PORTLAND HARBOR WILDLIFE ADVISORY GROUP
SITE VISIT REVIEW SUMMARY AND FOLLOW-UP INFORMATION

Notes Prepared by Jeremy Buck
U.S. Fish and Wildlife Service, Portland Oregon
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DATE OF SITE VISIT: MAY 14, 2010

ATTENDEES

Dr. Robert Grove, Contract Wildlife Toxicologist, Corvallis, Oregon

Frank Isaacs, Oregon Eagle Foundation, Philomath, Oregon

Dr. Mike Szumski, U.S. Fish and Wildlife Service, Natural Resource Damage Assessment Specialist, Newport, Oregon

Jeremy Buck, U.S. Fish and Wildlife Service, Contaminant Specialist, Portland, Oregon

Bill Price, U.S. Fish and Wildlife Service Volunteer, Aloha, Oregon

Document reviewed and additional comments provided by:

Jennifer Thompson, Fish and Wildlife Biologist, U.S. Fish and Wildlife Service, Portland, Oregon

Elizabeth Ruther, District Habitat Biologist, North Willamette Watershed District, Oregon Department of Fish and Wildlife, Portland, Oregon

PURPOSE OF TRIP

To identify:

- Existing habitat along the lower Willamette River from River Miles (RMs) 0 to 15 and surrounding areas that benefit primary indicator species including mink, river otter, bald eagle, and osprey.
- Areas that could become supporting habitat in the future with or without restoration.
- How past habitat changes and modifications could have influenced these species.

TRIP SUMMARY

Surveyed area:

- Departed from St. Johns Dock at Cathedral Park at 0900 hours by boat.
- Travelled along east shoreline to Willamette Cove and McCormick and Baxter.
- Crossed to the western shoreline near the railroad bridge at river mile (RM) 7.
- Proceeded to the shoreline of the Arkema/Doane Lake area and associated outfall.
- Crossed to the eastern shoreline near Triangle Park area.
- Entered Swan Island Lagoon at the U.S. Coast Guard station and along both shorelines of the lagoon to the boat launch.
- Crossed to the western shoreline at Willbridge Cove and the Gunderson area.

- Continued upriver investigating any remaining habitat near Albina Railyard, Cargill property, and Balch Creek/Fireboat cove.
- Proceeded upriver around Ross Island shorelines and inside the lagoon, to Sellwood Bridge.
- Continued downriver below Cathedral Park, investigating habitats along the east and west shorelines including the Port of Portland Terminal 4, GATX and Mobil properties, and PGE property along the powerline.
- Entered the Multnomah Channel and evaluating both sides to Sauvie Island Bridge.
- Continued along both shorelines along the last 3 miles of the lower Willamette River.
- Entered the lower Columbia River along the south shoreline from the Willamette River mouth to Columbia RM 105, as well as the south shoreline along West Hayden Island before returning to Cathedral Park at 1500 hours.

MINK AND RIVER OTTER IN THE LOWER WILLAMETTE RIVER

General habitat conditions suitable for mink

Mink are semi-aquatic mammals primarily found around streams, riverbanks, lake shores, and fresh- and saltwater marshes (Allen 1986). Mink are most commonly associated with brushy or vegetative cover next to aquatic habitats, especially in wet areas with irregular or diverse shorelines, and are somewhat tolerant of human activity. Most mink activity occurs close to open water. Prey availability is the primary factor influencing mink movement and habitat use throughout the year (Allen 1986). Mink prey includes an aquatic component (fish and crayfish), a semi-aquatic component (waterfowl and other water-associated mammals), and upland species such as rabbits and rodents (Gerell 1967; Allen 1986; Verts and Carraway 1998). Bank slope is an important factor affecting access and movement of mink into and out of the water, with steep slopes making it difficult for mink to access aquatic prey such as invertebrates, amphibians, and fish. In-stream habitat structures such as logs and logjams are important foraging areas for mink (Verts and Carraway 1998) due to increased presence of prey such as invertebrates, salmon, lamprey, and amphibians in these locations. Connectivity between habitats is also important for mink, providing access between various foraging locations and den sites. Ideal mink habitat along the lower Willamette River would consist of a nearly continuous, structurally complex corridor along the river bank that provided overhead cover (woody vegetation and debris), permitting mink to travel between upstream and downstream foraging areas, tributaries, and upland habitat.

