FISH SPECIES AND THEIR HABITAT NEAR THE RIVERGATE INDUSTRIAL DISTRICT

BASELINE CONDITIONS REPORT

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1.0 INTRODUCTION

1.1 BACKGROUND

The Port of Portland expects to conduct a series of mitigation activities at their Rivergate Industrial District property as outlined in the consent decree: Jones vs. Thorne, et al. (2001). These mitigation activities include bank excavation, culvert removal, grading, riparian planting and pedestrian pathway construction. The Rivergate property occupies both the north and south shore of the lower Columbia Slough, as well as land adjacent to Bybee Lake and Ramsey Lake.

The objective of this baseline conditions report is to describe the current environmental conditions within the Rivergate area in relation to listed, proposed, or candidate fish species and their designated critical habitat. This report focuses on those fish species and associated habitats that have a potential to be impacted by the proposed mitigation activities. It is anticipated that a biological assessment will be prepared to address the potential impacts of the proposed mitigation activities once preliminary plans have been established. This report has been prepared in a format similar to that used for baseline condition descriptions in standard Endangered Species Act Section 7 consultations such that it can be directly used to conduct an effects analysis in a biological assessment.

1.2 LOCATION

The Port of Portland property known as the Rivergate Industrial District is situated near the confluence of the Willamette and Columbia Rivers. The Rivergate Industrial District is located in Township 2N, Range 1W, Sections 23, 24 and 25 (Figure 1).

Mitigation activities will take place along both the north and south shores of the lower Columbia Slough between the Lombard Street Bridge and a railroad bridge directly to the south. Mitigation activities will also occur adjacent to Ramsey Lake and north of Bybee Lake at the Leadbetter Peninsula. The Columbia Slough discharges to the Willamette River near Kelley Point Park. The lower Columbia Slough is considered tidal riverine habitat and is separated from the middle and upper portions of the slough by a levee and pump station located at River Mile (RM) 8.2.

2.0 METHODS

A search and review of the existing data (see Reference section) related to fisheries in the lower Columbia River Slough was conducted. Fish abundance and habitat survey data were obtained from studies conducted by Fishman Environmental Services in 1986/1988 and U.S. Fish and Wildlife Service (USFWS) in 1992. Site visits were conducted in March and April 2001. Photographs and field notes were taken and used along with the existing data to describe habitat conditions.

Figure 1. Rivergate Industrial District; proposed mitigation and associated waterbodies.

Water quality grab sample data were obtained from the Oregon Department of Environmental Quality's (DEQ) Laboratory Analytical Storage and Retrieval (LASAR) Database (DEQ 2001). Continuous monitoring water quality data were obtained from the City of Portland Bureau of Environmental Services (BES 2000). Additional water quality information was obtained from the DEQ Total Maximum Daily Load (TMDL) report (DEQ 1998).

Factors considered in this report include species' dependence on specific habitat components, the abundance and distribution of habitat, the availability and quality of habitat (including water quality and flow conditions), distribution and population levels of the species, and general watershed conditions. The methods and definitions described in "*Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale*" (NMFS 1996) were used to evaluate baseline conditions in terms of properly functioning condition (PFC).

3.0 SPECIES STATUS AND OCCURRENCE

3.1 LISTING STATUS FOR FISH

Based on review of the National Marine Fisheries Service's (NMFS) web site (http://www.nwr.noaa.gov/1salmon/salmesa), a letter from the Natural Heritage Program and a letter from the USFWS (Appendix A), the following evolutionarily significant units (ESUs) and distinct population segments of anadromous salmonids could potentially occur within proposed action area:

- Upper Willamette River Chinook Salmon (*Oncorhynchus tshawytscha*) -Threatened
- Lower Columbia River Chinook Salmon (*Oncorhynchus tshawytscha*) - Threatened
- Lower Columbia River Steelhead (*Oncorhynchus mykiss*) - Threatened
- Upper Willamette River Steelhead (*Oncorhynchus mykiss*) - Threatened
- Columbia River Chum Salmon (*Oncorhynchus gorbuscha*) - Threatened
- Southwestern Washington/Columbia River Cutthroat Trout (*Oncorhynchus clarki clarki*) - Proposed for threatened status
- Lower Columbia River/Southwest Washington Coastal Coho Salmon (*Oncorhynchus kisutch*) - Candidate Species

Although Columbia Slough enters the Willamette River 0.8 miles upstream from the confluence of the Willamette and Columbia Rivers, use of Columbia Slough by either adult or juvenile salmonids that do not migrate upstream or downstream through the lower Willamette River is considered unlikely. Therefore, the focus of this document is on those distinct population segments known to routinely use the lower Willamette River as a migratory corridor.

The U. S. Fish and Wildlife Service (USFWS) has listed the Columbia River Bull Trout (*Salvelinus confluentus*) distinct population segment as a threatened species. The boundaries

of the distinct population segment include the entire lower Columbia River and its accessible tributaries. However, the present distribution of bull trout in the Willamette Basin is restricted to isolated small populations in headwater streams. There are no records of bull trout in the lower Willamette River below Willamette Falls and USFWS does not include bull trout in its lists of species likely to occur in the lower Willamette River (Young pers. com. January 25, 2000). In addition, white sturgeon (*Acipenser transmontanus*), Pacific lamprey (*Lampetra tridentata*) and green sturgeon (*Acipenser medirostris*) are categorized as "species of concern" by the USFWS.

The Magnuson-Stevens Act, which was reauthorized and amended in 1996, requires NMFS to recommend conservation and enhancement measures for any Federal or State activity that may adversely affect Essential Fish Habitat (EFH). A description of EFH for the Rivergate area is attached as Appendix B.

3.2 ESU Status, Migration Timing and Critical Habitat

3.2.1 Upper Willamette River Chinook Salmon (Threatened)

Status: It was concluded by NMFS that chinook salmon in this ESU are not presently in danger of extinction but are likely to become endangered in the foreseeable future. Total abundance has been relatively stable at approximately 20,000 to 30,000 fish. Natural escapement is less than 5,000 fish and has been declining sharply. It is estimated that about two-thirds of the natural spawners are first-generation hatchery fish, suggesting that the natural population is falling far short of replacing itself (63 FR 11481).

Use of the Action Area: Since there is no spawning habitat in Columbia Slough, use of the lower portion of the slough is limited to fish that move into the slough from the Willamette River. The upstream migration of adult spring chinook salmon on the Willamette River has been monitored at the Willamette Falls fish passage facilities for many years. Generally the run begins in March, peaks between late April and early June, and is complete by the end of July (Table 1). Based on sport fishing catches, it is known that adult spring chinook salmon occur in the Portland Harbor (up to RM 11) from a few weeks to a few months earlier than they occur at the Willamette Falls fish ladders (RM 25). It is likely that many adults hold in the water immediately downstream of the falls before ascending the fish ladders. However, it also is possible that some adults hold for periods within the lower portions of the river. Adult Upper Willamette River Chinook Salmon could potentially use the lower portion of Columbia Slough as a temporary holding area. However, no documentation of such use was found. Only the lower portion of Columbia Slough (up to RM 8.2) is accessible from the Willamette River because a levee cuts the lower slough off from the mid-portion of the slough.

Table 1. Timing of adult salmonid movements over the Willamette Falls fish ladder.

SPECIES	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Spr.Chinook*												
Fall Chinook*												
Coho Salmon**												
Win. Steelhead*												
Sum. Steelhead*												

Note: The gray areas bracket the runs and the black areas bracket the peaks of the runs.
* Based primarily on data compiled by Foster (1997).
** Based on Clackamas River North Fork Dam counts (PGE 1999).

The timing of downstream migrating spring chinook smolts was monitored at the Willamette Falls Sullivan Hydroelectric Project bypass facility from 1992 through 1997 by Portland General Electric (PGE) biologists. Records were kept of the numbers of hatchery (fin clipped) and wild smolts caught at the bypass. Wild spring chinook smolts typically begin passing the falls in January; peak numbers occur in March or April and by June the spring outmigration is essentially complete. A second out-migration of wild spring chinook smolts occurs during the autumn, beginning in August and peaking in November (Figure 2). Hatchery smolts are also released during the autumn, primarily in October and November.

Based on the occurrence patterns in the lower Willamette River, wild spring chinook juveniles could potentially be present in lower Willamette River and lower Columbia Slough from January through June and then again from late August through November.

Naturally-spawning spring chinook salmon from the Clackamas River are also considered part of this ESU. The number of out-migrating wild, yearling spring chinook smolts has been monitored for a number of years by PGE at their North Fork Dam fish facility. The five-year (1995-99) monthly out-migration averages for the Clackamas River indicate that the wild, yearling chinook out-migration begins in April, peaks in May, and ends in June. A second out-migration of the wild smolts occurs in October and November. Therefore, some of these Clackamas River juveniles potentially could be present in the lower Willamette River and lower Columbia Slough from April through early-July and then again in October through early-December.

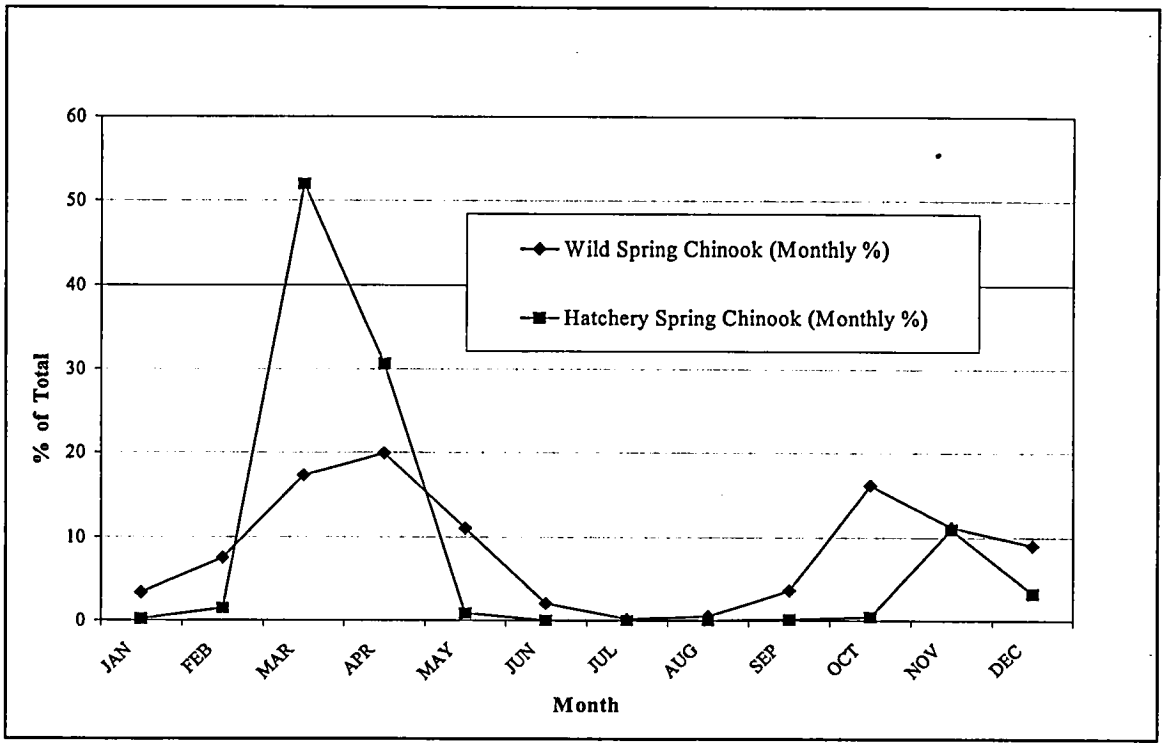

Figure 2. Average downstream migration timing of hatchery and wild spring chinook salmon smolts at Willamette Falls for 1992-1996 (Domina 1998).

Juvenile chinook salmon were found during the spring of 1986 in both the lower Columbia Slough and the Smith and Bybee Lake system (Fishman, 1986). A total of 29 stations were sampled with electrofishing gear along with a beach seine and set net. Sampling was conducted on April 30, May 2, May 9, June 26, October 24 and October 25. Juvenile salmonids were observed jumping out of the lake water, near the control structure, into the slough in early June. Water temperature ranged from 13.0°C to 15.0°C from April 30 through May 9th. Water temperatures recorded during the late June sampling period ranged from 24.0°C to 25.5°C. Water temperatures during the October sampling were again in the 15.0°C range.

The major distinguishing feature of abundance data for the late spring sampling (April 30 through May 9) was the abundance of juvenile chinook. Spring-time sampling occurred after a high flow event, which breached the dike between the lakes and north slough. Juvenile chinook salmon represented 13% of the catch in Bybee Lake, 12% in Smith Lake, 12% in Smith Channel, 29% in the Dam Pool and 30% in the lower Columbia Slough (Fishman 1986). The 15ft. by 5ft. breach may account for the occurrence of juvenile chinook salmon collected from the lakes. During the spring sampling period (April 30 through May 9) juvenile chinook salmon were found to be the most abundant species in the Columbia Slough (30%). The greatest number (19) of juvenile chinook salmon captured in a single day were collected from the lower Columbia Slough just upstream of the St. John's landfill. No juvenile chinook salmon were captured after May 9th at any of the sampling stations. No other salmonid species were collected during the entire study.

Ninety-five juvenile chinook salmon were collected during the spring of 1986. The mean length of these fish was 102.2 millimeters (mm). Of these juveniles, 51 were collected from the Smith and Bybee Lakes and outfall area. The mean length of these fish was 114.3mm. The remaining 44 juvenile chinook salmon were collected from the lower Columbia Slough. The mean length of these fish was 88.1mm. The fish collected from the lower Columbia Slough and the Smith and Bybee Lake probably represent both hatchery and wild sub-yearling (fall) and yearling (spring) chinook migrating from the upper Willamette River system. Twenty-one juvenile salmonids were analyzed for stomach content. They were found to be feeding primarily on Cladocerans, Copepods, Ostracods as well as other insects, spiders and mites. The results of the feeding habit analyses in Smith and Bybee Lakes indicated a great reliance on planktonic crustaceans over insects during the spring (Fishman 1986).

A follow-up electrofishing study was conducted in the Smith and Bybee Lakes system from June 29th through July 2nd, 1992, by USFWS. This study used the same sampling locations as the Fishman study but did not include sampling in the lower Columbia Slough itself. No juvenile salmonids were captured during this study (Willis et. al, 1992). The absence of juvenile salmonids in Smith and Bybee Lakes during this study concurs with the results of the Fishman (1986) study, which also did not find any juvenile salmonids present during June. Based on these studies, it appears that juvenile chinook salmon utilize the lower Columbia Slough primarily during early spring when water temperatures are more suitable.

Critical Habitat: Critical habitat was designated for lower Columbia River Chinook Salmon, Upper Willamette River Chinook Salmon, lower Columbia River Steelhead Trout, and Upper Willamette River Steelhead Trout on February 16, 2000 (65 FR 7764). Critical habitat designations have not yet been proposed for lower Columbia River/Southwestern Washington Coastal Coho Salmon or Southwestern Washington/Columbia River Coastal Cutthroat Trout. Critical habitat is defined to include the water, substrate, and adjacent riparian zone of accessible estuarine and riverine reaches. The width of the adjacent riparian zone is based on a functional (rather than quantitative) description.

Critical habitat for Upper Willamette River Chinook Salmon ESU includes all river reaches accessible to chinook salmon in the Willamette River and its tributaries above Willamette Falls. Also included are river reaches and estuarine areas in the Columbia River from a straight line connecting the west end of Clatsop jetty and the west end of the Peacock jetty upstream to and including the Willamette River in Oregon. Based on this definition critical habitat for this ESU would include the entire Columbia Slough, since it is a tributary of the Willamette River and was historically accessible.

3.2.2 *Lower Columbia River Chinook Salmon (Threatened)*

Status: According to the NMFS (63 FR 11481), production in this ESU appears to be predominantly hatchery-driven with few identifiable naturally spawned populations. The apparently healthy population in the Lewis River is the single exception. Long- and short-term trends in abundance of individual populations are mostly negative, some severely so. About half the populations comprising this ESU are very small. In the Willamette River Basin, this ESU is represented by a single small population of fall chinook that spawns primarily in the lower mainstem Clackamas River.

Spawning escapement for the Clackamas River population varies from about 1000 individuals in good years and as low as 50 individuals in poor years. These estimates are based on annual redd counts conducted by ODFW biologists. Redd counts have been monitored since 1967. Total numbers of redds have varied from 50 in 1990 to 554 in 1974. A partial redd survey (mouth to Carver Bridge) was conducted in the autumn of 2000 and only 14 redds were identified (Ellis Ecological Services 2001).

