U.S. DEPARTMENT OF COMMERCE
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National Ocean Service
Office of Ocean Resource Conservation and Assessment
Hazardous Materials Response and Assessment Division
Coastal Resources Coordination Branch
c/o EPA Region 10 (HW - 113)
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Memorandum for: Monica Rolluda, Site Assessment, EPA Region 10 (HW-093)

From: Chris Mebane, NOAA Coastal Resources Coordinator C Mebane

Subject: Anadromous Fisheries in the Vicinity of the McCormick Baxter-Creosoting Facility, Portland, Oregon

In response to your request for an evaluation of potential effects to sensitive environments for NOAA trust resources in the vicinity of the McCormick Baxter-Creosoting site in Portland, Oregon, the NOAA Coastal Resource Coordination Branch has reviewed resource information relevant to the site.

NOAA acts on behalf of the Secretary of Commerce as a Federal trustee for living and non-living natural resources in coastal and marine areas. Resources of concern to NOAA include all life stages, wherever they occur, of fishery resources of the exclusive economic zone and continental shelf; anadromous species throughout their ranges; endangered and threatened species for which NOAA is responsible, and the ecosystems supporting these living marine and anadromous resources. For resources in coastal waters and anadromous fish streams, NOAA may be a co-trustee with the Department of Interior, other Federal land managing agencies, and possibly Indian tribes as well as the affected states. The NOAA Coastal Resources Coordination Branch (CRCB) is responsible for identifying hazardous waste sites which pose a threat to natural resources for which NOAA is a public trustee.

Habitats at Potential Risk

Habitats at potential risk from contaminants are surface waters and associated bottom substrates of the lower Willamette River and its estuary. The Oregon Department of Fish and Wildlife considers the Willamette and the Columbia Rivers major salmonid migratory corridors that support large salmonid populations and high levels of sport fishing (Haxton, personal communications, 1991). Spawning occurs throughout the upper Willamette River basin, above Willamette Falls, approximately 32 km upstream from the site. Juvenile salmonids are known to utilize the Willamette River in the vicinity of the site as nursery habitat. The lower Willamette River in the vicinity of the site is a critical migratory pathway and feeding area for maintaining several anadromous fish species.

The Willamette and Columbia Rivers also provide habitat for other anadromous fishes and resident freshwater species. Near the site, trust resources may be at risk due to extended periods of residence during sensitive life stages.

Habitat Characterization

The Willamette River originates in the Cascade Range and, upon entering the Willamette Valley, is bounded on the east by the Cascade Range and on the west by the Coast Range. From the headwaters of the of the Middle Fork, the Willamette flows approximately 420 km north and discharges into the Columbia River 160 km upstream from the Pacific Ocean. The Willamette River is the largest within Oregon, draining an area of approximately 27,000 km^2 (USGS, 1985).

The point of confluence of the Willamette and Columbia Rivers denotes river kilometers (Rkm) 0. The McCormick & Baxter site at Rkm 11.3 is zoned for heavy industry. Surface waters in the vicinity of the site are tidal freshwater. The upper boundaries of the Columbia River estuary are approximately 115 km downstream of the site (Ward, personal communication, 1992).

There are three notable geographical features related to the study area. Multnomah Channel, located at RKm 5, is an important waterway for migrating spring chinook salmon. Swan Island, located at RKm 12, (700 m upstream from the site), is a heavily developed industrial peninsula and backwater that supports a popular warmwater fishery. Ross Island (RKm 24), separates the main channel from Willamette Slough (Farr et al, 1991).

Water depth averages 12-14 m near the site, with a maximum depth of 24 m. Except when obstructed by structure, water velocity is similar throughout the lower Willamette River, even during spring when flows are seasonally higher. River flow from 1987 to 1989 averaged between 685 and 825 cms with a high over 4,814 cms during January 1988 and a low of 198 cms during August 1988 (Farr et al, 1991). Physical properties fluctuate seasonally, primarily due to substantial intermittent freshwater inputs and temperature. Water quality data were collected from gauging facilities at RKm 20.6 from October 1988 to September 1989. Parameters measured were: temperature (6.5 - 21.0 °C), pH (7.0 - 7.6 standard units), fecal coliform (20 - 260 cols./100 ml), and dissolved oxygen (7.9 - 13.7 mg/l) (USGS, 1989).