Although mink are considered nonmigratory, they have been found to travel distances up to 7.5 miles between forage locations and den sites (Whitaker and Hamilton 1998). Mink will use upland habitat if sufficient cover and prey are available (DeGraaf and Yamasaki 2001). Home ranges of both sexes tend to parallel the configuration of a body of water or wetland basin. Mink move back and forth to forage in a core area, which is located adjacent to the den site (Allen 1986). Gerell (1970) reported that mink had daily activity core areas that did not exceed more than 300 m of shoreline. Based on this information, it

is assumed that any wetland or wetland-associated habitat in the lower Willamette River has the potential to support mink or provide a corridor for mink passage.

General habitat conditions suitable for otter

The river otter is a top mammalian predator in many aquatic food chains and is highly adaptable to a wide variety of aquatic habitats (Toweill and Tabor 1982; Melquist and Dronkert 1987; Melquist et al. 2003). River otters primarily prey on fish and crayfish in the Columbia River Basin, although they may also consume crabs, mussels, amphibians, waterfowl, small mammals, and insects (Toweill 1974; Toweill and Tabor 1982; Melquist et al. 2003). Connectivity between habitat types is important for otter, although less so compared to mink. Habitat requirements for otter are similar to those for mink, with a preference for complex overhanging vegetative cover along shorelines and access to open water. These areas are used for loafing, consuming captured prey, and interacting socially. Although river otter home ranges encompass a much larger area compared to mink, the habitat need not be as continuous because otter use the river itself as a travel corridor. Otter home range and habitat use are largely dependent on prey availability and shelter (Reid et al. 1994). Off-channel aquatic habitat is used extensively in spring and summer months by adult females when the kits first begin to accompany their mother on foraging excursions (Reid et al. 1994).

Existing habitats that could support mink and river otter in the Portland Harbor and surrounding areas (herein considered the surveyed area or RMs 0 to 15)

There is limited habitat available for river otter along the lower Willamette River between RMs 0 and 15, primarily due to the marked absence of shoreline vegetation and woody debris and lack of breeding and denning areas. The current best use of this portion of the river is providing connectivity to habitats that are of value at the upriver and downriver sections of the surveyed area (above RM 14 and below RM 4), as well as to tributaries, forested areas, wetlands, and lakes within the surveyed area. The river provides a travel corridor for dispersing juvenile males as they attempt to find and establish breeding territories. These males can travel long distances and were the most prominent individuals trapped during a recent contaminant study in the lower river (Grove and Henny 2008). It is unlikely that adult river otter males or females are breeding or raising young within the surveyed area outside of Oaks Bottom (above RM 14) and possibly on Sauvie Island because available habitat is limited. River otters have been observed throughout the lower river (most likely dispersing males) and have been reported as a nuisance on some docks (e.g., along the boathouse at the sheriff's dock in Fireboat Cove).

With a much smaller range and dispersal area, mink have very little habitat remaining in the surveyed area. Mink would most likely be found on the lower Willamette River where tributaries and sloughs enter the river. There are very few tributaries and sloughs or backwater areas along this section with habitat characteristics suitable for mink. Mink prey in the surveyed area would include juvenile salmon and other small fish, lamprey, invertebrates, and amphibians. These prey species prefer littoral habitat containing complex, interspersed cover elements such as large wood, boulders or vegetation (e.g.,

natural bank vegetation, overhanging vegetation, and emergent plants). An adult mink with kits has been observed on the north shore of the Willamette River across from Ross Island by a biologist from the U.S. Fish and Wildlife Service, Oregon Fish and Wildlife Office (OFWO), and reports of mink observed at Oaks Bottom have been given to biologists at the OFWO as well. Currently, the best mink habitat in the general area would include Ross Island and similar habitat upstream of the surveyed area, the Oaks Bottom area, Sauvie Island, Columbia Slough, Smith and Bybee Lakes, and areas along Multnomah Channel.