Historically, there may have been naturally reproducing populations of fall chinook salmon in the lower ends of streams such as Johnson Creek and Abernethy Creek, which enter the Willamette below Willamette Falls. However, only a few strays have been seen in these streams in recent years. Prior to hatchery introductions and the fish ladder facilities at Willamette Falls, there were no naturally spawning fall chinook above Willamette Falls. Low flow conditions during the late summer early autumn migration period were too low to allow access over the falls.

Use of the Action Area: Both fall-run and spring-run stocks of chinook salmon are included in this ESU. The fall run is predominant. The fall run consists of an early component that return from August through early October and spawn within a few weeks (Kostow 1995) and later components that enter over an extended period of time and spawn from late October through November. The majority of the fall run chinook salmon are called "tules" and are distinguished by their dark skin coloration and advanced state of maturation at the time of freshwater entry. The Clackamas River population consists of these early run "tules". The estimated timing of upstream movement of adult Clackamas River fall chinook through the lower Willamette River is shown in Table 1.

Adult fall run chinook salmon migrating upstream through the lower Willamette River may temporarily hold in the lower Willamette River and potentially in lower Columbia Slough during the months of August through October. However, no documentation of adult salmon use of the lower slough was found in our review of available information.

The majority of fall-run chinook salmon juveniles emigrate to the marine environment as sub-yearlings (Reimers and Loeffel 1967, Myers et al. 1998). Within the lower Willamette River system, sub-yearling fall chinook salmon originate from either the Clackamas River or the Willamette River upstream of Willamette Falls. Only those from the Clackamas River are listed and belong to the lower Columbia River Chinook ESU. Unfortunately, there are no monitoring stations or dams on the lower Clackamas River that allow estimation of the

numbers of juveniles leaving the river. The best available information on run timing for the fall chinook juveniles is data collected by PGE biologists at the Willamette Falls Sullivan Hydroelectric Plant fish bypass facility from 1996 through 1997 (Figure 3). The PGE data for years 1996 and 1997 were the only years that run timing could be determined for naturally spawning chinook salmon. Prior to 1996, large numbers of hatchery fingerlings were stocked above Willamette Falls and probably biased the results of the run timing estimates. We believe it is reasonable to assume that the timing of the out-migration of fall chinook on the Clackamas River is similar to the naturally spawning fall chinook in the Willamette River.

Juvenile chinook salmon emigrating from the Clackamas River are expected to be present in the lower Willamette River and potentially lower Columbia Slough from April into July, with no autumn migration component. Some of the juvenile chinook captured within the lower slough, Smith and Bybee Lake may be emigrants from the Clackamas River. Please refer to section 3.2.2.

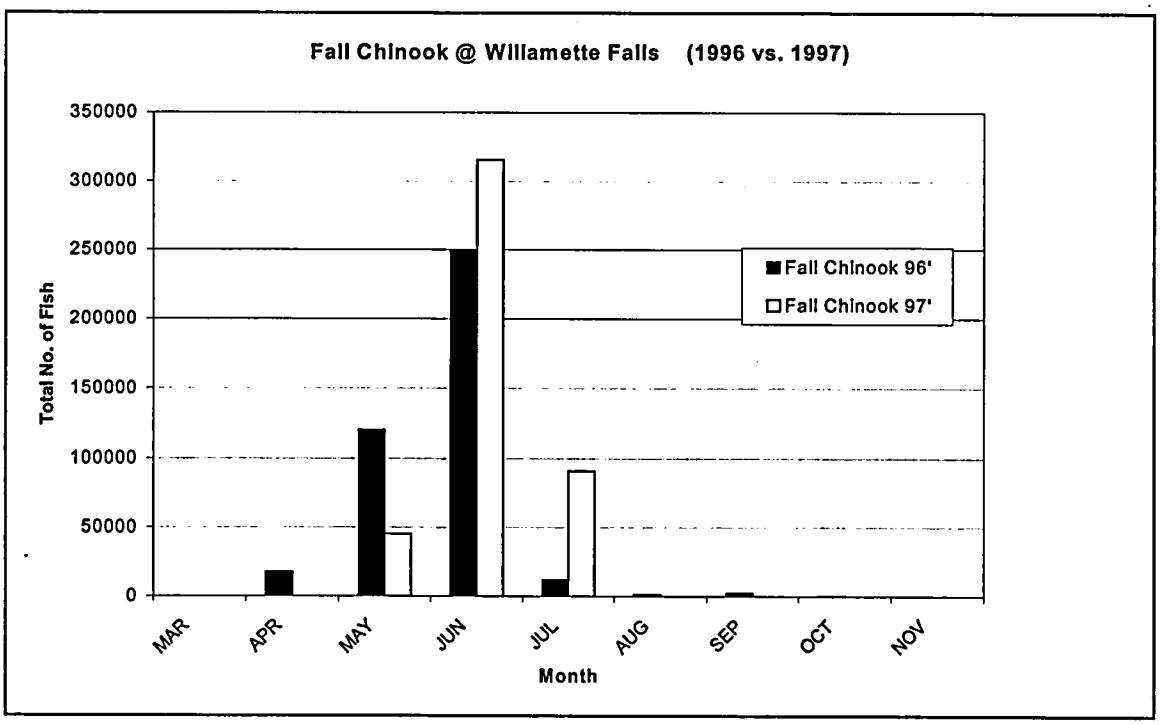

Figure 3. Downstream migration pattern for sub-yearling fall chinook salmon at Willamette falls for the period 1996-1997 (Domina 1998).

<u>Critical Habitat</u>: Critical habitat for the lower Columbia River Chinook Salmon ESU includes all river reaches accessible to chinook salmon in the Columbia River tributaries between the Grays and White Salmon Rivers in Washington and the Willamette and Hood Rivers in Oregon, inclusive. Also included are river reaches and estuarine areas in the Columbia River from a straight line connecting the west end of the Clatsop jetty and west end of the Peacock jetty upstream to The Dalles Dam. Since Columbia Slough is a tributary

of the Willamette River below Willamette Falls, potential impacts to critical habitat must be addressed for this ESU.

3.2.3 Lower Columbia River Steelhead Trout (Threatened)

Status: No estimates of historical (pre-1960s) abundance specific to this ESU are available. Total run size (natural + hatchery) for the major stocks in the lower Columbia River (below Bonneville Dam) during the early 1980s was estimated to be 150,000 winter and 80,000 summer steelhead (Light 1987). Light estimated that 75 percent of the total run was of hatchery origin. Recent five-year average natural escapements for streams with adequate data range from less than 100 to 1,100. Total recent (five-year average) run size for major streams in this ESU was greater than 16,000, but this total only includes a few basins for which estimates were available (Busby et al. 1996). Based on available evidence, NMFS concluded that lower Columbia River Steelhead ESU is not presently in danger of becoming extinct but is likely to become endangered in the foreseeable future.

The Clackamas River is the principal spawning and rearing area for members of this ESU that enter the lower Willamette River. Only late-run winter steelhead from the Clackamas River are listed. The late run component primarily spawns in the upper Clackamas River watershed (Murtagh et al. 1992). Portland General Electric has monitored run size at the North Fork Dam on the Clackamas for over two decades. Average recent run size over the North Fork Dam has been approximately 400 fish (years 1995-1999).

Use of the Action Area: The late run winter steelhead that spawn in the Clackamas River typically reach the spawning grounds in March and April. Some of these fish may pass through the lower Willamette River a few weeks earlier. Extended pre-spawning residency in down-river areas is unlikely because these fish enter freshwater in a mature state and do not typically hold for long periods prior to spawning. We anticipate that very few, if any, adults would be present in the lower Columbia Slough.

Counts of juvenile steelhead out-migrating from the Clackamas River have been monitored at PGE's North Fork dam fish facility. The five-year (1995-99) monthly out-migration averages for Clackamas River naturally spawned steelhead indicate that out-migration starts in April, peaks in May and is complete by mid July (Figure 4). Steelhead smolts are predominately 2+ years of age and typically move rapidly downstream to the ocean. Therefore, only a short lag time (a few days) between the timing shown for the North Fork counting station and the passage of these smolts through the lower Willamette River would be anticipated. Juvenile steelhead, emigrating from the Clackamas River, could potentially rear for short periods in lower Columbia Slough during the months of May and June. However, no juvenile steelhead have been captured in the Columbia Slough or in Smith and Bybee Lakes (Fishman 1986, Willis et. al, 1992).

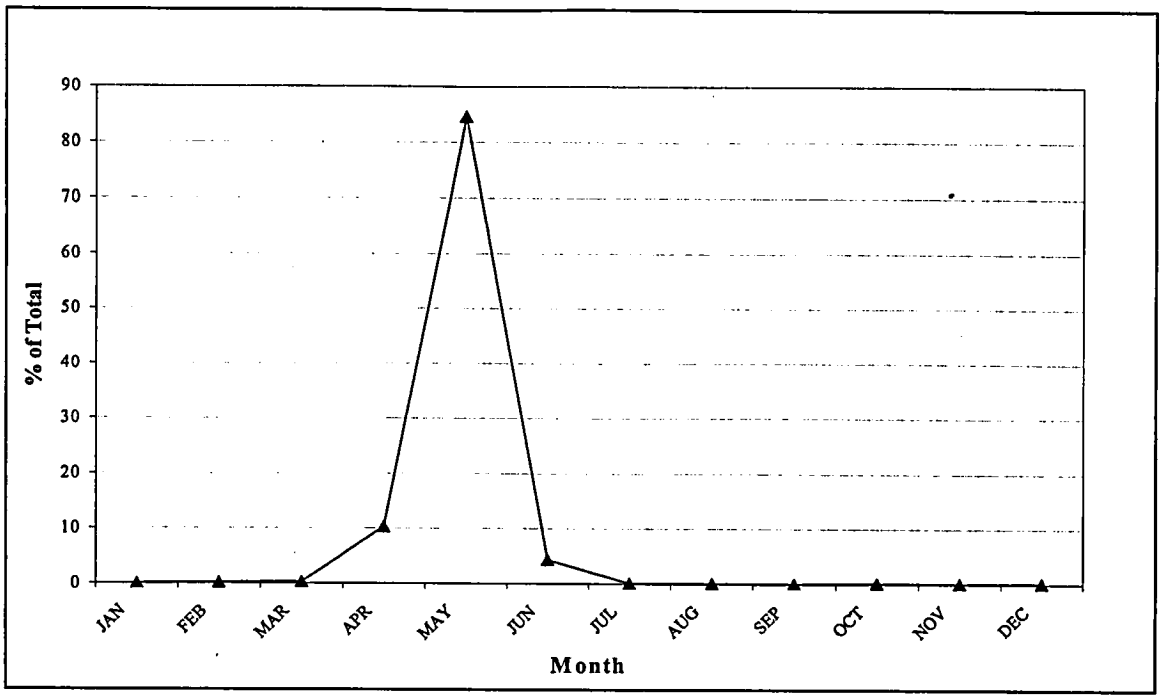

Figure 4. Average downstream migration pattern of wild Clackamas River steelhead at North Fork Dam for the period 1995-1999 (PGE Monitoring Report 1999).

Critical Habitat: Critical habitat for the lower Columbia River Steelhead ESU includes all river reaches accessible to listed steelhead in Columbia River tributaries between the Cowlitz and Wind Rivers in Washington and the Willamette and Hood Rivers in Oregon, inclusive. Also included are river reaches and estuarine areas in the Columbia River from a straight line connecting the west end of the Clatsop jetty and the west end of the Peacock jetty upstream to the Hood River in Oregon. Excluded are areas above specific dams (see 64 FR 5740) or above long-standing naturally impassable barriers. As a tributary to the Willamette River below Willamette Falls, Columbia Slough is included in the critical habitat designation.

3.2.4 Upper Willamette River Steelhead (Threatened)

Status: This ESU was reviewed by NMFS in 1996 (Busby et al. 1996). At that time, NMFS concluded that the available information did not indicate sufficient risk to warrant federal listing. Since that time, NMFS received some new estimates of winter steelhead abundance in the ESU. Counts of adult winter steelhead above Foster Dam through 1997 in the upper South Santiam River showed very low numbers for several years up to and including 1996 (Chilcote 1997). Also, Chilcote reported that indices of spawner abundance in the Calapooia River have reached record low levels since 1991. Run reconstructions for winter steelhead in the Molalla, North Santiam, and South Santiam Rivers provided in 1997 (WCSBRT 1998) suggested moderate-sized runs in these streams (850-1,200) in recent natural escapements. However, there was concern about the effects of introduced hatchery stocks on these populations. Because of the new information, NMFS concluded that the ESU is at risk of

becoming endangered in the foreseeable future and ruled to list it as a threatened species in March 1999 (64 FR 14517).

Use of the Action Area: Adults of the late-run Willamette River winter steelhead enter the lower Columbia River in mid-February and March. Spawning usually commences in the tributaries in April and continues through mid-May (Busby et al. 1996). The timing of the adult run has been monitored at the Willamette Falls fish ladder facilities for many years. The run generally begins in March and continues through early May. Recent run size (1995-1999) has averaged 3,313 fish.

It is anticipated that adult Steelhead migrating towards the falls would be present in the lower Willamette River starting in February and continuing through early May. However, extended pre-spawning residency in down-river areas is unlikely because these fish enter freshwater in a mature state and do not typically hold for long periods prior to spawning. We anticipate that very few, if any, adults would hold in the lower Columbia Slough.

Steelhead smolt out-migration counts were conducted by PGE at their Sullivan bypass facility from 1992 through 1997. Mean monthly counts of hatchery and wild steelhead are shown in Figure 5 for the period 1992-1996. Based on these data, wild steelhead smolt out-migration starts in March, peaks in May, and is essentially complete by mid July (Figure 5). It is anticipated that steelhead smolts migrating downstream would be present in the lower Willamette River system and potentially in portions of the lower slough, during the months of March through July. However, no juvenile steelhead have been captured in the Columbia Slough or in Smith and Bybee Lakes (Fishman 1986, Willis et. al, 1992).

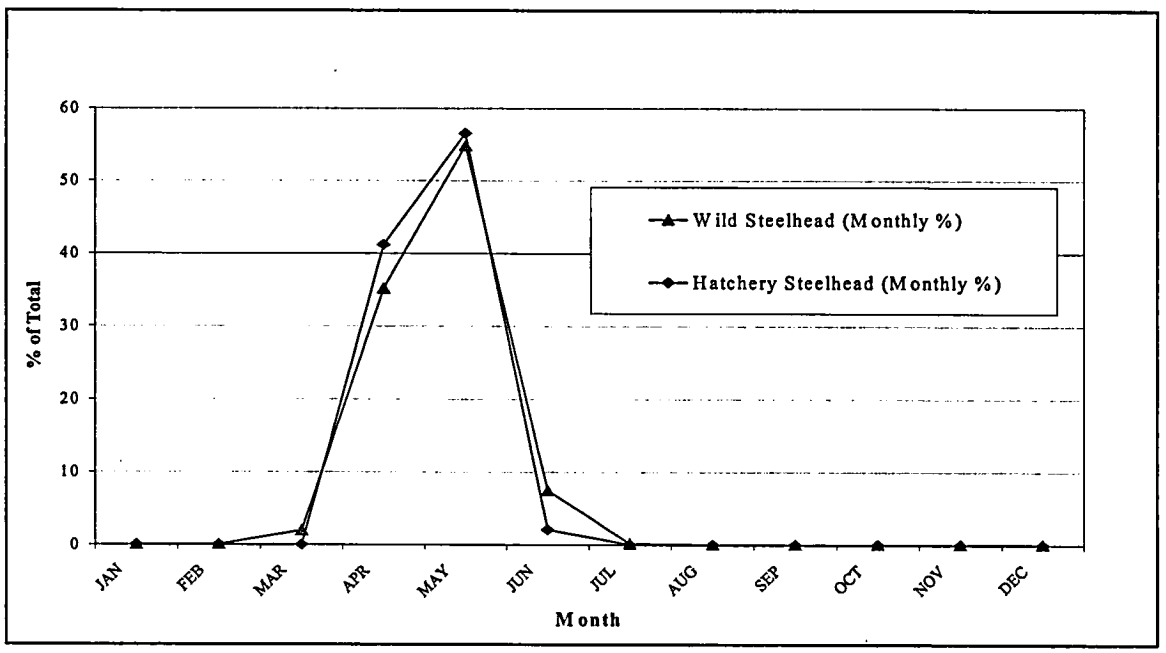

Figure 5. Average migration timing of wild and hatchery steelhead smolts past Willamette Falls for the period 1992-1996 (Domina 1997).