Most development along the Willamette River is in Portland Harbor, located between RKm 5 and Rkm 17. Habitat in the Willamette River near Portland has been altered to accommodate urban development and a growing shipping industry. Artificial structures (piers, wharves, etc.) in the harbor have changed the natural shoreline to riprap, bulkheads and sand-beached lagoons. Because of dredging, the river has a steeply sloped, silt and sand bottom. Although zoned for heavy construction, land use near the site is light industrial and agricultural (Farr et al, 1991). Industrial activities are dominated by timber processing (PTI, 1992).

Overall habitat value and water quality of the Willamette has varied considerably in the last 70 years. In the early 1920's, all industries and municipalities on the river dumped their untreated wastes directly into the river. These large loads of organically rich waste waters resulted in severe problems associated with low dissolved-oxygen concentrations that persisted for many years. Since the 1950's, public involvement, legislation, and voluntary action by municipalities and industries resulted in low-flow augmentation, basinwide secondary treatment of waste waters, and the use of other waste management practices which by comparison substantially improved the water quality of the river (USGS, 1985). However, in recent years the water quality of the Willamette has diminished through intensive urban, port, and industrial development in surrounding areas (Ward, personal communication, 1992). Nonetheless, the Willamette River still functions as a critical

migratory corridor for anadromous fish and provides nursery habitat for several species (Melcher, personal communication, 1992).

Since 1950, dams constructed on the upper Willamette River and several associated tributaries have obstructed over 640 stream kilometers that were once the most important spawning and rearing areas for chinook and steelhead. Upstream migration along the lower Willamette River was restricted at Willamette Falls until fish passage facilities were installed in 1971 (Bennett et al, 1991). Supplemental annual stocking programs are currently used to sustain salmonid populations within the Willamette River basin (Massey, personal communication, 1992).

Resource Utilization

The Willamette River contiguous to the Portland metropolitan area is habitat for several species of importance to NOAA. Recent studies identified 39 fish species from 17 families occurring near the site. Nineteen species from seven families were not residents and were introduced to the Willamette River system (Farr et al, 1991; Massey, personal communication, 1992). Both NOAA trust resources and dominant resident species occurring in the Willamette River near the site are provided in Table 1.

Table 1. Fish species present in the Willamette River in proximity of McCormick-Baxter Creosoting, Portland, Oregon. (Melcher, personal communication, 1992. Ward, personal communication, 1992. Bennett et al, 1991. Farr et al, 1991).

Species		Habitat				Fisheries	
Common Name	Scientific Name	Spawning Ground	Nursery Ground	Migration Route	Adult Forage	Comm. Fishery	Recr. Fishery
ANADROMOUS SPECIES							
White sturgeon	*Acipenser transmontanus*		♦	♦	♦		♦
American shad	*Alosa sapidissima*		♦	♦	♦		♦
Pacific lamprey	*Lampetra tridentatus*				♦	♦	
Cutthroat trout	*Oncorhynchus clarki*			♦			♦
Coho salmon	*Oncorhynchus kisutch*		♦	♦			♦
Steelhead trout	*Oncorhynchus mykiss*		♦	♦			♦
Sockeye salmon	*Oncorhynchus nerka*		♦	♦			♦
Chinook salmon	*Oncorhynchus tshawytscha*		♦	♦			♦

Table 1 (continued)

Species		Habitat				Fisheries	
Common Name	Scientific Name	Spawning Ground	Nursery Ground	Migration Route	Adult Forage	Comm. Fishery	Recr. Fishery
NON-ANADROMOUS SPECIES							
Chiselmouth	*Acrocheilus alutaceus*	Δ	Δ		♦		
Prickly sculpin	*Cottus asper*	Δ	Δ		♦		
Reticulate sculpin	*Cottus perplexus*				♦		
3-Spine stickleback	*Gasterosteus aculeatus*	Δ	Δ		♦		
Peamouth	*Mylocheilus caurinus*	♦	♦		♦		
Yellow perch	*Perca flavescens*		♦		♦		♦
Starry flounder	*Platichthys stellatus*		♦		Δ		
Northern squawfish	*Ptychocheilus oregonensis*	Δ	Δ		♦		
Walleye	*Stizostedion vitreum*	♦	♦		♦		♦

♦ Species known to utilize habitat in the vicinity of the site.
Δ Species considered likely to utilize habitat in the vicinity of the site.