Specific areas identified that might support mink and river otter and could be further restored or enhanced for these species

Oaks Bottom:

- Existing conditions: Provides good foraging, connectivity, and denning habitat for mink and possibly otter (if water remained year round).
- Restoration opportunities: Connectivity to Willamette River could be improved and habitat enhanced. Adding a water structure to keep water in the area year round would improve habitat for otter.

Ross Island Lagoon

- Existing conditions: East side of lagoon is currently very good mink and otter habitat with some overhanging, shaded cover entries of thick bush along beach area (provides good overhead cover for entry and exit to and from river).
- Restoration opportunities: Possible wetland and shoreline enhancements throughout the lagoon and around the island would improve habitat for denning and foraging. Excluding motorboats from the lagoon would reduce human disturbance to otter and mink.

Balch Creek

- Existing conditions: Small area, fairly deep, could provide habitat for mink and for transient otters, but currently there is no tributary access, so it would have limited use.
- Restoration opportunities: Enhancing connectivity and daylighting the creek would improve use by transient mink and otter.

Sheriff's boat house

- Existing conditions: Occupants reported otters using their docks and boat houses.
- Restoration opportunities: Very little, likely highest use is by transient, immature otters (which indicates that even small, quiet areas will get used by otter).

Swan Island Lagoon

- Existing conditions: Not much habitat available. Could provide potential foraging area for otter and mink.

- Restoration opportunities: Improve connectivity and provide corridor with habitat along shoreline (assuming cleanup reduces contaminant burdens in prey of mink and otter).

Doane Lake area

- Existing conditions: May provide good mink habitat and connectivity to the river along the base of railroad track abutment, although road crossings could be hazardous.
- Restoration opportunities: Enhancing wetlands and riparian corridor could provide denning and foraging habitat for mink.

Willamette Cove

- Existing conditions: Serves primarily as a refuge for dispersing mink and otter juveniles and provides connectivity between other habitats. Not good habitat for denning and reproduction.
- Restoration opportunities: Enhance denning and foraging potential, especially with enhanced shoreline and wetlands.

Triangle Park

- Existing conditions: Potential dispersal and connectivity habitat for mink and otter.
- Restoration opportunities: Improve connectivity to water and upland.

Multnomah Channel from Willamette River to Sauvie Island Bridge

- Existing conditions: Good foraging and dispersal habitat for river otter and mink along both shorelines. Logjams and rafts of vegetation provide good foraging habitat for mink. Possible denning opportunities on Sauvie Island and south shoreline of Multnomah Channel for mink.
- Restoration opportunities: Enhance wetlands and improve connectivity and denning habitat.

Sauvie Island

- Existing conditions: Northern half of Sauvie Island provides good otter and mink habitat along with the Burlington Bottoms area adjacent to the Multnomah Channel, but is somewhat outside the surveyed area.
- Restoration opportunities: Enhance wetlands and improve connectivity and denning habitat.

Kelley Point Park, West Hayden Island,

- Existing conditions: Good habitat along this area for dispersing males. Provides connectivity to both Columbia and Oregon Sloughs where denning of mink and otter are likely.

- Restoration opportunities: Improve areas or enhance connectivity for denning and foraging, respectively.

South shoreline of Columbia River, east of Willamette River mouth

- Existing conditions: Habitat very disrupted and of limited quality for mink and otter.
- Restoration opportunities: Limited, some opportunities to improve connectivity.

South shoreline of Columbia River, west of Willamette River mouth

- Existing conditions: Sandy beaches along south shoreline of the Columbia River (mostly consisting of private lands) down from the Willamette River mouth do not provide covered access from shoreline to water for mink and otter.
- Restoration opportunities: Limited, improve connectivity, restore habitat to the degree possible.