Critical Habitat: Critical habitat for the Upper Willamette River Steelhead ESU includes all river reaches accessible to listed steelhead in the Willamette River and its tributaries above Willamette Falls. Also included are river reaches and estuarine areas in the Columbia River from a straight line connecting the west end of the Clatsop jetty and the west end of the Peacock jetty upstream to, and including, the Willamette River in Oregon. Excluded are areas above specific dams (see 64 FR 5740) or above long-standing, naturally impassable barriers.

3.2.5 Columbia River Chum Salmon (Threatened)

Status: Chum salmon are second largest Pacific salmon and have the widest natural spawning distribution of any Pacific salmon. The range of the chum salmon extends from Korea and the Japanese island of Honshu east around the rim of the north Pacific Ocean to Monterey Bay in southern California. Historically, chum salmon were distributed throughout the coastal regions of western Canada and the United States, as far south as Monterey, California. Presently, major spawning populations are found only as far south as Tillamook Bay on the northern Oregon coast.

In the Columbia River basin, chum salmon runs historically may have occurred as far inland as the Walla Walla River in eastern Washington. Presently, the distribution in the Columbia River is restricted to tributary streams downstream of Bonneville Dam. Three streams on the Washington side of the river (Hamilton and Hardy Creeks near Bonneville Dam and the Grays River) support native spawning populations (WDF et al. 1993), while about 23 small native populations have been identified from streams on the Oregon side of the river downstream from the mouth of the Willamette River (Kostow 1995). The NMFS' status review of chum salmon (Johnson et al. 1997) concluded that the Columbia River chum salmon ESU is presently at significant risk of becoming endangered in the foreseeable future.

Use of the Action Area: Chum salmon generally mature between three and five 5 years of age with the majority maturing at four years. Adults enter the Columbia River on their spawning run, beginning in late September. The run typically peaks in mid-November. In Hamilton and Hardy Creeks near Bonneville Dam, spawning occurs from mid-November to mid-January. In the Grays River, spawning occurs from early November to late December (Johnson et al. 1997). The Oregon Department of Fish and Wildlife (ODFW) cited 23 locations where native chum salmon spawn on the Oregon side of the lower Columbia River, but no run times for these fish are available (Kostow 1995). Spawning typically occurs in the lower reaches of rivers and streams. No spawning of chum salmon has been documented for either the Willamette River or Columbia Slough. Lower Columbia Slough has no suitable habitat that could be used for chum salmon spawning.

Incubation time for chum salmon embryos varies considerably depending largely on water temperature. For example, fertilized eggs hatch in about 100 to150 days at 4°C, but hatch in only 26 to 40 days at 15°C. Due to differences in water temperature between spawning streams and the wide range of spawning timing, emergence from the gravel in the lower Columbia River tributaries probably occurs over an extended period of time. Based on spawning timing, it is reasonable to assume that emergence probably occurs from late

February through April in the Columbia River tributaries. Juvenile chum salmon move downstream to salt water immediately after emerging from the gravel. Therefore, juvenile chum salmon should pass the mouth of the Willamette River from early March through late April. No chum salmon fry have been identified in the Columbia Slough.

Critical Habitat: Critical habitat for the Columbia River Chum Salmon ESU includes all river reaches accessible to listed chum salmon (including estuarine areas and tributaries) in the Columbia River downstream from Bonneville Dam, excluding Oregon tributaries upstream of Milton Creek at RM 89 (RKm 144) near the town of St. Helens. Therefore, Columbia Slough is not part of the designated critical habitat for this ESU.

3.2.6 Southwest Washington/Columbia River Cutthroat Trout (Proposed Threatened)

Status: The Southwestern Washington/Columbia River Cutthroat Trout distinct population segment includes both anadromous (sea-run) and resident forms. However, the primary concern centers on the low and apparently declining abundance of the anadromous form. The boundary of this distinct population segment was originally described by NMFS in preparation for listing as a threatened ESU. However, in December 1999, jurisdiction for coastal cutthroat trout was transferred from NMFS to USFWS. USFWS retained the NMFS boundary designations for the Southwestern Washington/Columbia River Cutthroat Trout ESU and is presently reviewing available information to determine if it warrants listing as a threatened distinct population segment. Very little is known about abundance of migratory cutthroat trout in the tributaries to the Willamette River downstream of Willamette Falls.

Use of the Action Area: Adult cutthroat trout upstream movements in the Columbia River begin in late June and continue through October, with peaks in late September and October (Tipping and Springer 1980). Little is known about adult cutthroat trout migration timing through the lower Willamette but it probably follows the same general pattern as in the lower Columbia River. Adult cutthroat trout could be expected in the lower Willamette River below Willamette Falls starting in July and continuing through October. Some of these fish could potentially enter the lower portion of Columbia Slough, but none have been documented.

Cutthroat trout juvenile downstream migration timing on the Clackamas River and lower Willamette River is poorly documented. It is likely that smolts move downstream during April and May. It is possible that these fish will use off-channel habitat such as that provided by lower Columbia Slough. However, juvenile cutthroat trout have not been identified in the lower slough or the Smith and Bybee Lake system (Fishman 1986, Willis et. al, 1992).

Critical Habitat: No critical habitat has yet been defined for this distinct population segment.

3.2.7 Lower Columbia River/Southwest Washington Coastal Coho Salmon (Candidate Species)

Status: This ESU was previously reviewed by NMFS for possible listing as a threatened species but was determined not to warrant listing because of apparent widespread dilution of the native populations with hatchery fish. Recent work done by ODFW suggests that there may still be some late-run native populations of coho salmon within this ESU in the Sandy River and the Clackamas River in Oregon. NMFS is presently reviewing new information on the status of coho in this ESU and will be making a determination of whether to go forward with another proposal to list in the near future.

Naturally spawning coho in the Clackamas River consist of an early spawning component and late spawning component. ODFW considers the late run component to be a native population. The late run fish spawn primarily in the upper watershed. Recent spawning escapements have averaged about 700 adults, however, none have been found.

Use of the Action Area: The late spawning coho component of the adult coho salmon run to the Clackamas River passes over the North Fork Dam from November through March. These fish would be expected to pass through the lower Willamette River from late October through mid March. Therefore, it is possible, although unlikely, that adult coho migrating up the Willamette River could hold temporarily in lower Columbia Slough from late October through mid March.

The number of out-migrating coho juveniles is monitored by PGE at their North Fork dam fish facility. The five-year (1995-99) monthly out-migration averages for the Clackamas River indicate that coho out-migration begins in April, peaks in May and June and is essentially over by early July. Therefore, coho smolts, migrating downstream from the Clackamas River, would be expected in the lower Willamette River from April through early July. Some of these fish may use the off-channel habitat provided in lower Columbia Slough for rearing and refuge habitat.

Critical Habitat: No critical habitat has yet been defined for this ESU.

3.3 Non-Salmonid Species Occurrence and Use of the Action Area

No recent fish survey data are available for Columbia Slough. A survey of the fish community in the lower slough was conducted during spring, summer and fall 1986 (Fishman Environmental Services, 1988). Juvenile chinook salmon were found during the early spring and were numerically dominant. No other salmonid species were captured. During all other surveys conducted in late spring and early summer, carp (*Cyprinus carpio*), largescale sucker (*Catostomus macrocheilus*), goldfish (*Carassius auratus*), white crappie (*Pomoxis annularus*), and yellow perch (*Perca flavescens*) were numerically dominant. Eleven other species including, largemouth bass (*Micropterus salmoides*), northern pikeminnow (*Ptychocheilus oregonensis*) and starry flounder (*Platichthys stellatus*) were found in relatively low numbers. A complete list of non-salmonid fish species identified by Fishman (1988) and Willis et al. (1992) is presented in Table 2.

With the exception of the seasonal (spring) presence of juvenile chinook salmon, the lower slough appears to be dominated by species that are relatively tolerant of pollution and warm water temperatures. In 1987, additional fish sampling was conducted at several locations throughout the Slough by Fishman Environmental Services as part of a study to evaluate fish and benthos tissue levels for pesticides, PCB and trace metals (Fishman Environmental Services 1989).

Table 2. Non-salmonid fish species collected during 1986 Smith and Bybee Lakes Study (Fishman 1988, Willis et. al 1992).

Scientific Name	Common Name
Family Cyprinidae	minnows and carp
Carassius auratus	goldfish
Cyprinus carpio	common carp
Mylocheilus caurinus	peamouth
Ptychocheilus oregonensis	northern pikeminnow
Family Catostomidae	suckers
Catostomus macrocheilus	largescale sucker
Family Ictaluridae	freshwater catfishes
Ictalurus natalis	yellow bullhead
Ictalurus nebulosus	brown bullhead
Family Poecillidae	livebearers
Gambusia affinis	mosquitofish
Family Centrarchidae	sunfishes
Lepomis gibbosus	pumpkinseed
L. gulosus	warmouth
L. macrochirus	bluegill
Micropterus salmodies	largemouth bass
. *Pomoxis annularis*	white crappie
P. nigromaculatus	black crappie
Family Percidae	perches
Perca flavescens	yellow perch
Family Pleuronectidae	righteye flounder
Platichthys stellatus	starry flounder
Family Cottidae	sculpins

3.4 BENTHIC INVERTEBRATE COMMUNITY

Benthic infauna samples were collected by Fishman (1989) from thirteen locations located throughout the Columbia Slough. The mean number of taxa (simple diversity) per station ranged from a low of 2.7 in the lower slough to a high of 13.7 in the upper slough. The lowest abundance (11 organisms per square foot) was found in the sediment sample collected just downstream of the Lombard Street bridge (RM 0.4). The highest abundance (1745 organisms per square foot) was found just downstream of the mouth of Whitaker Slough (RM 1.7). Diversity and abundance were generally higher in the upper slough than in the lower slough. Sediments in the lower slough were generally dominated by sand whereas silt was the dominant substrate component in the upper slough. Sandy substrates are

generally less productive for benthic macroinvertebrates than silty substrates for the lower Columbia River region.

The Lombard Street bridge (RM 0.4) site had the second highest mean number of *Corophium* amphipods when compared to the other twelve sites. *Corophium* is often an important source of food for juvenile salmonids in the lower Columbia River system. The mean number of taxa identified at this station was three (3). The three taxa were comprised of Oligochaete worms (mean number = 4.0), *Corophium* amphipods (mean number = 3.0), and Sphaeriid clams (mean number = 4.0). The particle size distribution of the sediment sample collected at this site was 98.4% sand, 1.4% silt and 0.2% gravel.

In comparison, the benthic infauna sample collected just downstream of the St. Johns landfill bridge (RM 2.7) had 350 organisms per square foot. The mean number of taxa found at this site was 4.3. These taxa were mostly comprised of Oligochaete worms (mean number 344), midge fly larvae (mean number 0.3), *Corophium* (mean number = 0.3), and Sphaeriid clams (mean number = 1.0). The particle size distribution of the sediment sample collected at this site was 90.5% sand, 8.5% silt and 1.0% gravel.

The benthic infauna sample collected from the east bank of the Willamette River, upstream from the United Grain Terminal, had 48 organisms per square foot by comparison. This site had the highest mean number (15.3) of *Corophium*. The mean number of taxa found at this site was 6.7. These taxa were mostly comprised of Oligochaete worms (mean number 22), midge fly larvae (mean number 1.3), *Corophium* (mean number = 15.3), and Sphaeriid clams (mean number = 6.3). The particle size distribution of the sediment sample collected at this site was 71.9% sand, 27.0% silt and 1.1% gravel.

4.0 EXISTING ENVIRONMENTAL CONDITIONS

The following description of existing conditions addresses only riparian and aquatic conditions. These conditions are generally described following the NMFS' guidelines for "Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale" (NMFS 1996). The habitat indicators recommended for evaluation by NMFS were designed for streams in forested upland areas and some do not apply in the lowland flood plain environment where Columbia Slough is located. We have selected those indicators that are appropriate, added additional indicators, and indicated where modifications are needed for the specific conditions of Columbia Slough. Table 3 summarizes the existing condition information.

Table 3. Environmental pathways and indicators, environmental baseline and comments regarding mitigation activities.

Pathways / Indicators	Environmental Baseline[1]	Comments
WATER QUALITY:		
Water Temperature	Not Properly Functioning Spring, Summer, Fall Months	Continuous temperature data collected by BES and DEQ indicate that 7-day moving average of daily maximum temperatures exceed 64°F (17.8°C).
Dissolved Oxygen	Not Properly Functioning Year-Round	Grab sample data and continuous monitoring data collected by DEQ indicated that the cool-water aquatic life standard (6.5 mg/L) is violated throughout the entire year.
Sediment/Turbidity	Properly Functioning	No data supporting violation of the standard (10% above background). Turbidity within acceptable levels for salmonids.
Nutrients (Nitrogen & Phosphorous)	Not Properly Functioning Year-Round	Grab sample data collected by DEQ and BES show frequent violations of the ortho-phosphate criteria.
pH	Not Properly Functioning- Spring, Summer, Fall Months	Grab sample data and continuous monitoring data collected by DEQ and BES indicate that the upper limit of the pH standard (8.5) is sometimes exceeded.
Chemical Contamination: DDE, DDT, PCBs, Dioxins	Not Properly Functioning Year-Round	DEQ, National Bioaccumulation Study (July 1987); Parametrix for BES (Summer 1994); OR Health Division has issued advisories against eating fish caught in slough.
HABITAT ACCESS:		
Physical Barriers	At Risk Year-Round	Access to the Willamette River from the lower slough is unhindered. No access to Smith & Bybee Lakes under average flow conditions. No access to middle and upper Columbia Slough under all flows.
HABITAT ELEMENTS:		
Substrate	Not Properly Functioning	Indicator is not appropriate for the lower slough. Sediments comprised of 95%-99% silt and sand composition not suitable for salmonid spawning.
Large Woody Material	At Risk	Indicator not appropriate for the lower slough. Does not meet NMFS matrix criteria of >80 pieces/mile; >24"diameter; > 50 ft. length. Good LWD recruitment potential.
Pool Frequency/Quality	At Risk	Indicator not appropriate for the lower slough. Does not meet NMFS matrix criteria for pool frequency/quality standards.
Off-channel habitat	At Risk	The lower slough functions as off-channel habitat. Access to additional off-channel habitat is blocked.
Refugia	At Risk	Existing refugia are not sufficient in number or size.
CHANNEL CONDITION & DYNAMICS:		
Width/Depth Ratio	At Risk	Indicator not appropriate for the lower slough. W/D ratio varies from <10 to between 10-12.
Streambank Condition	Properly Functioning	>90% banks are stable. <10% are actively eroding.
Floodplain Connectivity	Not Properly Functioning	Columbia Slough is diked and levees prevent inundation of floodplain. Off-channel areas are infrequently inundated. Over-bank flow infrequent.

Pathways / Indicators	Environmental Baseline[1]	Comments
FLOW/HYDROLOGY:		
Change in Peak/Base Flow	Not Properly Functioning	Columbia Slough is diked and flows are controlled to prevent flooding. Base and peak flows are altered compared to undisturbed watershed of similar size.
Increase in Drainage Network	Not Properly Functioning	Large increases in drainage network due to CSO's and roads.
WATERSHED CONDITIONS:		
Road Density and Location	Not Properly Functioning	Road density is greater than $3mi/mi^2$.
Disturbance History	Not Properly Functioning	Greater than 15% of the watershed disturbed.
Riparian Reserves	At Risk	The riparian area in the lower slough is mature and connected. Moderate loss of connectivity and function (shade, LWD recruitment) of riparian area for the entire slough; incomplete protection of habitat and refugia for sensitive aquatic species.

[1]Three categories of function are defined for each indicator in the "Matrix of Pathways and Indicators" (NMFS 1996). For the purposes of this checklist, "restore" means to change the function of an "at risk" indicator to "properly functioning", or to change the function of a "not properly functioning" indicator to "at risk" or "properly functioning" (i.e., it does not apply to "properly functioning" indicators).

4.1 WATER QUALITY

The Columbia Slough is currently on the DEQ 303(d) list as water quality limited for the following parameters: bacteria, phosphorous, pH, dissolved oxygen (DO), chlorophyll a, and temperature. The Columbia Slough is also water quality limited for DDE, DDT, PCBs, and dioxin due to elevated levels found in fish tissue. The Oregon Health Division and the City of Portland have issued recommendations against eating fish from the slough due to contamination by PCBs, DDE and DDT (Table 3). The slough is posted with "no fishing" signs due to a potential risk to human health. The slough is also water quality limited for lead (Pb) because of levels above the fresh water chronic criteria for the protection of aquatic life.

