of the mitigation site also provide valuable and accessible habitat for species that frequent western Washington only on a seasonal basis or as part of a corridor of habitat used during migration stopovers.

Table 3. Observed Species-Habitat Relationships

Habitat Type	Wildlife Species Detected	Use
Exposed sediment/mudflats	Evidence of use by shorebird species (tracks) and visual detections of great blue herons and many dabbling duck species	Foraging
Gravel road	Killdeer (audible detection), coyote scat	Coyote scat indicates regular foraging and movement
Cattail-dominated colonizing vegetation	Red-winged blackbird, marsh wren, Bewick's wren	Foraging and hiding cover
Hardhack spirea	Red-winged blackbird, marsh wren, song sparrow, Bewick's wren, yellow-rumped warbler	Foraging and hiding cover
Shallow open water with colonizing intertidal marsh vegetation	Pied-billed grebe, double-crested cormorant, Canada goose, all observed ducks, great blue heron	Foraging, resting
Dead hardwood snags	Primarily pileated woodpecker, and to a lesser degree, downy woodpecker and northern flicker	Foraging
Conifers adjoining mitigation site	Black-capped chickadee, dark-eyed junco, song sparrow, northern flicker, golden-crowned kinglet	Foraging
Deciduous woodlands adjoining mitigation site	Song sparrow, spotted towhee, American robin, purple finch, yellow-rumped warbler	Foraging
Open space over wetland	Raptors, ducks, geese, gulls	Flyover for potential prey resources or local movement

Priority Wildlife Species

Ten Washington State priority species (Washington Department of Fish and Wildlife 2008) have been documented using the mitigation site. These species include bald eagle (federal species of concern, state sensitive), peregrine falcon (federal species of concern, state sensitive), common loon (state sensitive), western grebe (state candidate), Vaux's swift (state candidate), and pileated woodpecker (state candidate), as well as wood duck, common goldeneye, bufflehead, and hooded merganser, which have no specific state or federal status but are considered priority species.

Other priority species such as great blue heron and osprey have been documented at the mitigation site. Both osprey and great blue herons are commonly seen foraging and resting in and around the mitigation site and are expected to continue to use the site as conditions change, because they forage in both fresh water and saltwater habitats. Several great blue herons were detected foraging and resting during the fall surveys, primarily in the north-central portion and the south-central portion (west of the Central Bridge and nearby large alder snags) of the site. While no osprey were detected

at the mitigation site during the fall surveys, the have commonly been detected during previous surveys.

Bald eagles have not been observed hunting at the mitigation site, but they do perch on the snags in and adjacent to the site. Two bald eagles were observed perching in trees near the south-central border of the mitigation site during the fall surveys. Both of these eagles flew to that perch location from the southeast, likely coming from the Spencer Island area. Bald eagle foraging opportunities have likely increased in response to the increase in waterfowl frequenting the mitigation site.

Waterfowl are expected to continue to use the mitigation site once hydraulic conditions are addressed, because the site is expected to continue to support open water habitats, as well as increasing areas of mudflats and intertidal marsh. As dead trees in the mitigation site fall, use of the site by pileated woodpeckers is expected to decrease.

Priority species that may use the mitigation site to a greater degree in the future include the western grebe and concentrations of both waterfowl and shorebirds that migrate through or overwinter in the area. Twenty-five shorebird species are known to use estuarine mud flats as foraging habitat (Buchanan 2004). The bridge removal activities underway at the mitigation site in 2011 and 2012 should create the exposed mudflat habitat that would be attractive to migratory waterfowl and shorebirds.

Birds

The mitigation site supports common migratory and non-migratory (resident) birds, including species adapted to the intertidal habitats restored to the site (e.g., shorebirds and waterfowl) and habitat generalists such as American crows, European starlings, and American robins. The birds consistently observed in all years and seasons of monitoring represent common, non-migratory species and those that are either habitat generalists (e.g., American crow) or are well adapted to conditions at or near the mitigation site (e.g., mallard, American robin, pileated woodpecker).

The mitigation site is located on a major waterfowl migration route, the Pacific Flyway. In addition, the mitigation site and surrounding areas provide important habitat that supports shorebird migration such as stop-over (resting) and foraging habitat. Migration activity is typically high during the fall surveys and typically occurs during the spring surveys. Hence, variation in the number of waterfowl and shorebird species observed during short-duration surveys is likely explained by factors other than habitat suitability. For example, it may relate to the timing of the monitoring visits in relation to the precise timing of the waterfowl and the shorebird migrations during any given year.

The fall 2011 surveys were conducted slightly after the peak of the 2011 fall shorebird migration. The ambient temperatures in early October were lower than average in western Washington, and the colder weather likely resulted in shorebirds migrating out of this region prior to the mid-October surveys. In contrast, the surveys occurred during the waterfowl migration period, and 15 different duck species were observed among the mitigation site and adjacent habitats. The previous year's survey (fall 2010) recorded 14 species of ducks in the mitigation site.