Opportunities exist for restoration such as improving connectivity and enhancing shoreline vegetation at other sites outside the surveyed area including Riverview Cemetery, Kellogg Creek, and areas north of the surveyed area, but these sites were not visited during this site visit.

Past habitat changes and modifications that would have influenced mink and river otter

Channelization, wetland loss, and steepening of stream banks in the surveyed area have reduced habitat and water accessibility for both mink and otter. Most of the historic off-channel and floodplain habitat has been disconnected from the river by diking and hardening of channel banks. Elimination or decreased diversity of shoreline configuration and aquatic, riparian, or shoreline vegetation reduces habitat quality, prey abundance, and presence of mink (Allen 1986). Reduction in floodplain vegetation and structure reduces mink and otter habitat for den sites and dispersal corridors.

Shorelines and emergent vegetation are the principal foraging areas for mink and otter, and both species benefit from shrubby vegetation close to the water that provides complete cover to the animals as they enter and exit the water in search of prey. Removal of this type of vegetation has been associated in other areas with a decline in mink populations (Allen 1986); these activities have likely reduced numbers of mink and otter from the surveyed area as well. In addition, loss of wood from streams (as has happened in the lower Willamette River) usually diminishes habitat quality and reduces the carrying capacity for rearing salmon and lamprey (mink prey species) during all or part of the year (Hicks et al. 1991). The current and historical populations of otter and mink along the lower Willamette River are unknown. The Oregon Department of Fish and Wildlife has trapping records for both mink and otter, but these records are available by county only, and specific records for the lower Willamette River are not available.

Subsequent Discussions

Responses to follow-up questions given to Drs. Robert Grove and Mike Szumski after the site visit regarding mink and otter habitat and restoration opportunities:

1) What are the limiting habitat features for mink and river otter currently in the surveyed area?

Grove: Human activity is high with boat, barge and ship traffic [disturbance issues]. For mink, the concentrations of PCBs in the surveyed area are still too high for mink to inhabit on a permanent basis. There is no structure at the water's surface for concealed ingress and egress of the river to cover along the shoreline. Otter are probably using whatever above water structures under the dock systems as cover for resting and grooming (and there may be possible exposure to creosote on fur). Only the upper portion of the surveyed area presents any habitat suitable for potential denning and reproduction for both species.

Szumski: For mink, lack of cover and foraging areas that provide a year-round food supply and resting/natal dens are missing, as well as travel corridors that connect between these areas. Otters need riparian cover near food supply to haul out, rest and socialize. Bank dens created by beaver or accumulation of large woody debris are important natal /resting areas. Off channel, aquatic habitat is important for females with young.

Additional comments by Elizabeth Ruther: Most limiting habitat features include (1) denning habitat structure; (2) logjams, beaver dams that make pools for fishing; and (3) barriers [between habitats].

2) What habitat enhancements or restoration would best benefit mink and river otter foraging and denning habitat in the surveyed area?

Grove: Concentrate on habitat improvements in the upper portion of the surveyed area, as the potential for improvement is best there. For otters, the lower portion does serve an important function as refuge for the young dispersing individuals, as territories of older breeding individuals do not exist there [although breeding habitat does occur outside the surveyed area].

It is unlikely you could create enough riparian habitat to sustain a population of either mink or otter throughout the entire surveyed area. However, certain locations might be enhanced to provide core areas capable of sustaining one or more mink. I doubt you could create sufficient habitat to meet all of the needs of an otter population, but you could increase the use of the surveyed area by providing additional areas for otter to rest between foraging activities.

Szumski: Agree with above statement. Ideally, what is needed is to create a contiguous habitat corridor along the length of the surveyed area (to the extent possible). The goal would be to create a series of core activity areas capable of

providing mink and otter with enough complex, riparian habitat to forage and create resting/natal dens. These areas would be connected by travel corridors of sufficient width to allow mink to travel from one core area to the next safely and allow otter to haul out of the water to feed on larger prey, rest, and interact socially. The core areas should be spaced no more than 1.0 km apart if possible. Width of corridor should include entire bank from water's edge to top of bank or 50 feet (whichever is greater). Other strategies could include restoring riparian/aquatic habitat elsewhere along the Willamette River (Ross Island and above).