4.1.1 Temperature

The specific temperature requirements of juvenile anadromous salmonids during their seaward migration are not well documented. Ocean-type chinook typically migrate during March and April at temperatures between 4.5°C and 15.5°C (Healey 1991). Once temperatures exceed a threshold level in the spring, salmon smolts will revert to a presmolt physiology and remain within the stream. The preferred temperature range for juvenile anadromous and resident salmonids is generally between 10°C and 14°C. The lower lethal temperature limit for juvenile salmonids ranges between 0.0°C for steelhead trout and 3.1°C for sockeye salmon. The lower lethal limit for juvenile chinook salmon is 0.8°C. The upper lethal limit for juvenile anadromous and resident salmonids ranges between 22.8°C for cutthroat trout and 29.4°C for rainbow trout. The upper lethal limit for juvenile chinook salmon is 26.2°C (Spence et al. 1996).

Table 4. Oregon 303(d) water quality status of the lower Columbia Slough.

Parameter	Standard Criteria	Season	Supporting Data
Temperature	Water Standard = 7 day maximum moving average ≤ 64°F (17.8°C)	Spring through Fall	Continuous temperature data collected by BES and DEQ indicate that 7-day moving average of daily maximum temperatures exceed 64°F (17.8°C).
Dissolved Oxygen	Cool-Water Aquatic Life Standard ≥ 6.5mg/L	Annual	Grab sample data and continuous monitoring data collected by DEQ indicate that the cool-water aquatic life standard (6.5 mg/L) is violated throughout the entire year.
Toxics (DDT, DDE, PCBs, Dioxins, Dieldrin)	Fish Tissue	Annual	DEQ, National Bioaccumulation Study (July 1987); Parametrix for BES (Summer 1994); OR Health Division has issued advisories against eating fish caught in slough.
pH	Water Standard = 6.5-8.5	Spring through Fall	Grab sample data and continuous monitoring data collected by DEQ and BES indicate that the upper limit of the pH standard (8.5) is exceeded.
Chlorophyll a	Water Criteria = 15 ug/L	Spring through Fall	Grab sample data collected by DEQ indicate that the chlorophyll a action level of 15 ug/L is exceeded.
Bacteria	Water Standard = 126 E.coli/100 ml (30-day log mean)	Annual	Grab sample data collected by DEQ and BES show frequent violations of the standard.
Dissolved Ortho-Phosphate	Water Criteria = 20 ug/L	Spring through Fall	Grab sample data collected by DEQ and BES show frequent violations of the criteria.
Lead	Water Column Criteria = 1.2 ug/L	Annual	Hardness and lead grab sample data collected by BES show frequent violations of the criteria.

Outmigration of juvenile salmonids in the Willamette River system generally starts in March and continues through June. The temperature standard for the Willamette River and its tributaries is set at 64°F (17.8°C) year-round by the Oregon Department of Environmental Quality (DEQ). This standard is used to protect "cool water aquatic life" including the use of the lower slough for juvenile salmonid rearing (DEQ 1998).

Juvenile chinook salmon were found to be the most abundant fish species in the lower slough and Smith and Bybee Lakes system during the spring of 1986 (Fishman 1988). A review of available temperature data was conducted to determine if springtime temperatures in the lower slough are generally within the preferred temperature range for migrating juvenile chinook salmon. Grab sample data obtained by the DEQ Laboratory for the spring quarter (April-June) period (1995-2000) indicates that the mean water temperature for the Columbia Slough at the St. John's landfill road bridge (SJB) was 15.3°C (59.5°F). The minimum and maximum temperature for this same time period was 12.5°C (54.5°F) and 18.8°C (65.8°F), respectively. The temperature maximum occurred during June 2000. May and June have historically been months of relatively high juvenile salmonid outmigration in the lower Willamette River basin.

Continuous temperature monitoring data were also reviewed. BES collected these data on the lower slough at the SJB using a Hydrolab (BES 2000). The time-period selected for our review of the continuous temperature monitoring data was from March 1st, 2000 through June 30, 2000. This time-period was selected because it is generally the time when juvenile salmonids, primarily chinook, are potentially present in the lower slough. Temperatures generally ranged from a low of 8.0°C in March to a high of over 26°C in late June. Temperature remained below the State standard of 17.8 °C through the middle of May at which time water temperatures then exceeded and remained above the standard (Figure 6). Maximum daily temperatures exceeded the lethal limit for juvenile salmonids in late June. These data correspond well with the grab sample data collected by DEQ, which show violations of the temperature standard starting in June.

It appears that the lower slough is properly functioning for temperature during the winter, and early to mid-spring. The lower slough is not properly functioning for temperature during the late spring, summer and early fall seasons. More fish population data are required to estimate timing and distribution patterns of migrating and resident juvenile salmonids within the lower slough and Smith and Bybee Lake system. The collection of these data should coincide with the collection of temperature data to investigate the relation between water temperature and the presence of salmonids. The DEQ is presently developing a Total Maximum Daily Load (TMDL) for temperature in the lower Willamette River, including Columbia Slough.

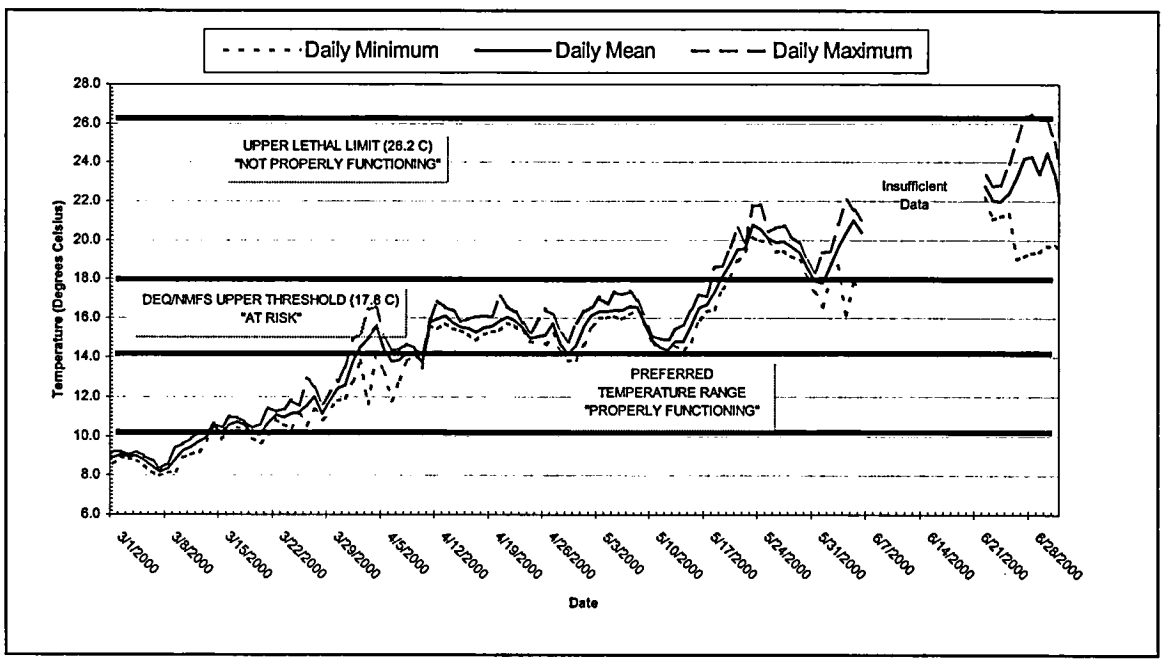

Figure 6. Lower Columbia Slough stream temperature at St. John's Bridge during potential chinook rearing, March – June 2000 (BES 2000).

4.1.2 Dissolved Oxygen

The DEQ has established the Columbia Slough as providing "cool water aquatic life" habitat. Under this designation the dissolved oxygen (DO) standard has been set at 6.5 milligrams per liter (mg/L) as a 30-day mean minimum; 5 mg/L as a seven-day minimum mean; and 4 mg/L as an absolute minimum (OAR 341-41-0445). The cool water standard provides protection for mixed native cool water species, and is sufficient for migrating salmon and trout during part or all of the year. However, this level of protection does pose a slight risk to salmon and trout and these fish will not dominate the community at this level of protection. The minimum DO range for coldwater species, including salmon and trout, is generally thought to be between 6.0 mg/L as an absolute minimum and 8.0 mg/L as a 30-day mean. At this level of protection, juvenile anadromous and resident salmonids may rear throughout the year with a low level of risk and may dominate the fish community (Spence et al. 1996).

Extensive monitoring of DO levels has occurred within all areas of the slough by several agencies and private consultants. In February 1995, a severe DO depletion was recorded in the middle and lower slough. DO in the lower slough was recorded as zero for almost two days. This severe oxygen depletion occurred after a winter storm hit Portland on February 12th, 1995. Significant snow and ice accumulation lasted until February 16th. Portland International Airport (PDX) used de-icing and anti-icing chemicals (ethylene glycol, urea) with high biochemical oxygen demand (BOD) values during this time period. The severe oxygen depletion appears to be the results of the de-icing activities (Wells 1995). Summer violations of the DO standard occur much less frequently than winter violations and are thought to be due to stagnant water and algal processes (DEQ 1998). Monthly dissolved oxygen concentrations averaged over a period of 28 years range from 7.7 mg/L in January to 16.6 mg/L in April (Figure 7).

In order to improve DO levels in the Columbia Slough, the DEQ has developed a TMDL for permitted outfalls that discharge to the slough. It has been demonstrated that aircraft and pavement deicing chemicals entering the slough, as storm water flowing from the PDX airport, contribute to lowering DO levels (DEQ 1998). Generally, the highest BOD loads, and thus lower DO levels, have occurred during the winter when deicing chemicals are used. This problem is exacerbated in the lower Sough where a BOD plug can stagnate when the Willamette River flows are high. A combined waste load allocation has been issued to the Port of Portland (Port) and co-permittees for their National Pollutant Discharge Elimination System (NPDES) permit. This waste load allocation limits the amount of waste, in kilograms per day of BOD, which can enter the slough from the airport. Waste load allocations for BOD were calculated to ensure that the DO standards of 4.0 mg/L and 6.5 mg/L would be met.

Until recently several combined sewer overflows (CSOs) have been discharged to the lower slough. However, the City of Portland is currently in the process of removing all CSOs discharging to the lower slough. This should also help to reduce BOD in the slough and have a positive effect on dissolved oxygen levels.

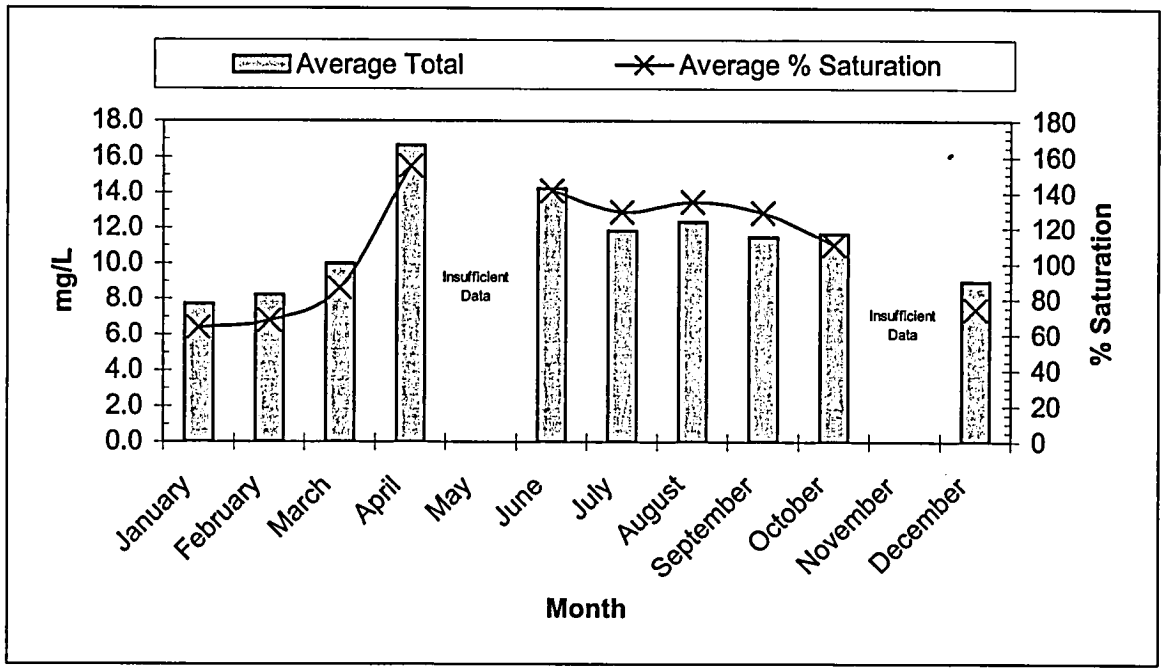

Figure 7. Monthly average dissolved oxygen conditions at Landfill Road within the lower Columbia Slough, 1973-2000 (DEQ 2001).

4.1.3 Sediment/Turbidity

Short-term elevations in turbidity as a result of storm or snowmelt events appear to have little effect on adult and juvenile salmonids. Bisson and Bilby (1982) reported that coho salmon avoided water exceeding 70 nephelometric turbidity units (NTU), levels that may occur in some watersheds with high erosion potential. In the laboratory, juvenile coho salmon and steelhead trout exhibited reduced growth rates and higher emigration rates in turbid steams (25-50 NTU) compared to clear streams (Sigler et al. 1984). Lloyd et al. (1987) found that juvenile salmonids avoided chronically turbid streams including glacially influenced streams and those disturbed by human activities. Turbidity also influences foraging behavior of juvenile anadromous and adult resident salmonids by reducing the distance from which they can locate drifting prey (Spence 1996).

Grab sample data, obtained by the DEQ Laboratory (DEQ 2001), for the spring quarter (April-June) and time period 1995-2000 were reviewed for the St. Johns Bridge location. The mean turbidity level for this location during this time period was 23 NTUs. The maximum and minimum turbidity levels were found to be 49 NTUs and 3 NTUs, respectively. Based on these data, the lower slough seems to be properly functioning for this water quality parameter.

4.1.4 Nutrients, pH and Chlorophyll a (Eutrophication)

The pH of water is directly influenced by photosynthesis, which is a function of primary productivity. Nutrients increase primary productivity, in the form of algae, and therefore photosynthesis rate. During the day as algae utilize carbon dioxide the pH of water increases. The pH of the water decreases at night, when algae respire, giving off carbon dioxide. pH outside the range in which species evolved may result in both direct and indirect toxic effects. The DEQ pH standard for all basins except the Columbia River and Cascade Lakes is 6.5 to 8.5 (DEQ 1998).

Monitoring data on the slough have demonstrated large swings in pH on a diurnal basis during the summer (CH2M Hill, 1995a). During the summer months pH levels in the lower slough frequently exceed 8.5. Diurnal swings in pH and DO are thought to be a result of algae growth and eutrophication occurring in the slough. Improvements in pH variations were observed in the summer of 1996 in the lower slough. At St. John's Bridge there was significant improvement in pH since 1992, as seen in the following graphs generated from continuous Hydrolab data (DEQ 1998).