Salmonids are considered an extremely important anadromous fish species within the study area. Two races of chinook, two races of steelhead, coho, and sockeye salmon utilize the Willamette River. Typical salmonid behavior involves an inshore movement and settling down to river bottoms in areas of substrate cover. During their freshwater residence, all salmonids are opportunistic drift and benthic feeders. In general, chinook and steelhead populations are the largest and most widespread of the salmonids found in the Willamette River basin (Melcher, personal communication, 1992). Anadromous species are discussed individually due to their unique utilization of the Willamette River system. Cutthroat trout are omitted from the following discussion, based on information obtained from Bennett et al (1991), because of their low relative abundance.

Spring chinook

During their annual migration, spring chinook bound for the Willamette River enter the Columbia River during the first of January. Peak densities occur in late March, with entries tapering off by mid-May. Historically, the spring chinook migrate past Willamette Falls to access spawning habitats in secondary tributaries associated with the Willamette River. Spawning takes place in the early fall. Typically, the juvenile spring chinook migrate to the ocean in the spring after rearing approximately 6 to-12 months in freshwater. They spend anywhere from 1 to 5 years in the ocean. The 1990 Willamette spring chinook run entering the Columbia River was a recent record high of 130,600 individuals. The calculated total of 106,300 spring chinook entering the Willamette River in 1990 was the largest on record, up 30% from the recent 5-year average (1985-1989) of 81,900 (Bennett et al, 1991).

Five large hatcheries currently produce approximately 5 million smolt-size spring chinook for release into the Willamette River each year, plus additional fingerling salmon to seed the under used reservoir and stream areas. Current hatchery practices include the release of approximately two-thirds of the annual production of smolts in March as moderate-size yearlings and one-third in November as large subyearlings. Most of the smolts are released near the adult collection sites, but some may also be trucked to areas within the lower Willamette River as a means to increase survival. Fisheries in the Willamette and tributaries

above Willamette Falls are predicted to increase by approximately 10,000 salmon during the next season (Bennett et al, 1991).

Fall chinook

Fall chinook were introduced above Willamette Falls in 1964 to take advantage of the expected improvement of low-water passage at Willamette Falls. Releases are currently of early spawning (tule) stock. About 5-7 million smolts are released annually in late April to early May (Melcher, personal communication, 1992). Natural production comprises about 28% of recent runs. Fall chinook spawn and rear in the main-stem of the upper Willamette River and lower reaches of east-side tributaries. Tule fall chinook migrate downstream from mid-August through late September, with greatest numbers generally moving during the first and second week of September (Bennett et al, 1991). Estimated run sizes of fall chinook were not available.

Coho

Efforts to establish coho above Willamette Falls began in 1952. The run never reached expectation. Due to concerns regarding competition between coho and native game fish and a lack of contribution to Willamette fisheries, coho have been de-emphasized. Coho often migrate up the Willamette from late August through early November with peak numbers beginning in mid to late September. Spawning occurs from September through December. Coho return to saltwater as age-3 adults and age-2 jacks. The proportion of adults to jacks is likely biased toward jacks due to the size selectivity of ocean and Columbia River fisheries (Bennett et al, 1991). Estimated run sizes of coho were not available.

Winter steelhead

The native Willamette River winter steelhead run is late in the year, migrating upstream from February through May. Spawning occurs from March through May. Naturally spawned juveniles generally spend 2 years in freshwater before smolting. Smolt migration begins in early April and extends through June. In 1991, approximately 565,000 hatchery-raised winter steelhead smolts were released in the Willamette River basin (Massey, personal communication, 1992; Mamoyac, personal communication, 1992). Juveniles from these stocks were released in April and May as age 1+ smolts (Bennett et al, 1991). Estimated run sizes of winter steelhead were not available.

Summer steelhead

Summer steelhead were introduced above Willamette Falls in the late 1960's for sport fishing activities. Since 1972, all releases of summer steelhead have been from Skamia stock. Natural production is low and is monitored closely by the Oregon Department of Fish and Wildlife to ensure populations are sustained by hatchery releases and angling regulations (Massey, personal communication, 1992). In 1991, approximately 750,000 summer steelhead smolts were released in the Willamette River basin (Massey, personal communication, 1992; Mamoyac, personal communication, 1992). Summer steelhead begin entering the Willamette River in spring and pass Willamette Falls starting in early March. Peak migrations occurs from mid-May through June. The majority of returning adults spend two years in saltwater. Hatchery spawning occurs January through March. Hatchery juveniles smolt during their first year and are released from mid-April through early May (Bennett et al, 1991). Estimated run sizes of summer steelhead were not available.