Additional comments by Elizabeth Ruther: Enhancing logjams and beaver activity that creates habitat, along with removing man-made barriers, would be best [to increase mink and otter activity and enhance habitat].

3) What would be considered a sustainable number of denning females of mink and otter along the river between RMs 2 to 12? Or, for otter, should it just be considered transitory habitat?

Grove: The lower portion should be considered transitory. I would suspect only one breeding female [otter] could exist in the Ross Island area, with possibly as many as five female mink.

Szumski: Not sure you could determine what is a sustainable number. At a minimum, male and female mink home ranges need to overlap, and there needs to be sufficient prey throughout the year to feed both. On large, relatively clean Wisconsin rivers, I would capture different males every 1 to 2 km and females every 0.5 to 1 km. The riverbanks had, for the most part, a continuous ribbon of woody vegetation that allowed mink to travel between foraging areas (tributaries, off-channel marshes, oxbows, etc.). Root wads of trees along the river bank provided resting and natal dens as did logjams found along the bank. Wooded lots adjacent to rivers and streams provided auxiliary upland prey (primarily voles and mice) when aquatic prey was scarce.

The lower Willamette River might provide some foraging opportunities for adult otter, but most areas would not currently support females with young. To do so would require much more woody vegetation along the riverbank (providing in-stream habitat for prey species and overhead cover for otters) and the presence of den sites (usually created by beavers burrowing into river banks or the accumulation of large woody debris). Off-channel aquatic habitat is used frequently by adult females as the young begin to accompany their mother on foraging excursions. The only nearby areas that meet all of these criteria are Burlington Bottoms/Sauvie Island Wildlife Management Area, Columbia Slough/Smith and Bybee Lakes, and Ross Island/Oaks Bottom.

Additional comments by Elizabeth Ruther: Other human dimensions to consider would be increased use of otters and mink causing damage or complaints from floating home inhabitants and the associated issues with managing the problem.

4) Do you know of any information available regarding mink or otter numbers in the surveyed are prior to 1970?

Neither respondent knew of any such information.

OSPREY AND BALD EAGLE IN THE LOWER WILLAMETTE RIVER

General habitat conditions suitable for osprey

Historically, osprey nested in forested regions due to their preference for large live trees and snags located within 2 miles of a large waterbody (Henny et al. 1978; Vana-Miller 1987). Nest and perch sites are now limited due to the conversion of forest land for agricultural use and urban development, so osprey have adapted to man-made structures such as channel markers and utility poles for nest sites (Marshall et al. 2006). In the surveyed area, lack of nesting opportunities (e.g., large trees and nest platforms) appears to be the primary limiting habitat feature for ospreys, as suitable open water and foraging opportunity exists.

Ospreys along the Willamette River feed on fish (nearly 100 percent of the diet is fish) which includes primarily largescale sucker and northern pikeminnow (Henny et al. 2003). Ospreys in this area spend about 6 months on their wintering grounds in Mexico and Central America and return to their breeding grounds along the Willamette River by mid-March to early April of each year (Henny et al. 2003). The same pair typically returns to the same nest each year. Ospreys are much more tolerant of human disturbance than are eagles.

General habitat conditions suitable for bald eagle

Bald eagles primarily nest in forested areas within 2 miles of a fish-bearing water body, and preferred foraging habitat includes rivers, lakes, and estuaries (DeGraaf et al. 1980; Peterson 1986). Nests observed in Oregon, west of the Cascades, largely occur in Sitka spruce and Douglas-fir, although the lower Columbia and Willamette River populations have shown an increase in the use of black cottonwood for nesting. Bald eagles are sensitive to human disturbance, and protection from human disturbance is important for nesting, successful hunting, and feeding of young (Marshall et al. 2006). Protecting and enhancing nest sites along the surveyed area with buffer zones would minimize disturbance.