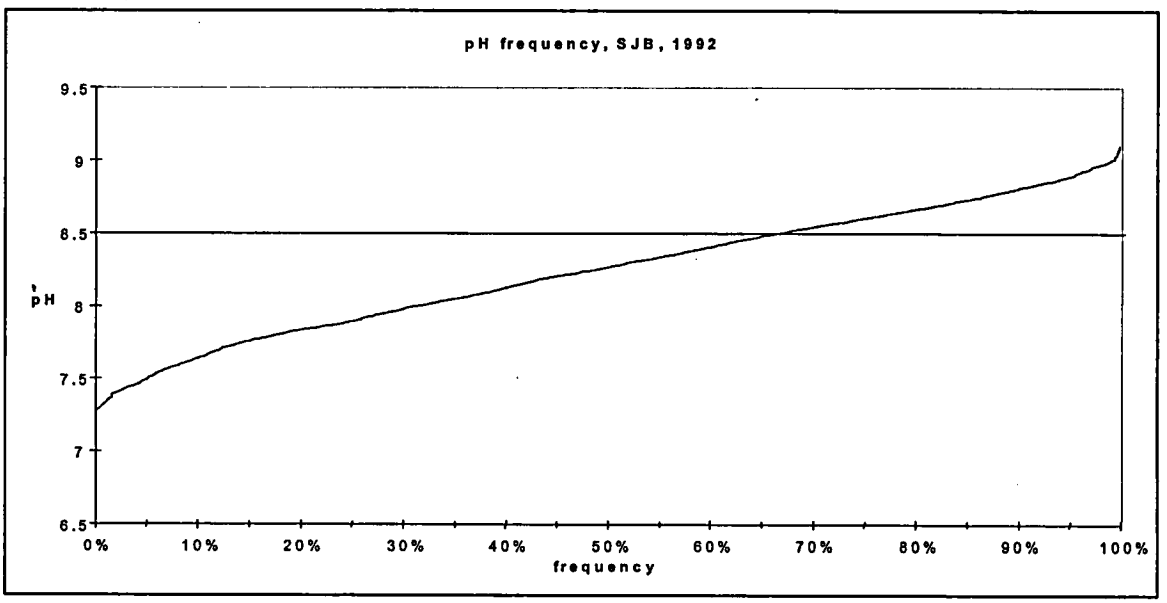

Figure 8. pH in lower slough at St. John's Bridge; July-September 1992 (DEQ 1998).

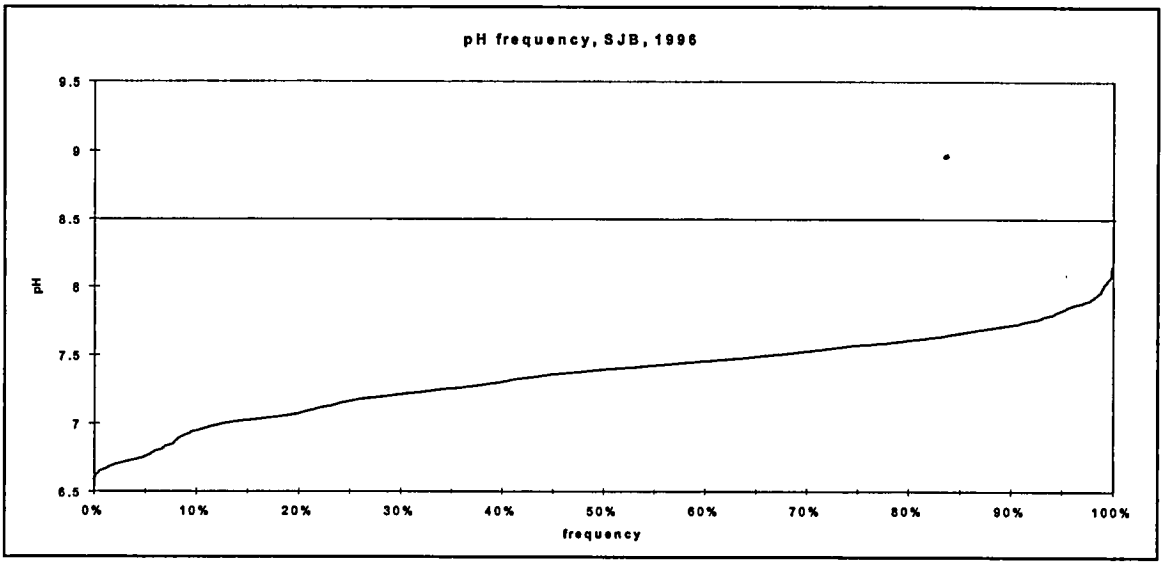

Figure 9. pH in lower slough at St. John's Bridge; July- September 1996 (DEQ 1998).

The DEQ criteria for dissolved ortho-phosphate is 20 ug/L. Grab sample data, obtained by the DEQ Laboratory (DEQ 2001), for the spring quarter (April-June) and time period (1995-2000) were reviewed for the SJB location. The mean ortho-phosphate concentration was found to be 9.2 ug/L. The maximum and minimum ortho-phosphate concentrations were found to be 14 ug/L and 6 ug/L, respectively.

Nitrogen in the form of ammonia is acutely toxic to salmonids in concentrations as low as 80 ug/L. Ammonia toxicosis is a function of pH. The lower the pH the greater the tendency for nitrogen to exist as dissolved ammonia. Low DO levels also exacerbate the toxicological response to ammonia-nitrogen. Grab sample data, obtained by the DEQ Laboratory (DEQ 2001) for the spring quarter (April-June) and time period (1995-2000) were reviewed for the SJB location. The mean ammonia-nitrogen concentration was found to be 100 ug/L. The maximum and minimum ammonia-nitrogen concentrations for this location and time period were found to be 300 ug/L and 30 ug/L, respectively. These data suggest the presence of elevated levels of ammonia-nitrogen during the spring quarter when juvenile salmonids are most likely to be present.

Elevated nutrient levels also generate nuisance conditions due to algal growth. Chlorophyll *a* is an indirect measurement of algal biomass. Oregon rules (OAR-41-150(1)(b) cite an action level for average chlorophyll *a* concentrations of 15 ug/L (3 month average based on a minimum of 3 samples) to control growth of nuisance phytoplankton. During the summer, spring and fall the Columbia Slough also exceeds the action level for chlorophyll a. Winter chlorophyll *a* values are generally lower (CH2Mhill, 1995a). The following graph demonstrates this exceedance at the SJB location within the lower slough (1993-1997 grab data) (DEQ 1998).

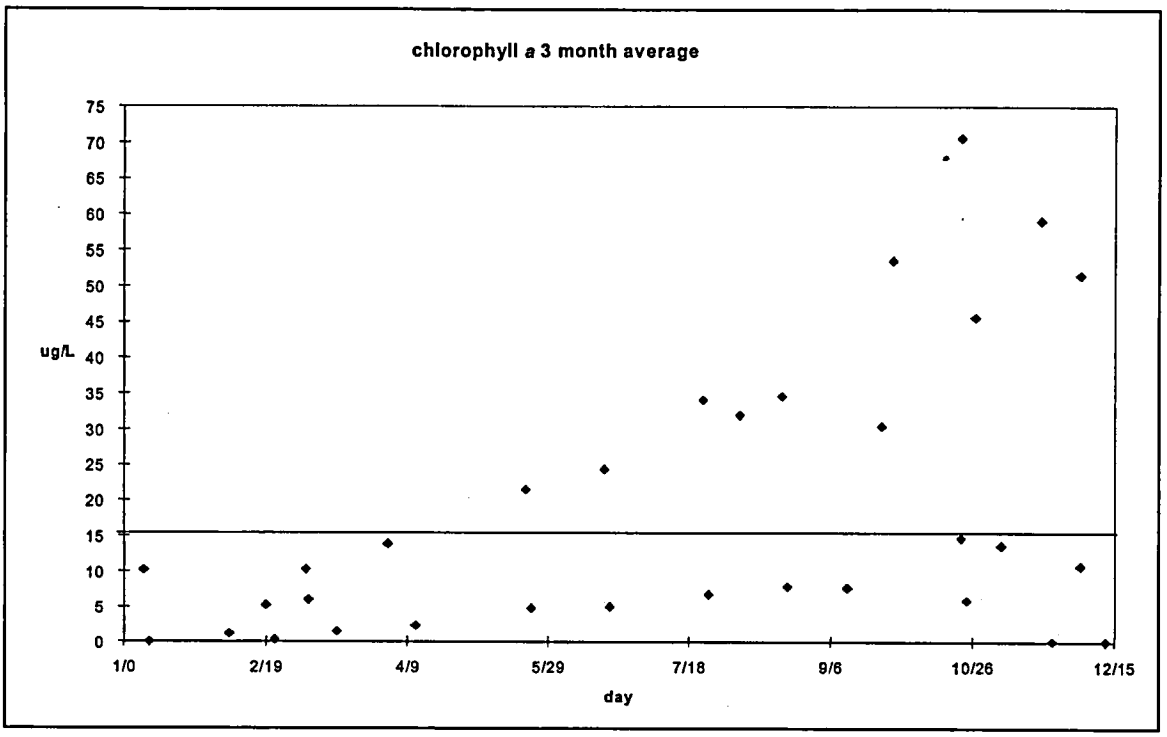

Figure 10. Chlorophyll *a* concentrations at St. John's Bridge, three month average (DEQ, 1998).

4.1.5 Chemical Contamination

Columbia Slough is water quality limited for DDE, DDT, PCBs and dioxin, based on elevated levels found in fish tissue (DEQ 1998). The slough is also water quality limited for lead due to detected levels above the freshwater chronic criteria for the protection of aquatic life. Other heavy metals such as zinc, copper, nickel, cobalt, and chromium also have been found in some sediment locations in the lower and upper sections of the slough (Fishman Environmental Services 1989).

Based on the above information, it can be concluded that present water quality conditions in the lower Columbia Slough are not properly functioning for temperature, dissolved oxygen, chemical contamination and nutrients.

4.2 HABITAT ACCESS

4.2.1 Lower Columbia Slough

Columbia Slough is a remnant of an interconnected network of sloughs, channels, and marshes that historically extended along the Oregon side of the Columbia River from the mouth of the Sandy River downstream to the Willamette River. Much of this area was seasonally connected to the Columbia River during spring high flow events and undoubtedly provided important off-channel rearing and refuge habitat for downstream migrating juvenile anadromous salmonids. Today, Columbia Slough is a highly modified 19-mile long

waterway that has been channelized, diked, and diverted. It has been functionally disconnected from the Columbia River floodplain and is bordered by levees that provide protection from the 500-year flood event (Hendricks pers. comm. 2000).

Columbia Slough discharges to the north shore of the Willamette River (RM 0.8) at Kelley Point Park, just upstream of the Willamette River's confluence with the Columbia River. lower Columbia Slough is freely accessible to salmonids via the Willamette River. The lower slough splits at RM 1.5 into the north slough and main stem. The main stem of the slough is freely accessible until RM 8.2, where a levee and pump station prevent further access. Migratory access to the middle and upper portions of the Columbia Slough is not possible under all flow conditions.

The levee, referred to as MCDD1, has two large drainpipes that are used seasonally to pass water through it. Each pipe has a tide gate on the downstream end, slide gates that close off the water flow, sumps in the middle and bar gates at the upstream ends. The gravity drains are typically used during low flow conditions from July through September. Upstream passage of fish through this system of gates, pipes and sumps by juvenile or adult salmonids is considered highly unlikely. During most of the year, the gravity drains are closed and water is pumped across the levee.

4.2.2 Smith and Bybee Lakes

The Smith and Bybee Lake system and their extensive wetland area discharge to the north slough via a single out-fall. The out-fall is a 60 inch diameter culvert with a flap-gate and does not allow upstream fish passage under normal flow conditions (Stewart pers. comm. 2001). The water control structure, constructed in 1982, essentially created an impoundment in a system that was previously a tidal wetland (Bybee Lake) and bottomland lake (Smith Lake). This impoundment has restricted the movement of fish between the lakes and Columbia Slough. At the present time, the extent of fish passage between the lakes and lower slough is dependent on the timing and height of the high-water events in the Columbia and Willamette Rivers. Periodic inundation of the Smith and Bybee Lake area occurs when high flows overtop the Columbia Slough bank. METRO is investigating the feasibility of removing the water control structure to allow tidal influence within the lakes. If designed properly, this should provide improved access for juvenile salmonids to the lakes and associated wetlands.

4.3 HABITAT ELEMENTS

The following sections describe the primary indicators of physical habitat for the lower Columbia Slough.

4.3.1 Substrate

No known salmonid spawning habitat is present in the lower slough or any other reach of Columbia Slough. The lower slough typically has a soft-bottom with little or no aquatic vegetation. The lower slough reach is tidally influenced and the sediment composition is dominated by sand. The lower has been classified (Fishman 1988) as R1UB2 and R1UB3

(riverine, tidal, unconsolidated bottom, sand and mud) using the U.S. Fish and Wildlife Service classification system (Cowarden et al. 1985).

Fishman (1989) collected six sediment samples from the lower slough and analyzed them for particle size distribution. The sediment sample collected at the Lombard Street bridge (RM 0.40) was comprised of 98.4% sand (by weight), 1.4% silt and 0.2% gravel. This sample had the highest density of *Corophium* amphipods when compared to the five other sediment samples collected from the lower slough. The sediment sample collected at the St. Johns landfill bridge (RM 2.70) location was comprised of 90.5% sand, 8.5% silt and 1.0% gravel. The benthic community at this location was dominated by Oligochaete worms, which are indicative of pollution.

These sediment samples were also analyzed for total organic carbon (TOC). TOC values ranged from 2.2% (by weight) at the Lombard St. Bridge to 2.8% at the St. John's Bridge. The percentage of TOC increased to 3.8% at the upper end of the lower slough (RM 8.2). Values of less than 4% are considered indicative of a relatively "healthy" system (Fishman 1989). Tides, CSOs and filling activities may all influence the amount of sand and organic matter being deposited in the lower slough. Based on the results of the particle size distribution data collected by Fishman (1989) the substrate in the lower slough is not properly functioning for salmonid spawning. However, spawning would not be expected in this off-channel area.

4.3.2 Large Woody Debris

No comprehensive survey of large woody debris (LWD) frequency has been conducted for the lower Columbia Slough. During our reconnaissance of the lower slough we observed large diameter trees and logs partially submerged in the water (refer to pictures in Appendix C). The number of LWD per mile and length of LWD in the lower slough did not appear to meet NMFS matrix requirements for this habitat parameter. Our reconnaissance revealed that there are adequate sources of deciduous trees available for recruitment in the riparian area. The riparian area is comprised mostly of mature black cottonwood (*Popuus balsamifera*) with an understory of Red-osier Dogwood (*Cornus stolonifera*), Himalayan Blackberry (*Rubus discolor*), and Pacific Willow (*Salix lucida*). No conifers were observed along the bank. Pictures of the riparian area were taken and are presented in Appendix C. Based on our observations we consider the LWD component of the habitat matrix to be at risk.

4.3.3 Pool Frequency and Quality

Sloughs on the lower Columbia River and Willamette River flood planes are typically slow-moving pool-type habitat. Channelization of the Columbia Slough has reduced the quality of the slough-type habitat through reduction in the complexity of the channel features and connectivity with adjacent wetlands and other sloughs. During our reconnaissance of the lower slough we observed a few deep-channel pools formed by submerged tree trunks and LWD. The channel width of the lower slough was estimated to range between 75 and 125 feet. The estimated number of pools per mile did not appear to meet the criteria (23-26 pools/mile) for pool frequency as outlined in the NMFS habitat matrix.

This area of the slough is tidally influenced and, therefore, pool depth is dependent on tidal fluctuation as well as fresh water input. In general, however, the pools we observed were estimated to be at least one meter in depth, thus meeting the matrix criteria (>1 meter) for pool quality. Both habitat parameters, pool frequency and quality, are considered to be at risk based on our field observations.

4.3.4 Off-channel Habitat

Backwaters and side-channels that developed along unconstrained reaches in alluvial floodplains were historically important rearing habitats for many salmonid juveniles (Sedell and Luchessa 1982). Where these habitats remain intact they often contribute a disproportionate share of total salmonid abundance (Spence 1996). Lower Columbia Slough below the levee at RM 8.2 represents off-channel habitat for the lower Willamette River. Historically, the entire slough and its connections to the broad Columbia River flood plain provided off-channel rearing and refuge habitat for juvenile salmonids. However, as noted above, the connections to the Columbia River have been cut off and dikes have been constructed along much of the slough. The Smith and Bybee Lake system and associated wetlands represents some of the last remaining off-channel habitat still present today along the Columbia River floodplain.

Access for juvenile salmonids to the Smith and Bybee Lake area is limited. The single out-fall that connects the entire system to the north slough does not allow upstream passage under normal flow conditions. However, under flood conditions this area is inundated and access via the slough is possible. The fish population study performed by Fishman (1988) revealed that juvenile chinook salmon were the most numerous fish species present during the spring in the lower slough and Smith and Bybee Lake area. Sampling was conducted after a flood event (Fishman pers. comm. 2001), which may explain the presence of juvenile salmonids in the backwater area.

The wetlands, ponds and lakes associated with the Smith and Bybee Lake area offers potential extensive low-energy rearing habitat for juvenile salmonids. However, access is limited and this habitat parameter is considered not properly functioning because of this limitation. Additional field research should be conducted in order to determine the extent, timing and distribution of juvenile salmonids using this off-channel habitat.

4.3.5 Refugia

Migrating fish are particularly vulnerable to predation because they often are concentrated and may move through areas with limited cover and high abundance of predators (Larsson 1985). Physical structure in the form of undercut banks and large woody debris provides refugia during resting periods and cover from predators.