Mammals and Amphibians

The mammal use of the mitigation site continues to be primarily associated with coyotes, with evidence of use also including raccoons and muskrats. Mammals may now have access to a larger percentage of the site during low tides than in previous years due to the gradual decline in water surface elevations as scour and erosion have continued at the bridges. Therefore, evidence of use by mammal species or actual detections of mammal species may increase over the next several years, particularly once all the bridges are completely removed in the summer of 2012.

Unique Fall 2011 Site Conditions

The October 15 and 16, 2011, point-count surveys coincidentally occurred on the opening weekend of hunting season for ducks and geese. Many hunters were present on Spencer Island to the east of the mitigation site and Union Slough during the surveys. The noise created by frequent shots associated with hunting was very loud and may have reduced the number of bird detections during these point-count surveys. While the hunters were targeting waterfowl species, many bird species display aversions to increased noise and human activity in the local vicinity.

Due to the tidal influence now present within the mitigation site, increased shorebird use of the site is anticipated. The fall surveys did not indicate an increase in shorebird use due to several factors. Although migrating shorebirds likely used the site in October for stop-over (resting) and foraging habitat during low tides, the anticipation of bridge demolition work initially delayed the monitoring and then the daytime low tides on October 15 and 16 were not low enough to safely traverse the mitigation site on foot after the point-count surveys, so the transect survey was delayed until November 9. The November 9 monitoring visit was specifically tailored for walking transects during the daytime low tide to monitor the site for shorebirds using the site at the end of the migration period. However, temperatures in the local region during the weeks prior to the transect survey were colder than average, likely causing shorebirds to migrate out of the area prior to the survey.

Construction activities had not commenced by the October 15 and 16 point-count surveys. However, by the time of the November 9 transect survey, the North Bridge had been removed; construction vehicles were moving on the dikes during the transect survey. Increased noise levels associated with the increased vehicular traffic along the dikes, may have temporarily affected wildlife use of the site and potentially caused a slight reduction in use of the site by wildlife species.

Progress toward Achieving Performance Standards

No specific performance standards are associated with wildlife use of the mitigation site. Data collection supports Goal Number 7.

Goal Number 7. Increase the database of scientific information relative to restoring the Snohomish River estuary.

Performance Standard for Goal Number 7. Monitoring reports will be prepared and submitted to the Corps, Ecology, and other agencies identified for each element that is monitored.

Status. The wildlife data provide scientific information regarding the species composition and seasonal use of the habitats in the mitigation site and information relative to wildlife use during periods of vegetation transition. Submittal of this monitoring report to the regulatory agencies will meet this performance standard by disseminating this information.

Conclusions and Recommendations

Conclusions

Wildlife monitoring shows that the mitigation site supports a wide variety of birds, including diving birds, wading birds, waterfowl, raptors, woodpeckers, and songbirds. It also supports several species of mammals, with additional species likely present but not observed. Breaching of the dike has provided mammals such as beaver, mink, muskrat, raccoon, and river otter with access to aquatic habitat types not previously available. The mitigation site appears to provide habitat for individuals migrating through the Snohomish River estuary, as well as foraging and nesting habitat for both migratory and resident bird species.

Recommendations

Wildlife monitoring is next scheduled for spring and fall of Year 6 (spring and fall 2013). Repeating the wildlife monitoring during the spring and fall will document any further changes in the amount, species, and distribution of bird and other wildlife species as the vegetation begins to change in response to removal of the North Bridge.

Literature Cited

Buchanan, J.B. 2004. Shorebirds: Plovers, Oystercatchers, Avocets and Stilts, Sandpipers, Snipes, and Phalaropes. Pages 20-1–20-48 in E. M. Larsen, J. M. Azerrad, and N. Nordstrom (eds.), *Management Recommendations for Washington's Priority Species, Volume IV: Birds*. Washington Department of Fish and Wildlife, Olympia, WA. 268pp.

ICF International. 2010. *Year 2 Monitoring Report—Smith Island/Union Slough Restoration Project*. February (ICF 00993.07.) Seattle, WA. Prepared for City of Everett Public Works Department, Everett, WA.

ICF International. 2011. *Year 3 Monitoring Report—Smith Island/Union Slough Restoration Project*. February (ICF 00048.10.) Seattle, WA. Prepared for City of Everett Public Works Department, Everett, WA.

ICF Jones & Stokes. 2009. *As-Built and Year 1 Monitoring Report. Smith Island/Union Slough Restoration Project*. April. (ICF J&S 00993.07.) Seattle, WA. Prepared for City of Everett Public Works Department, Everett, WA.

Jones & Stokes. 2002. *Smith Island Habitat Restoration and Dike Maintenance Project. Wetland Mitigation Plan*. October 22. (J&S 98-247.) Bellevue, WA. Prepared for City of Everett Public Works Department, Everett, WA.

Washington Department of Fish and Wildlife. 2008. *Priority Habitats and Species List Draft*. Last revised: May 2008. Available: <http://wdfw.wa.gov/hab/phs/phs_review/2008-apr-29_phs_list.pdf>. Accessed: November 17, 2008.