Habitat requirements for eagles include the presence of large, mature trees to use for nesting and perching, and access to shallow-water areas for foraging. Nest trees are characterized by having large trunk forks or multiple forks of the trunk, and are usually dominant or codominant large-diameter trees with open branching and stout limbs. Nest trees are typically surrounded by a buffer of additional trees. The majority of nest sites are within 0.5 mile of a body of water and have an unobstructed view of the water, although nest trees may occur up to 2 miles from fish-bearing water bodies.

Prey species taken by eagles in the surveyed area most likely include resident fish and some waterfowl. Along the lower Columbia River, previous studies have reported that eagles foraged mostly on fish (predominantly largescale sucker, American shad, and carp) which accounted for 71 percent of prey remains found at nest sites and 90 percent of direct foraging observations (Watson et al. 1991). Birds (primarily mallards, western grebes, cormorants, and gulls) comprised 26 percent of nest remains and 7 percent of direct observations (Watson et al. 1991). Scavenging opportunities by eagles along the lower Columbia River (and likely for eagles using the surveyed area) are rare and were not reported in previous studies. However, pirating of prey items from other species such as osprey and gulls is fairly common.

Eagles nesting along the lower Columbia and Willamette Rivers are year-round residents. Although eagle ranges expand somewhat after the breeding season, they do not migrate. Migrating eagles from other areas do overwinter in the lower Columbia River, and eagle numbers in the lower Columbia River can almost double during the winter. Home ranges of lower Columbia River eagles can be as large as 22 km^2, but most eagle activity occurs within 0.5 to 1 km of the nest site (Garrett et al. 1993). Fish are the most common prey collected by eagles during the breeding season.

Existing habitats that could support osprey and bald eagle in the surveyed area

Nest trees for bald eagles are very limited along the water in the surveyed area, and there are few trees that serve as suitable perch sites. Currently, the closest active eagle's nests to the surveyed area are on Ross Island, the northern end of Forest Park (Harborton nest site), Sauvie Island, West Hayden Island, and Smith and Bybee Lakes. Eagles have been observed foraging within the surveyed area, typically around RM 7, and using low perch sites just above the water or perching in larger cottonwoods or Douglas-fir along the water. The best nesting habitat for eagles foraging in the surveyed area is Forest Park, as this park includes some old-growth clusters and generally lies within 0.5 to 1 mile from the river. Prey species for eagles (resident fish and waterfowl) are available within the surveyed area and would not necessarily be considered a limiting factor preventing eagles from nesting in the area. However, the available habitat in the surveyed area consists primarily of mainstem deepwater habitat, which limits the hunting opportunities (and therefore prey availability) for eagles. Eagles along the lower Columbia River tend to prefer, or are found in more abundance, near shallower water where wetlands, tidal mudflats, and backwater slough areas provide ample cover and foraging areas.

It is more likely that nest trees with suitable buffer, perch trees, access to shallow water, and human disturbance issues are the limiting features that currently impede more eagles from nesting within the surveyed area. Currently, the most suitable nesting and perching habitat along the surveyed area occurs at Ross Island, Oaks Bottom, Willamette Cove, Doane Lake, Triangle Park, the head of Multnomah Channel, Sauvie Island, and Kelley Point Park. Nesting and perching habitat could be protected or enhanced in these areas, and perching habitat also could be enhanced all along the surveyed area. Limiting human disturbance in these areas during critical nesting times would also increase use by eagles. Hayden Island, just outside the surveyed area, also provides good nesting habitat for eagles that could forage in the lower Willamette River. Increasing shoreline and wetland

habitats, and providing natural or artificial perches within these habitats, would greatly increase use of the surveyed area by eagles.