Refuge for migrating juvenile salmonids in the lower slough is present in the form of LWD, bridge abutments and vegetative cover along the banks. However, in-depth studies to document the presence of refugia or its use have not been conducted for the Columbia Slough. The Smith and Bybee Lake system also offers high flow refuge juvenile salmonids. However, access for migrating juvenile salmoinds to this area is limited by way of a single culvert and this area is essentially disconnected from the main slough during normal flow

conditions. Currently, this habitat parameter is considered at risk because refugia exist in limited number and off-channel habitat is disconnected from the main channel.

4.4 Channel Condition and Dynamics

4.4.1 Width/Depth Ratio

The width of the lower slough ranges between 75 and 125 feet. The depth of the lower slough is dependent on tidal fluctuations and freshwater input and can range from 2 to 10 feet. Scouring of the lower slough is limited because flows are controlled. This limits the formation of undercut banks and deep-water habitat. Sedimentation does occur in the lower slough also reducing the amount of deep-water habitat available for juvenile salmonids. The lack of in-water LWD also prevents the formation of deep-water pockets. This habitat parameter is considered to be presently at risk.

4.4.2 Streambank Conditions

The existing riparian vegetation along Columbia Slough in the Rivergate area have been modified over the years by levee development, removal of vegetative cover on the flood plain, and commercial and industrial development. Presently, the riparian area is dominated by mature black cottonwood. No conifers were observed along the bank (Appendix C). However, the stream bank did appear to be stable with root structure from the cottonwoods reaching down onto the bank of the lower slough. The stream bank did appear to be greater than 90% stable with less than 10% of the bank eroding. This habitat parameter appears to be properly functioning.

4.4.3 Floodplain Connectivity

The lower slough is hydrologically connected under "normal" flow conditions to the Smith and Bybee Lake system and its associated wetlands via a single culvert. Under flood conditions the lower slough can overtop its bank and flood the Smith and Bybee Lake system. Juvenile salmonids have been collected within the Smith and Bybee Lake system and within the lower slough itself (Fishman 1988). However, the fish population study performed by Fishman in 1986 was conducted after a flood event (Fishman pers. comm. 2001). Not enough data exists to determine if juvenile salmonids utilize the Smith and Bybee Lake system under "normal" flow conditions. Access to the system is limited to a single culvert which does not allow upstream fish passage under "normal" flow conditions.

Metro is currently evaluating whether the removal of the culvert, to provide additional rearing habitat for juvenile salmoinds, is reasonable (Stewart pers. comm. 2001). Removal of the culvert would have to insure that water levels in the Smith and Bybee Lake system would not be adversely altered. The culvert would have to provide upstream and downstream fish passage under high and low flow conditions to prevent juvenile salmonids from becoming stranded. Under the current flow regime, this habitat parameter is considered not properly functioning.

4.5 FLOW/HYDROLOGY

4.5.1 Change in Peak/Base Flows

The lower slough is tidally influenced through its connection with the lower Willamette River. Flow conditions in the lower slough are also influenced by the system of levees and pumps in the upper watershed. Changes in runoff patterns associated with combined sewer overflows and large changes in quantity of impervious surface have also altered the hydrology of the lower slough (Limno-Tech 1999). The Columbia Slough is subject to pronounced changes in peak flow, base flow, and flow timing relative to an undisturbed watershed of similar size and therefore, is not properly functioning for this habitat indicator (Port of Portland 2000).

4.5.2 Increase in Drainage Network

The Columbia Slough watershed contains considerable drainage network area designed to convey runoff from developments and roadways. Due to intense past commercial, residential, and roadway development, the drainage network in the Columbia Slough watershed has been significantly altered from predevelopment conditions and is not properly functioning relative to salmonid habitat.

4.6 WATERSHED CONDITIONS

4.6.1 Road Density and Location

Road density within the Columbia Slough watershed is significant. Based on available mapping, most of the road density is located south of NE Columbia Boulevard and NE Sandy Boulevard. Roadway expansion has occurred throughout the watershed to accommodate increased growth and traffic congestion. Accompanying the development, roadway networks have been extended throughout the watershed, including the valley floor and Columbia River floodplain.

4.6.2 Disturbance History

The Columbia Slough watershed has experienced considerable past disturbance in all areas of the watershed. Approximately 80 percent of the Columbia Slough watershed has been disturbed. Since most of the Slough lies on the old Columbia River flood plain, there are relatively few areas where steep slopes could cause unstable soil conditions. The Slough has largely been isolated from its historic flood plain by a series of levees, thus eliminating connections with areas that were historically used by juvenile anadromous salmonids for refuge and feeding areas.

4.6.3 Riparian Reserves

The extent of riparian habitat along the Columbia Slough corridor has been significantly reduced by past land use activities, land clearing, and development. Intact riparian corridors are infrequent along the slough. Riparian habitat in the watershed has been fragmented by development. The extent and condition of riparian reserves is not documented, although it is clear that significant losses of riparian function have occurred in the watershed. Within the lower slough the riparian area is mostly connected and is dominated by mature black

cottonwood with an understory of Red-osier Dogwood, Himalayan Blackberry, and Pacific Willow.

5.0 AQUATIC HABITAT VALUE WITHIN THE RIVERGATE AREA

Very little aquatic habitat data exists for the Rivergate area, however it appears to function primarily as Willamette River off-channel habitat for outmigrant juvenile salmonids. Electrofishing surveys were conducted in 1986 and 1992. The 1986 study was conducted in the spring (after a flood event), summer and fall; while the 1992 study was conducted in late-June/early-July under average flow conditions. Juvenile chinook were only captured during the late-April/early-May 1986 electrofishing effort. No salmonids were captured in either survey during the summer or fall. These data suggest that juvenile chinook may take advantage of available forage in the Columbia Slough seasonally during periods of high flow and low water temperature. As water temperatures increase in June, juvenile chinook probably move out of the slough and continue their journey downriver. No other salmonid species were captured during these survey efforts. Additional survey data are needed to confirm the presence of juvenile chinook during normal flow conditions in the early Spring.

Water quality and habitat conditions in the lower slough and Smith/Bybee Lake system are not ideal for salmonids, as they generally require cool temperatures and water that is relatively free of contaminates. Predator fish such as northern pikeminnow, crappie and bass are present in the lower slough and Smith and Bybee Lakes. However, during March through early May predators are generally inactive during cold conditions, allowing a window of opportunity for juvenile salmonids to move into the area and forage on benthic invertebrates and zooplankton without heavy predation pressure. Stomach content data of juvenile chinook captured in the lower slough during the spring of 1986 suggest a preference for planktonic crustaceans (Fishman 1986).

Restoration activities and riparian enhancement aimed to provide additional shade, bank stabilization, and in-stream cover may prolong the period of time that the lower slough is available for rearing juvenile salmonids. Improvements to water quality may directly aid salmonids by providing a healthier rearing environment or indirectly by increasing invertebrate colonization and zooplankton abundance in the lower slough.

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APPENDIX A. RARE AND ENDANGERED SPECIES LETTERS FROM USFWS AND ONHP

Oregon NATURAL HERITAGE PROGRAM

A Cooperative Project of:

821 SE 14th Avenue
Portland, Oregon 97214-2537
(503) 731-3070
FAX (503) 230-9639

April 10, 2001

Robert Ellis, Ph.D.
Ellis Ecological Services, Inc.
20988 South Springwater Road
Estacada, OR 97023

Dear Dr. Ellis:

Thank you for requesting information from the Oregon Natural Heritage Program (ONHP). We have conducted a data system search for rare, threatened and endangered plant and animal records for your Rivergate Industrial Park Mitigation Project in Township 2 South, Range 1 West, Sections 23, 24 and 25.

Seventeen (17) records were noted within a two-mile radius of your project and are included on the enclosed computer printout. A key to the fields is also included.

Please remember that the lack of rare element information from a given area does not mean that there are no significant elements there, only that there is no information known to us from the site. To assure that there are no important elements present, you should inventory the site, at the appropriate season.

Please note that at this time ONHP does not have comprehensive computerized records available for all anadromous fish in Oregon. I have listed below the species that may be present within the waterways contained in the project area. I have also included their listing by the National Marine Fisheries Service (NMFS). For more information on anadromous fish you may wish to contact NMFS at: 525 NE Oregon Street; Portland, Oregon 97232-2737. Please also note that the U.S. Fish and Wildlife Service now has jurisdiction over coastal cutthroat trout.

Chum salmon (Lower Columbia River)	*Oncorhynchus keta*	Threatened
Coho salmon (Lower Columbia River)	*Oncorhynchus kisutch*	Candidate
Steelhead (Lower Columbia River)	*Oncorhynchus mykiss*	Threatened
Steelhead (Snake River Basin)	*Oncorhynchus mykiss*	Threatened
Steelhead (Middle Columbia River)	*Oncorhynchus mykiss*	Threatened
Steelhead (Upper Willamette River)	*Oncorhynchus mykiss*	Threatened
Sockeye salmon Salmon River tributary to the Snake River, ID	*Oncorhynchus nerka*	Endangered
Chinook salmon Runs in the Snake River (proposed to include Deschutes River fall run)	*Oncorhynchus tshawytscha*	Threatened
Chinook salmon (Lower Columbia River)	*Oncorhynchus tshawytscha*	Threatened
Chinook salmon (Upper Willamette River)	*Oncorhynchus tshawytscha*	Threatened

This data is confidential and for the specific purposes of your project and is **not to be distributed.**

If you need additional information or have any questions, please do not hesitate to contact me.

Sincerely,

Cliff Alton
Conservation Information Assistant

encl.: invoice
computer printout and data key

NAME: HALIAEETUS LEUCOCEPHALUS
COMMON NAME: BALD EAGLE
EO-CODE: ABNKC10010*006 LAST OBS: 2000 FED STATUS: LT-PDL
COUNTY(s): MULTNOMAH FIRST OBS: 1998 STATE STATUS: LT
QUAD NAMES: SAUVIE ISLAND LAT: 453931N SIZE:
PHYSIOGRAPHIC PROV: WV LONG: 1224604W MINELEV (Feet): 30
T-R-S: 002N001W 14 QUADCODE: 4512267 MAXELEV (Feet):
T-R-S COMMENTS: NE4 PRECISION: S
EO-RANK/COMM: :
DIRECTIONS: BELLE VUE POINT ON SAUVIE ISLAND
DESCRIPTION:
EO-DATA: SEE ANNUAL OBSERVATION
EOTYPE: BREEDING SITE
COMMENTS: ISAACS AND ANTHONY NEST 800.
ANNUAL OBSERVATION: 2000-2 FLEDGED
1999-NESTING FAILURE
1998-1 FLEDGED
OWNER: PRIVATE
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: ISAACS & ANTHONY. 2000. BALD EAGLE NEST LOCATIONS AND HISTORY OF USE IN OR & WA PORTION OF THE COLUMBIA RIVER RECOVERY ZONE 1971-2000.

NAME: COCCYZUS AMERICANUS
COMMON NAME: YELLOW-BILLED CUCKOO
EO-CODE: ABNRB02020*012 LAST OBS: 1977-09-11 FED STATUS: SOC
COUNTY(s): MULTNOMAH FIRST OBS: 1977 STATE STATUS: SC
QUAD NAMES: SAUVIE ISLAND LAT: 454105N SIZE: 0
PHYSIOGRAPHIC PROV: WV LONG: 1224855W MINELEV (Feet): 10
T-R-S: 002N001W 04 QUADCODE: 4512267 MAXELEV (Feet):
T-R-S COMMENTS: PRECISION: G
EO-RANK/COMM: D :
DIRECTIONS: SAUVIE ISLAND, NEAR PORTLAND.
DESCRIPTION: LARGE ALLUVIAL DELTA ISLAND AT WILLAMETTE/COLUMBIA RIVER CONFLUENCE. CONSIDERABLE BRUSHY RIPARIAN HABITAT. NEAR URBAN CENTERS, HEAVY RECREATIONAL USES.
EO-DATA: ONE INDIVIDUAL OBSERVED SEPTEMBER 2-11, 1977 AND SEPTEMBER 28.
EOTYPE:
COMMENTS: POPULATION FORMERLY WIDESPREAD IN THE WILLAMETTE AND COLUMBIA BASIN RIPARIAN AREAS.
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: WILBUR, S.R. 1980. PRELIMINASRY STATUS REPORT, C. AMERICANUS OCCIDENTALIS. USFWS, CA. NEHLS, HARRY.

NAME: COCCYZUS AMERICANUS
COMMON NAME: YELLOW-BILLED CUCKOO
EO-CODE: ABNRB02020*026 LAST OBS: 1985 FED STATUS: SOC
COUNTY(s): MULTNOMAH FIRST OBS: 1923-06-08 STATE STATUS: SC
QUAD NAMES: PORTLAND LAT: 453712N SIZE: 0
PHYSIOGRAPHIC PROV: WV LONG: 1224300W MINELEV (Feet): 10
T-R-S: 002N001E 32 QUADCODE: 4512256 MAXELEV (Feet):
T-R-S COMMENTS: PRECISION: G
EO-RANK/COMM: D :
DIRECTIONS: PORTLAND-ALONG THE COLUMBIA RIVER FROM THE MOUTH OF THE WILLAMETTE N TO WHAT IS NOW THE PORTLAND AIRPORT
DESCRIPTION: COLUMBIA RIVER BOTTOMLANDS
EO-DATA: 1985: 1 CUCKOO HEARD. 1940: 2 BIRDS ON 7-27. 1923: AT LEAST 12 BIRDS ON 6-8.
EOTYPE:
COMMENTS: OBSERVERS: MIKE HOUCK (1985), W.H. TELFER (1940), GABRIELSON AND JEWETT (1923).
ANNUAL OBSERVATION:

OWNER: PRIVATE
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: HOUCK, MIKE. PORTLAND AUDUBON SOCIETY.

NAME: PROGNE SUBIS

COMMON NAME: PURPLE MARTIN
EO-CODE: ABPAU01010*116 LAST OBS: 1998-07-17 FED STATUS: SOC
COUNTY(s): MULTNOMAH FIRST OBS: 1998-06-16 STATE STATUS: SC
QUAD NAMES: SAUVIE ISLAND LAT: 453837N SIZE:
PHYSIOGRAPHIC PROV: WV LONG: 1224658W MINELEV (Feet): 30
T-R-S: 002N001W 41 QUADCODE: 4512267 MAXELEV (Feet):
T-R-S COMMENTS: SE4 PRECISION: S
EO-RANK/COMM: :
DIRECTIONS: FROM THE BRIDGE AT SAUVIE ISLAND, DRIVE E ON GILLIHAN RD ABOUT 1.5 MI. THE HOUSE IS NEAR THE DIKE TO THE S OF THE ROAD, AND THE GOURD RACK IS EASILY SEEN IN THE GARDEN.
DESCRIPTION: 7 PAIRS ARE NESTING IN GOURDS AND 1 PAIR IN BOX.
EO-DATA: 1998: 8 PAIRS.
EOTYPE:
COMMENTS: ACCORDING TO HORVATH SECTION 22 SE4
ANNUAL OBSERVATION:
OWNER: PRIVATE
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: HORVATH, E. 1999. DISTRIBUTION, ABUNDANCE, AND NEST SITE CHARACTERISTICS OF PURPLE MARTINS IN OREGON. UNPUBLISHED REPORT FOR ODFW.