Sockeye salmon

Sockeye salmon are not indigenous to the Willamette River. Experimental releases were conducted 1966 and 1967 with 143,000 Columbia River sockeye and 243,000 Adams River (British Columbia) stock introduced into up-river reservoirs, respectively. Adults from these releases returned in 1970 and 1971 and were allowed to spawn naturally. No further releases were made as natural reproduction has continued. Since the first introduction, the population of sockeye salmon in the Willamette has decreased considerably. Based on the Willamette River Basin Fish Management Plan, the sockeye run is being eliminated from the Willamette River (Bennett et al, 1991). Estimated run sizes of sockeye salmon were not available.

American shad
Shad enter the lower Willamette River and migrate upstream to Willamette Falls from mid-May to mid-July, peaking in June. Shad rarely use the Willamette Falls fishway due to structural limitation that inhibit the species to proceed upstream. A small migration is known to take place through the Corps of Engineers' navigation boat locks (Bennett et al, 1991). Data for sport catch indicate that shad are abundant in the Willamette River, but spawning location and general resource utilization by the species is unclear (Melcher, personal communication, 1992). Estimated run sizes of American shad were not available.

White sturgeon
White sturgeon are plentiful throughout the lower Willamette River and transplants have established a small isolated population above Willamette Falls. Very little interchange occurs between sturgeon populations above and below Willamette Falls since sturgeon do not ascend the fishway. Some interchange, however, is possible through the Corps of Engineers' navigation boat locks. Tag recoveries have confirmed the interchange of sturgeon between the lower Willamette and the Columbia River (Bennett et al, 1991).

Commercial and Recreational Fisheries

Only a small commercial fishery for pacific lamprey, a NOAA trust resource, exists in the Willamette River (Melcher, personal communication, 1992). The Columbia River supports a valuable commercial fishery. Due to precipitous declines in stocks, stock preservation activities, competing fishing gears, and conflicting uses of the Columbia River (*e.g.* hydropower and shipping), commercial fisheries are highly regulated. Currently, a winter gill-net season conducted in the lower Columbia River in mid-to-late February and early March harvests early arriving portions of the spring chinook run (Bennett et al, 1991).

Recreational fishing is extremely popular throughout the lower Willamette basin. Species most desired are spring chinook, steelhead, coho, shad, and white sturgeon. Resident species such as largemouth bass, black crappie, white crappie, and walleye also support a significant recreational fishery (Farr et al, 1991). There are no restrictions on these fisheries other than general regulations on take limit and minimum sizes (Melcher, personal communication, 1992; Haxton, personal communication, 1991).

Spring chinook contribute substantially to the main-stem Columbia River sport fishery and consistently supports the largest recreational fishery in the lower Willamette River. The chinook fishery in the Willamette River occurs between Oregon City and the confluence of the Willamette and Columbia River and throughout the Multnomah Channel downstream from the site. Angling is conducted in these 75 km of the river, mostly from anchored or slow-moving boats. Recently a bank fishery has developed popularity along the Multnomah Channel. The Willamette River recreational catch for Spring chinook often peaks in April. Total sport catch in the Willamette River for 1990 totaled 78,000 fish;

approximately 30% of this catch was landed in the lower Willamette River (Bennett et al, 1991).

Steelhead catch data were not collected during peak angling periods in December and January. Spring chinook anglers incidentally caught a total of 552 steelhead in the Willamette from March through late June 1990. Peak effort for white sturgeon occurs during the spring and summer months of this year-round fishery. Although estimates were not available, harvest of legal sized sturgeon is considered to be less than 1,000 individuals per year. An estimated 181 legal-sized white sturgeon were caught from mid-March to June 1990 alone. The majority of sturgeon angling effort occurs upstream in proximity at the Willamette Falls (Bennett et al, 1991).

An increasing boat fishery for shad occurs in the Multnomah Channel in the vicinity of Coon Island. No catch data is available for the Multnomah shad fishery. The 1990 total estimated catch of 23,467 shad was the second highest of 15 years of record (Bennett et al, 1991).

Summary

It is apparent that numerous and valuable NOAA trust resources and habitats occur within the 24 km area of investigation. Anadromous fish of particular concern to NOAA are considered likely to utilize portions of the study area for extended period during sensitive life stages. Commercially valuable salmonids use the area near the site, either as adults during migration or as juveniles during their early development stages. Salmonid species also support an extremely important sport fishery. The region under investigation has experienced intensive development within the watershed. Activities adversely impacting the ability of trust habitats to support commercially and recreationally important resources in the lower Willamette River are of concern to NOAA.

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