Ospreys currently nest and forage within the surveyed area. The number of active nests (adult observed in incubation position) with known nesting in 2008 included nine sites in the lower Willamette River from RM 1 to 11 (eight of these sites were included in the Portland Harbor reach from RM 2 to 11), 11 sites in the Multnomah Channel, and 22 sites in the mid-Willamette River (Buck and Kaiser 2011). Ospreys will readily use natural trees, man-made platforms or other structures for nesting, and there is plenty of open water habitat for ospreys to forage. Currently, habitat factors possibly limiting osprey nesting numbers in the surveyed area would include suitable nesting areas with platforms and mature perch trees or poles near nest sites. Ospreys may also be limited by eagle harassment in areas where eagles are present. Protecting and restoring areas with suitable nest and perch sites are important to retaining and expanding historical nesting habitat along the Willamette River.

Areas that could support osprey and bald eagle in the future with or without restoration

Ross Island Lagoon

- Existing conditions: Provides good nesting, perching, and foraging habitat for eagles and ospreys. A pair of eagles currently occupy a nest on the west side of the island, and ospreys nest near the lagoon.
- Restoration opportunities: Limit human disturbance during nesting period for eagles; enhance or add new platforms to improve osprey nesting success.

Oaks Bottom

- Existing conditions: Provides good perching and foraging habitat.
- Restoration opportunities: Protect older trees in areas with limited human access to increase occupancy and nesting success of eagles and ospreys, and limit human disturbance during nesting period.

Swan Island

- Existing conditions: For eagles, high human activity (boating, fishing, and other recreation) limits the value of this area for bald eagle nesting due to disturbance, yet foraging opportunities exist. A pair of ospreys nest and forage within the lagoon.
- Restoration opportunities: West side of Swan Island provides plenty of nesting habitat (light towers) for osprey (there is an existing nest in the area on a light tower that needs repair or replacement). Poles could also be erected in this area with nest platforms to further increase osprey use.

Triangle Park and Triangle Bluff

- Existing conditions: There is plenty of space for osprey nests in this area. Triangle Bluff provides very good eagle nesting habitat, but there is a trail with a high human and vagrant disturbance factor that could minimize or prevent eagle use. The edge habitat towards the U.S. Coast Guard facility has less disturbance and could provide nesting substrate for eagles.
- Restoration opportunities: Add osprey platforms in area; minimize human disturbance to encourage eagle use of older trees.

Willamette Cove

- Existing conditions: Provides some value as perching and foraging site for eagles and ospreys.
- Restoration opportunity: For eagles, protect existing mature cottonwoods for nesting, perching, and protect/enhance buffer trees; plant native conifers and cottonwoods to replace mature trees as they age. For ospreys, add nesting platforms.

Kelley Point Park

- Existing conditions: Provides good nesting and perching habitat for eagles.
- Restoration opportunities: Minimize human disturbance for eagles, add osprey platforms.

West Hayden Island, Southern shore of Columbia River

- Existing conditions: Provides good nesting and perching habitat for eagles. There is an active eagle nest on West Hayden Island.
- Restoration opportunities: Minimize human disturbance for eagles, add osprey platforms.

Forest Park (west side at St. Johns Bridge)

- Existing conditions: This large park with older conifers and buffer trees provides preferred nesting habitat for eagles as well as perching habitat. An occupied eagle nest occurs near Harborton, and osprey nests occur in the area. Forest Park provides the majority of nesting sites for eagles foraging within Portland Harbor.
- Restoration opportunities: Encourage/support protection of old-growth trees; limit human disturbance where possible during the nesting period.

Past habitat changes and modifications that would have influenced osprey and bald eagle

Contaminants, primarily DDE (a metabolite of the pesticide DDT), have limited reproduction of eagles and osprey in many areas of the United States and elsewhere, and populations have rebounded since the banning of various organochlorine chemicals (Grier 1982; Henny et al. 2010). In addition to contaminants, the main habitat factors in

the surveyed area that would have reduced osprey and bald eagle numbers in the past include channelization, reduction of backwater areas and shallow-water habitat, human disturbance, and loss of nesting and perching trees. Also, reduction in habitat that benefited salmonids (and ultimately reduced salmonid populations) would have reduced prey items for eagle and osprey. Historically, it is likely that adult salmon played a much larger role in the eagle diet in the area, with resident fish playing a lesser role and introduced fish such as carp and shad not being part of the historical diet. Both eagles and ospreys have been found to adapt to impoundments, slower moving waters, and other human-induced habitat modifications provided suitable nest sites, perch sites, and open water remained intact; and both avian species have taken advantage of introduced fish species as prey. Very little information is available regarding eagle or osprey numbers, nest sites, or habitat associations in the surveyed area prior to the 1970s.