NAME: AGELAIUS TRICOLOR
COMMON NAME: TRICOLORED BLACKBIRD
EO-CODE: ABPBXB0020*002 LAST OBS: 1985 FED STATUS: SOC
COUNTY(s): MULTNOMAH FIRST OBS: 1983 STATE STATUS: SP
QUAD NAMES: PORTLAND LAT: 453550N SIZE: 0
PHYSIOGRAPHIC PROV: WV LONG: 1224305W MINELEV (Feet): 20
T-R-S: 001N001E 05 QUADCODE: 4512256 MAXELEV (Feet):
T-R-S COMMENTS: PRECISION: M
EO-RANK/COMM: C :
DIRECTIONS: ST. JOHNS LANDFILL IN PORTLAND
DESCRIPTION: DENSE HIMALAYAN BLACKBERRIES ADJACENT TO A BLIND SLOUGH W/ SPARSE TREE COVER ALONG THE SLOUGH MARGINS
EO-DATA: 1985: A COLONY OF 20-30 BIRDS PRESENT DURING THE NESTING SEASON. 1983: 36 BIRDS OBSERVED 6/25-7/31, APPARENTLY NESTING.
EOTYPE:
COMMENTS: REPORTED BY HOUCK ET AL. THIS COLONY WOULD BE ABOUT 250 MI N OF THE CLOSEST NESTING AREAS IN THE ROGUE RIVER VALLEY
ANNUAL OBSERVATION:
OWNER: CITY
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: HOUCK ET AL. 1983. AMERICAN BIRDS. 37(6):1022. HOUCK. 1985. PERSONAL COMMUNICATION W/ONHDB

NAME: ONCORHYNCHUS KISUTCH POP 1
COMMON NAME: COHO SALMON (LOWER COLUMBIA RIVER/SW WASHINGTON COAST RUNS)
EO-CODE: AFCHA02031*037 LAST OBS: 1999-PRE FED STATUS: C
COUNTY(s): COLUMBIA FIRST OBS: STATE STATUS: LE
MULTNOMAH
CLACKAMAS
QUAD NAMES: OREGON CITY LAT: SIZE:
GLADSTONE
LAKE OSWEGO
PORTLAND

LINNTON
SAUVIE ISLAND
ST HELENS
PHYSIOGRAPHIC PROV: LONG: MINELEV (Feet):
T-R-S: QUADCODE: 4512235 MAXELEV (Feet):
4512245
4512246
4512256
4512257
4512267
4512277
T-R-S COMMENTS: PRECISION: M
EO-RANK/COMM: :
DIRECTIONS: SCAPPOOSE BAY, MULTNOMAH CHANNEL, WILLAMETTE RIVER
DESCRIPTION:
EO-DATA: ODFW DISTRIBUTION MAPS USED TO CREATE THE 1:24,000 COVERAGE

EOTYPE: REARING & MIGRATION - fish
COMMENTS: DISTRIBUTION INFORMATION USED IN THIS EOR WAS DERIVED FROM ODFW GEOGRAPHIC RESOURCES DATA PRODUCED AND DISTRIBUTED IN 1999. UNLESS SPECIFIC DATA EXISTS IN THE DATA FIELD, THE INFORMATION PRESENTED IN THIS EOR REPRESENTS THE "BEST PROFESSIONAL JUDGMENT" BY ODFW'S DISTRICT FISHERIES BIOLOGIST; THE PRESENCE OF COHO IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT.
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: 2000 ODFW GEOGRAPHIC RESOURCES DATA; MASSEY, JAY; BENNETT, DON.

NAME: ONCORHYNCHUS TSHAWYTSCHA POP 21
COMMON NAME: CHINOOK SALMON - LOWER COLUMBIA RIVER SPRING RUN
EO-CODE: AFCHA0205W*006 LAST OBS: 1999-PRE FED STATUS: LT
COUNTY(s): CLACKAMAS FIRST OBS: STATE STATUS:
MULTNOMAH
COLUMBIA
QUAD NAMES: OREGON CITY LAT: SIZE:
GLADSTONE
LAKE OSWEGO
PORTLAND
LINNTON
SAUVIE ISLAND
ST HELENS
PHYSIOGRAPHIC PROV: LONG: MINELEV (Feet):
T-R-S: QUADCODE: 4512235 MAXELEV (Feet):
4512245
4512246
4512256
4512257
4512267
4512277
T-R-S COMMENTS: PRECISION: M
EO-RANK/COMM: :
DIRECTIONS: SCAPPOOSE BAY, MULTNOMAH CHANNEL, WILLAMETTE RIVER
DESCRIPTION:
EO-DATA: SPRING RUN; ODFW DISTRIBUTION MAPS USED TO CREATE THE 1:24,000 COVERAGE
EOTYPE: REARING & MIGRATION - fish
COMMENTS: DISTRIBUTION INFORMATION USED IN THIS EOR WAS DERIVED FROM ODFW GEOGRAPHIC RESOURCES DATA PRODUCED AND DISTRIBUTED IN 1999. UNLESS SPECIFIC DATA EXISTS IN THE DATA FIELD, THE INFORMATION PRESENTED IN THIS EOR REPRESENTS THE "BEST PROFESSIONAL JUDGMENT" BY ODFW'S DISTRICT FISHERIES BIOLOGIST; THE PRESENCE OF CHINOOK IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT.
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:

MANAGE COMM:
PROT COMM:
BEST SOURCE: 2000 ODFW GEOGRAPHIC RESOURCES DATA; MASSEY, JAY; BENNETT, DON.

NAME: ONCORHYNCHUS TSHAWYTSCHA POP 22
COMMON NAME: CHINOOK SALMON - LOWER COLUMBIA RIVER FALL RUN
EO-CODE: AFCHA0205Y*006 LAST OBS: 1999-PRE FED STATUS: LT
COUNTY(s): CLACKAMAS FIRST OBS: STATE STATUS: SC
MULTNOMAH
COLUMBIA
QUAD NAMES: OREGON CITY LAT: SIZE:
GLADSTONE
LAKE OSWEGO
PORTLAND
LINNTON
SAUVIE ISLAND
PHYSIOGRAPHIC PROV: LONG: MINELEV (Feet):
T-R-S: QUADCODE: 4512235 MAXELEV (Feet):
4512245
4512246
4512256
4512257
4512267
T-R-S COMMENTS: PRECISION: M
EO-RANK/COMM:

DIRECTIONS: SCAPPOOSE BAY & TRIBUTARIES, WILLAMETTE RIVER & TRIBUTARIES
DESCRIPTION:
EO-DATA: FALL RUN; ODFW DISTRIBUTION MAPS USED TO CREATE THE 1:24,000 COVERAGE
EOTYPE: REARING & MIGRATION - fish
COMMENTS: DISTRIBUTION INFORMATION USED IN THIS EOR WAS DERIVED FROM ODFW GEOGRAPHIC RESOURCES DATA PRODUCED AND DISTRIBUTED IN 1999. UNLESS SPECIFIC DATA EXISTS IN THE DATA FIELD, THE INFORMATION PRESENTED IN THIS EOR REPRESENTS THE "BEST PROFESSIONAL JUDGMENT" BY ODFW'S DISTRICT FISHERIES BIOLOGIST; THE PRESENCE OF CHINOOK IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT.
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: 2000 ODFW GEOGRAPHIC RESOURCES DATA; MASSEY, JAY; BENNETT, DON; CALDWELL, DICK.

NAME: ONCORHYNCHUS MYKISS POP 27
COMMON NAME: STEELHEAD - LOWER COLUMBIA RIVER WINTER RUN
EO-CODE: AFCHA02132*001 LAST OBS: 1999-PRE FED STATUS: LT
COUNTY(s): CLACKAMAS FIRST OBS: STATE STATUS: SC
MULTNOMAH
COLUMBIA
QUAD NAMES: OREGON CITY LAT: SIZE:
GLADSTONE
LAKE OSWEGO
PORTLAND
LINNTON
SAUVIE ISLAND
ST HELENS
PHYSIOGRAPHIC PROV: LONG: MINELEV (Feet):
T-R-S: QUADCODE: 4512235 MAXELEV (Feet):
4512245
4512246
4512256
4512257
4512267
4512277
T-R-S COMMENTS: PRECISION: M

EO-RANK/COMM: :
DIRECTIONS: SCAPPOOSE BAY, MULTNOMAH CHANNEL, WILLAMETTE RIVER
DESCRIPTION:
EO-DATA: WINTER RUN: ODFW DISTRIBUTIION MAPS USED TO CREATE THE 1:24,000 COVERAGE
EOTYPE: REARING & MIGRATION - fish
COMMENTS: DISTRIBUTION INFORMATION USED IN THIS EOR WAS DERIVED FROM ODFW GEOGRAPHIC RESOURCES DATA PRODUCED AND DISTRIBUTED IN 1999. UNLESS SPECIFIC DATA EXISTS IN THE DATA FIELD, THE INFORMATION PRESENTED IN THIS EOR REPRESENTS THE "BEST PROFESSIONAL JUDGMENT" BY ODFW'S DISTRICT FISHERIES BIOLOGIST; THE PRESENCE OF STEELHEAD IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT.
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: 2000 ODFW GEOGRAPHIC RESOURCES DATA; MASSEY, JAY; BENNETT, DON.

NAME: CHRYSEMYS PICTA
COMMON NAME: PAINTED TURTLE
EO-CODE: ARAAD01010*013 LAST OBS: 1939 FED STATUS:
COUNTY(s): MULTNOMAH FIRST OBS: STATE STATUS: SC
QUAD NAMES: SAUVIE ISLAND LAT: 453900N SIZE: 0
PHYSIOGRAPHIC PROV: WV LONG: 1224602W MINELEV (Feet):
T-R-S: 002N001W 14 QUADCODE: 4512267 MAXELEV (Feet):
T-R-S COMMENTS: PRECISION: G
EO-RANK/COMM: D :
DIRECTIONS: WILLAMETTE RIVER NEAR MOUTH.
DESCRIPTION:
EO-DATA: HISTORIC COLLECTION.
EOTYPE:
COMMENTS: OBSERVER: WILLIAM GRAF, STANLEY JEWETT AND KENNETH GORDON.
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:

MANAGE COMM:
PROT COMM:
BEST SOURCE: BRUCE, CHARLIE. ODFW.

NAME: CHRYSEMYS PICTA
COMMON NAME: PAINTED TURTLE
EO-CODE: ARAAD01010*022 LAST OBS: 1993-06 FED STATUS:
COUNTY(s): MULTNOMAH FIRST OBS: 1985-06 STATE STATUS: SC
QUAD NAMES: PORTLAND LAT: 453655N SIZE: 0
PHYSIOGRAPHIC PROV: WV LONG: 1224425W MINELEV (Feet): 10
T-R-S: 002N001E 31 QUADCODE: 4512256 MAXELEV (Feet):
T-R-S COMMENTS: PRECISION: M
EO-RANK/COMM: A :
DIRECTIONS: SMYTH-BYBEE LAKES
DESCRIPTION: SUNNING LOGS & SNAILS ABUNDANT. NO OTHER TURTLE SPECIES PRESENT. BULLFROGS ABUNDANT
EO-DATA: 1993: 128 INDIVIDUALS OBSERVED. 1985: 1 PAINTED TURTLE OBSERVED.
EOTYPE:
COMMENTS: OBSERVERS: MARK HAYES AND DAN HOLLAND (1993). PHILLIP GADDIS AND CHAR CORKRAN (1985).
ANNUAL OBSERVATION:
OWNER: PRIVATE
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: BRUCE, CHARLIE. ODFW BIOLOGIST.

NAME: CHRYSEMYS PICTA
COMMON NAME: PAINTED TURTLE
EO-CODE: ARAAD01010*067 LAST OBS: 1995-04-02 FED STATUS:

COUNTY(s): MULTNOMAH FIRST OBS: STATE STATUS: SC
QUAD NAMES: VANCOUVER, WASH LAT: 453803N SIZE:
PHYSIOGRAPHIC PROV: WV LONG: 1224353W MINELEV (Feet): 20
T-R-S: 002N001E 30 QUADCODE: 4512266 MAXELEV (Feet):
002N001E 19
T-R-S COMMENTS: NW4NE4 PRECISION: M
SE4 (REPORTED AS SEC 18)
EO-RANK/COMM: C :
DIRECTIONS: BENSON POINT
DESCRIPTION: POND
EO-DATA: 1998: NONE OBSERVED. 1995: 1 TURTLE OBSERVED LOAFING/FORAGING.
EOTYPE:
COMMENTS:
ANNUAL OBSERVATION:
OWNER: CITY
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: SMYTH, MAURITA

NAME: HOWELLIA AQUATILIS
COMMON NAME: HOWELLIA
EO-CODE: PDCAM0A010*006 LAST OBS: 1886-05 FED STATUS: LT
COUNTY(s): MULTNOMAH FIRST OBS: 1879 STATE STATUS:
QUAD NAMES: SAUVIE ISLAND LAT: 454105N SIZE: 0
PHYSIOGRAPHIC PROV: WV LONG: 1224855W MINELEV (Feet): 75
T-R-S: 002N001W 04 QUADCODE: 4512267 MAXELEV (Feet):
T-R-S COMMENTS: PRECISION: G
EO-RANK/COMM: :
DIRECTIONS: SAUVIE ISLAND. WILLAMETTE SLOUGH (J. HOWELL #187)
DESCRIPTION: PONDS. IN STAGNANT WATER (J. HOWELL, #187).
EO-DATA: HERBARIUM COLLECTION: HOWELL, 5-1886, OSC; HENDERSON, #592, 5-9-1885, OSC; J. HOWELL AND T. HOWELL, S.N., 5-1881, WTU, GH; J. HOWELL, S.N., 8-10-1879, GH; J. HOWELL, #187, 5-1879, GH
EOTYPE:
COMMENTS: TYPE LOCALITY. RELOCATION EFFORTS UNSUCCESSFUL.
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: HOWELL COLLECTION

NAME: CIMICIFUGA ELATA

COMMON NAME: TALL BUGBANE
EO-CODE: PDRAN07030*023 LAST OBS: 1887-07 FED STATUS:
COUNTY(s): MULTNOMAH FIRST OBS: 1887 STATE STATUS: C
QUAD NAMES: SAUVIE ISLAND LAT: 454105N SIZE:
PHYSIOGRAPHIC PROV: WV LONG: 1224855W MINELEV (Feet):
T-R-S: 002N001W 04 QUADCODE: 4512267 MAXELEV (Feet):
T-R-S COMMENTS: PRECISION: G
EO-RANK/COMM: :
DIRECTIONS: FIR FOREST, SAUVIES ISLAND
DESCRIPTION:
EO-DATA: HERBARIUM COLLECTION: THOMAS HOWELL S.N., 7-1887, BR
EOTYPE:
COMMENTS:
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: THOMAS HOWELL COLLECTION

NAME: SULLIVANTIA OREGANA
COMMON NAME: OREGON SULLIVANTIA
EO-CODE: PDSAX0X020*012 LAST OBS: 1887- FED STATUS: SOC
COUNTY(s): MULTNOMAH FIRST OBS: 1887 STATE STATUS: C
COLUMBIA
QUAD NAMES: SAUVIE ISLAND LAT: 454004N SIZE: 0
PHYSIOGRAPHIC PROV: WV LONG: 1224835W MINELEV (Feet): -1111
T-R-S: 002N001W 09 QUADCODE: 4512267 MAXELEV (Feet):
T-R-S COMMENTS: PRECISION: G
EO-RANK/COMM: :
DIRECTIONS: SAUVIES ISLAND, MILWAUKIE (MAPPED ON SAUVIES ISLAND)
DESCRIPTION:
EO-DATA: HERBARIUM COLLECTION: JOSEPH HOWELL, 1887, G. (ASSUMED TO BE GRAY HERBARIUM)
EOTYPE:
COMMENTS: FROM ROSENDAHL, C.O. 1927. REVISION OF THE GENUS SULLIVANTIA. MINN STUD. PLANT SCI 6:407
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: JOSEPH HOWELL COLLECTION

NAME: CAREX COMOSA
COMMON NAME: BRISTLY SEDGE
EO-CODE: PMCYP032Y0*004 LAST OBS: 1884-06-05 FED STATUS:
COUNTY(s): MULTNOMAH FIRST OBS: 1882-06 STATE STATUS:
COLUMBIA
QUAD NAMES: SAUVIE ISLAND LAT: 454004N SIZE:
PHYSIOGRAPHIC PROV: WV LONG: 1224835W MINELEV (Feet): 10
T-R-S: 002N001W 09 QUADCODE: 4512267 MAXELEV (Feet): 20
T-R-S COMMENTS: PRECISION: G
EO-RANK/COMM: :
DIRECTIONS: SAUVIE ISLAND
DESCRIPTION: FLOATING ISLAND (HENDERSON 1884)
EO-DATA: NONE GIVEN
EOTYPE:
COMMENTS: HERBARIUM COLLECTION: 1) T.J. HOWELL, 6-1882, OSC-1989 (ORIG ID C. PSEUDOCYPERUS VAR COMOSA (ANN. TO C. COMOSA JW STACEY). 2) HENDERSON #1051, 6-5-1884, OSC-1991 (SEE ANNOTATION NOTES IN #1).
ANNUAL OBSERVATION:
OWNER:
MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: HOWELL COLLECTION

NAME: WOLFFIA COLUMBIANA
COMMON NAME: COLUMBIA WATER-MEAL
EO-CODE: PMLEM03030*002 LAST OBS: 1991-07-03 FED STATUS:
COUNTY(s): MULTNOMAH FIRST OBS: 1991 STATE STATUS:
QUAD NAMES: PORTLAND LAT: 453650N SIZE: 100
PHYSIOGRAPHIC PROV: WV LONG: 1224358W MINELEV (Feet): 20

T-R-S: 002N001E 31 QUADCODE: 4512256 MAXELEV (Feet):
T-R-S COMMENTS: PRECISION: M
EO-RANK/COMM: B :
DIRECTIONS: FROM I-5, FOLLOW COLUMBIA BLVD. WEST TO RIVERGATE, HEAD WEST ON RIVERGATE TO BOAT LANDING ON SMITH LAKE.
DESCRIPTION:
EO-DATA: NOT ABUNDANT IN SHELTERED AREAS, EDGE OF SALIX LASIANDRA SWAMP. WITH LEMNA MINOR.
EOTYPE:
COMMENTS:
ANNUAL OBSERVATION:
OWNER: PORT OF PORTLAND

MANAGED AREA:
MANAGE COMM:
PROT COMM:
BEST SOURCE: CHRISTY, JOHN A.

17 Records listed.

KEY TO PRINTOUT

NAME AND COMMON NAME: The scientific and common name of the species.

EO-CODE (element occurrence code): Unique Heritage Program code for this occurrence. The first 10 characters are the code for the species, and the last 3 are the occurrence number.

STATE STATUS: For animals, Oregon Department of Fish and Wildlife status; **LE**=listed endangered, **PE**=proposed endangered, **PT**=proposed threatened, **SC** or **C**=sensitive-critical, **SV** or **V**=sensitive-vulnerable, **SP** or **P**=sensitive peripheral or naturally rare, **SU** or **U**=sensitive-undetermined.

FED STATUS: US Fish and Wildlife Service status. **LE**=listed endangered, **LT**=listed threatened, **PE** or **PT**=proposed endangered or threatened, **C**=candidate for listing with enough information available for listing, **SOC**=species of concern.

LASTOBS: Last reported sighting date, in the form YYYY-MM-DD

FIRSTOBS: First reported sighting date for this occurrence in the form YYYY-MM-DD

COUNTY(S): County name(s)

QUAD NAMES: Name of the USGS topographic quadrangle map(s) where the record is mapped.

DIRECTIONS: Site name and direction to site

LAT: latitude, North

LONG: longitude, West

T-R-S: Township, Range and Section, with township first, range second and section third (a space appears between range and section). 004S029E 32 = Township 4S, Range 29E, Section 32. Fractional townships and ranges are further defined in the T-R COMMENTS field.

T-R-S COMMENTS: Comments relating to township, range or section(s), e.g. SE4NE4 or SENE=SE 1/4 of the NE 1/4.

PHYSIOGRAPHIC PROVINCE: Code for physiographic province. **CR**=Coast Range, **WV**=Willamette Valley, **KM**=Klamath Mountains, **WC**=West slope and crest of the Cascades, **EC**=East slope of the Cascades, **BM**=Ochoco, Blue and Wallowa Mts., **BR**=Basin and Range, **HP**=High Lava Plains, **OU**=Owyhee uplands, **CB**=Columbia Basin.

WATERSHED: Hydrologic unit code

EO-DATA: Species and population biology - numbers, age, nesting success, vigor, phenology, disease, etc.

ANNUAL OBSERVATIONS: Summary of yearly observations

DESCRIPTION: Habitat information, e.g. aspect, slope, soils, associated species, community type, etc.

MINELEV: Minimum elevation, in feet.

SIZE: in acres, whole numbers. 0=unknown

COMMENTS: Miscellaneous comments

PROT COMM (Protection Comments): Comments regarding protectibility and threats.

MANAGE COMM: Comments on how the site is managed.

MANAGED AREA: BLM district, USFS Forest, Private Preserve, etc.

OWNER: federal, state, private, etc.

BEST SOURCE: Best source of information for this occurrence.

SOURCE CODE: Code for sources

APPENDIX B. ESSENTIAL FISH HABITAT

APPENDIX B. ESSENTIAL FISH HABITAT

INTRODUCTION

The Magnuson-Stevens Act, which was reauthorized and amended in 1996, requires the NMFS to recommended conservation and enhancement measures for any Federal or State activity that may adversely affect Essential Fish Habitat (EFH). EFH has been defined for the purposes of the Magnuson-Stevens Act as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (NMFS 2000). The NMFS has further added the following interpretations (62 FR 66551) to clarify this definition:

- "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate;
- "Substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities;
- "Necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and
- "Spawning, breeding, feeding, or growth to maturity" covers the full life cycle of a species.

Under this act, Federal agencies are required to consult with NMFS regarding any of their actions authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken that may "adversely affect" EFH. "Adverse effect" means any impact which reduces the quality and/or quantity of EFH, which can include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

Cumulative impacts are incremental impacts, occurring within a watershed or marine ecosystem context, which may result from individually minor but collectively significant actions. The assessment of cumulative impacts is intended in a generic sense to examine actions occurring within the watershed or marine ecosystem that adversely affects the ecological structure or function of EFH. The assessment should specifically consider the habitat variables that control or limit a managed species' use of a habitat. It should also consider the effects of all impacts that affect either the quantity or quality of EFH.

For any Federal action that may adversely affect EFH (except those activities covered by a General Concurrence), federal agencies must provide NMFS with a written assessment of the effects of that action on EFH. Federal agencies may incorporate an EFH Assessment into documents prepared for other purposes such as Section 7 Biological Assessments.

An EFH assessment must contain:

- A description of the proposed action;
- An analysis of the effects, including cumulative effects, of the proposed action on EFH, the managed species, and associated species, such as major prey species, including affected life history stages;
- The Federal agency's views regarding the effects of the action on EFH; and
- Proposed mitigation, if applicable.

OCCURRENCE OF EFH IN LOWER COLUMBIA SLOUGH

COASTAL PELAGIC SPECIES

The coastal pelagic species (CPS) fishery includes four finfish species [Pacific sardine (*Sardinops sagax*), Pacific mackerel (*Scomber japonicus*), northern anchovy (*Engraulis mordax*), and jack mackerel (*Trachurus symmetricus*)] and the invertebrate, market squid (*Logigo opalescens*) (NMFS 2000). All of these species are restricted to marine and saline estuarine waters and are not known to occur in the vicinity of the proposed projects.

WEST COAST GROUND FISH SPECIES

The West Coast ground fish Fisheries Management Plan (FMP) manages 83 species over a large and ecologically diverse area. Of the 83 species, starry flounder (*Platichthys stellatus*) is the only species found in the vicinity of the proposed projects. The EFH for Pacific coast groundfish is defined as the aquatic habitat necessary to allow for groundfish production to support long-term sustainable fisheries for groundfish and for groundfish contributions to a healthy ecosystem. The boundaries for West Coast ground fish EFH are generally defined as all waters from the mean higher high water line, and the upriver extent of saltwater intrusion in river mouths along the coasts of Washington, Oregon and California seaward to the boundary of the U.S. EEZ (64 FR 49092). However, more specific definitions of EFH on a species by species basis are provided in an appendix (Casillas et al. 1998) to the Pacific Coast Groundfish Fishery Amendment 11 (64 FR 49092). The habitat description for starry flounder notes, " adults and juveniles are known to swim great distances (>120 km) up major coastal rivers but not following any migratory trend." Therefore, in the case of starry flounder it appears that EFH includes the freshwater of major coastal rivers used by adults and juveniles. Starry flounder was collected from lower Columbia Slough in 1986 (Fishman Environmental Services 1988) and is known to be present in both the Willamette and Columbia Rivers.

PACIFIC COAST SALMON SPECIES

In September 2000, the NMFS approved the Pacific Fishery Management Council's Amendment 14 to the Pacific Coast Salmon Plan. Appendix A of draft Amendment 14 provides definitions of EFH for chinook salmon and coho salmon. Appendix A to Amendment 14 defines freshwater EFH for chinook salmon and coho salmon as including all streams, lakes, ponds, wetlands, and other water bodies currently viable and most of the habitat historically accessible to these species in Washington, Oregon and California within specific hydrologic units. Lower Columbia Slough is included in this definition for both species.

APPENDIX C. PHOTOGRAPH LOG

APPENDIX C - PHOTOGRAPH LOG

Photograph 1. Location of proposed path under Lombard Street Bridge.

Photograph 2. North bank of lower slough upstream of the Lombard Street Bridge.

Photograph 3. North bank of the lower slough.

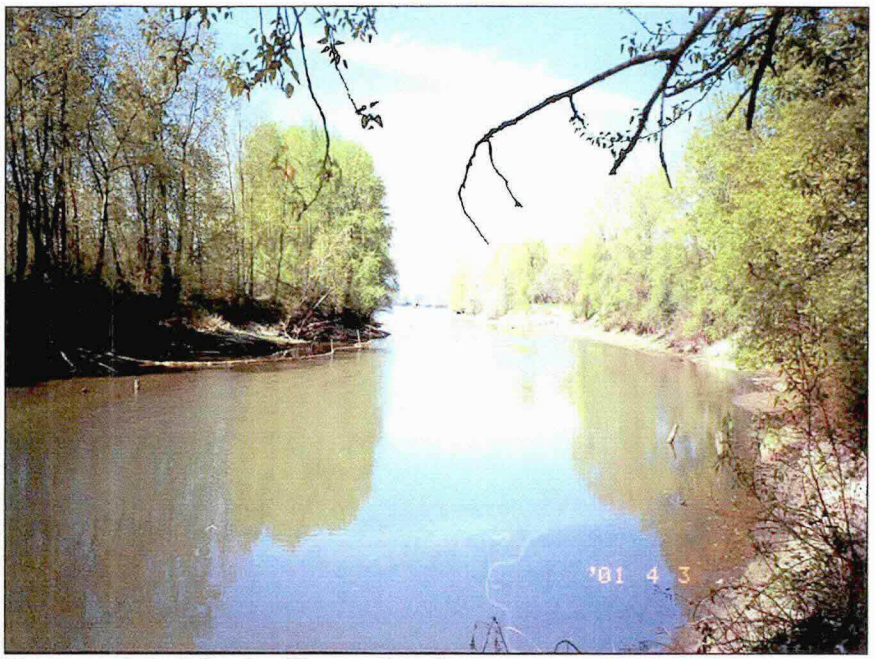
Photograph 4. Railroad bridge at lower slough.

Photograph 5. Lower slough looking downstream from the Railroad bridge.

Photograph 6. Leadbetter peninsula.

Photograph 7. Fill material at Leadbetter Peninsula.

Photograph 8. Bybee Lake at Leadbetter Peninsula.



Photograph 9. Mouth of lower slough.


Photograph 10. South bank of the lower slough.

Photograph 11. Unstable bank at north bank lower Columbia Slough.

Photograph 12. Riparian plantings at north bank lower Columbia Slough.

Photograph 13. Fill material near the north bank of lower slough.

Photograph 14. Culvert outlet and lower slough near rail bridge.

Photograph 15. Lower slough upstream of rail bridge.

Photograph 16. Wetland and riparian enhancement area east of Ramsey Lake.

Photograph 17. Culvert inlet and pond near Ramsey Lake and rail bridge.

Photograph 18. Culvert outlet near Ramsey Lake and rail bridge.

Photograph 19. Culvert outlet near Rail Bridge.

Photograph 20. Pond between Ramsey Lake Industrial Park and Ramsey Lake.

Photograph 21. Northern Ramsey Lake.

Photograph 22. Upper end of pond behind Ramsey Lake Industrial Park.

Photograph 23. Ramsey Lake.

APPENDIX D. LETTER TO U.S. ARMY CORPS OF ENGINEERS.

Ellis Ecological Services, Inc.

June 20, 2001

Judy Linton, Regulatory Project Manager – Team Leader
U.S. Army Corps of Engineers
CENWP-OP-G
P.O. Box 2946
Portland, Oregon 97208-2946

RE: Rivergate Industrial District, Vegetation and Final Grading Plan

Ms. Judy Linton:

At the request of the Port of Portland we have reviewed the Rivergate mitigation plans (dated May 30, 2001). At this time a Biological Assessment, pursuant to Section 7 of the Endangered Species Act, has not been prepared and is anticipated by July 9, 2001. Therefore, the following information should be regarded only as a preliminary assessment; and assumes that you have already reviewed both the draft baseline conditions report for the Rivergate area, entitled "Fish Species and Their Habitat Near the Rivergate Industrial District" (April 18, 2001) and the mitigation plans (May 30, 2001).

In terms of federally listed fish species (as listed in the baseline conditions report) the primary concern remains the stranding of fish following flood events. Although, very little is known about the presence and absence of juvenile salmonids in the Lower Columbia Slough and the Smith/Bybee Lake system, juvenile chinook were captured throughout the area following a flood event in the spring of 1986. Both the Leadbetter excavation site and the culvert removal site are not designed to allow an escape route for fish. The Leadbetter site may only flood infrequently while the culvert removal site may flood frequently. It should be noted, however, that a stranding risk currently occurs at both the culvert removal site and in ponded areas adjacent to Bybee Lake. Further investigation is necessary to determine the frequency and reoccurrence interval of high water events that cause a stranding concern.

The grading plan for the North and South Slough provides for positive drainage from the excavated area to the Lower Columbia Slough, minimizing the risk of fish stranding. The pedestrian trail at the North Slough parallel the swale grades and the bottom of excavation. A gravel drainage section parallels the upslope side of the trail and cross drains will be located at profile low points. Excavation at the Ramsey Mitigation site also provides positive drainage.

Approximately 237 trees (> 12 inches dbh) will be removed. The majority of these trees will be taken from the mitigation area immediately north of Ramsey Lake. Most trees will be utilized for live plant cuttings and live rootballs. Large woody material (both live trees and dead trees) will be stockpiled and are intended for future restoration projects within the Rivergate area. Substantial riparian forest (20.1 ac), scrub-shrub (12.5 ac), emergent (4.8 ac) and grassland (1.3 ac) plantings are planned in and around the North and South Bank excavation areas, Ramsey Lake excavation area and the Leadbetter Peninsula excavation area. As this planted vegetation matures it will provide protection from increasing water temperatures and bank sloughing as well as encourage the production of terrestrial and aquatic invertebrates (salmonid forage). In addition, plantings within the visual vegetation buffer will provide some additional shade to the pond upstream of the culvert removal site, which is currently denude of large vegetation. The paved pedestrian trail, which follows the north bank of the slough, will permanently occupy a portion of the riparian corridor. Efforts will be made to remove noxious weeds and to protect and preserve native wetland plants.

Prior to the establishment of newly planted vegetation, and once excavation is complete there is a short-term risk of bank sloughing and failure. This is of particular concern at the Ramsey Lake

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mitigation site, where many trees will be removed/relocated. Bank sloughing may cause a short-term increase in turbidity and sediment delivery to the Lower Columbia Slough. Bank sloughing may also adversely impact the survival of plantings. A maintenance plan may be necessary to assure that established grades are maintained and that connections to the slough are not lost through natural sediment depositional processes. If grade elevation increases at swale connections, positive flow from the excavated areas to the slough may be disrupted. Rock sills are provided at the North and Sough Slough excavation sites to protect from potential scour.

The USFWS has determined that bald eagle and water howellia are the only federally listed threatened or endangered wildlife and plant species that are possibly present in the project vicinity. Our preliminary review suggests that impacts to bald eagles may result from potential disturbance to nesting and wintering bald eagles and possible alteration of habitat used for foraging. The closest nesting site is on Sauvie Island at a location approximately 1.25 miles from the westernmost portion of the project site. The closest wintering sites are located on Sauvie Island and near Vancouver Lake. These sites are far enough from the project site so that disturbance from noise will likely not be an issue, so long as blasting, pile driving, and other very loud activities are not conducted. The sites are close enough to the project to potentially disrupt eagles' foraging behavior on the Columbia Slough. While the Columbia Slough may not be considered a major foraging area for eagles, they do utilize it to some extent. Activities associated with the project including noise, movement, and vehicle traffic may disrupt the eagles' foraging activities. Moreover, removal of riparian vegetation may result in perching trees being removed.

Water howellia was also determined to possibly occur in the project vicinity. However, no recent records of the occurrence of this plant have been noted in the project vicinity or the state. The requisite habitat for this species is not found along the Columbia Slough. Potential habitat for this species may be present in or near Smith and Bybee Lakes or other areas of ponding and small lakes. Given that this plant has not been recorded in Oregon for over two decades and the lack of requisite habitat, we anticipate no impact to these plant species.

Sincerely,

Joseph P. Krieter III

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