Subsequent Discussions

Responses to follow-up questions given to Mr. Frank Isaacs and Dr. Robert Grove after the site visit regarding eagle and osprey habitat and restoration opportunities:

1) Currently, what is the limiting habitat or other features for eagles and osprey in the surveyed area?

Isaacs: For eagles, human activity and disturbance, lack of perches, and lack of large trees in secluded forest stands for nesting are probably the major limiting factors. In addition, lack of preferred habitat for foraging (e.g., wetlands, backwater areas, sloughs, mudflats) may decrease hunting opportunities or available prey and limit eagle nesting and other activities along the main stem of the lower Willamette River. Nesting habitat is very limited along the lower Willamette River shorelines, but eagles foraging in the surveyed area would be expected to nest in mature trees in Forest Park which is within 1 mile of the lower Willamette River shoreline for much of the park. The most immediate factors limiting eagle use in the surveyed area would likely include suitable perch trees, foraging habitat, and human activity.

Grove: Nest structures [e.g., platforms] for ospreys.

2) What habitat enhancements or restoration would best benefit osprey and eagle foraging and nesting habitat in the surveyed area?

Isaacs: Increasing habitat diversity (wetlands and backwater areas), providing suitable perch trees, and restoration of fisheries would enhance hunting opportunities for eagles. Protecting existing and planting new Douglas-fir and cottonwood in areas of low human activity (or limiting human activity near potential nest sites during critical periods) would benefit bald eagles by providing hunting perches and potential nest substrate.

Grove: For ospreys, inclusion of artificial nest platforms at strategic locations along the river's shoreline.

Additional comments by Elizabeth Ruther: Conserving or protecting any mature, large-diameter trees that are near water in the surveyed area to provide nesting, roosting, or perching habitat for ospreys and eagles.

3) What is the total number of nesting pairs of eagle and osprey that would be sustainable between RMs 2 to 12? What is a sustainable distance between nests?

Isaacs: For bald eagles nesting under ideal conditions (e.g., suitable nest and perch trees and pristine foraging areas such as wetlands, active floodplain, and backwater areas with no human development), there could have been eight to ten breeding areas along this stretch of the Willamette River (RMs 2 to 12), based on an approximate 1-mile distance between nest sites and compared to the distribution of breeding pairs on other stretches of the Willamette and Columbia Rivers as identified in Isaacs and Anthony (2011). Under current conditions, a realistic minimum potential population for the area would be two breeding areas between the Harborton and Ross Island nest sites. With habitat enhancements and improved hunting opportunities, there could be as many as seven breeding areas along this stretch of river. This estimate is based on eagles nesting in Forest Park 2 miles apart, between the Harborton and Ross Island breeding areas, and includes the Harborton and Ross Island breeding pairs.

Grove: For ospreys, I do not believe we need to be concerned about distances between nest sites as they are known to nest colonially. As long as the prey abundance is good, you should be able to have as many as 20 nesting pairs (possibly more) from the Ross Island area to the mouth.

4) What information is available regarding eagle or osprey numbers or nesting habitat prior to 1970?

Isaacs: None for bald eagles. Gabrielson and Jewett (1940) did not mention the area as having nesting bald eagles by 1940, so nest sites were very rare or nonexistent by that time.

Grove: For ospreys, Gabrielson and Jewett (1940) reported they were "formerly common along the Columbia and Willamette Rivers…", but Henny and Kaiser (1996) reported that the historical numbers of osprey nesting along the Willamette River prior to 1976 remain unknown.

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