Portland Harbor

Portland, Oregon

EPA Facility ID: ORSFN1002155

Basin: Lower Willamette

HUC: 17090012

Executive Summary

The Portland Harbor site is a heavily industrialized stretch of the lower Willamette River in Portland, Oregon. The site is composed of numerous individual sites. From the center of the site, the Willamette River flows approximately 10 km (6.2 mi) north to its confluence with the Columbia River. Spills and direct discharges into this section of the river have contaminated river sediment with PAHs, PCBs, metals, and pesticides. The NOAA habitats of concern are the lower Willamette River and the Columbia River downstream of the site. The Willamette River contains NOAA trust resources, including spawning populations of American shad, chinook and coho salmon, Pacific lamprey, sockeye salmon, steelhead, and white sturgeon. The lower Willamette River is a migratory corridor for juvenile and adult anadromous fish and is rearing habitat for several juvenile anadromous fish species. Downstream of the site, the Columbia River supports recreational fishing of spring chinook and several commercial fisheries.

Site Background

The Portland Harbor site includes approximately 10 km (6.2 mi) of the lower Willamette River in an industrial section of Portland, Oregon. The site boundary has not yet been determined. From the center of the Portland Harbor site, the Willamette River flows approximately 10 km (6.2 mi) north before discharging into the Columbia River (Figure 1). The Portland Harbor site has been divided into five reaches (Reaches A through E) to facilitate environmental investigations (Figure 2).

Numerous industrial sites have been identified as possible sources of sediment contamination at the Portland Harbor site (NOAA 1999b). Spills and direct discharges into this section of the river have led to the contamination of the sediment with polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), metals, and pesticides. Current and historical activities at these industrial sites include hazardous waste storage, marine construction, storage and handling of bulk petroleum products, oil firefighting training, oil gasification plant operations, wood treating, agricultural chemical production, battery processing, liquid natural gas plant operations, chlorine production, ship maintenance and repair, and railcar manufacturing.

In May 1997, contractors for the U.S. Environmental Protection Agency (USEPA) completed a site inspection (SI) for the Portland Harbor site (Weston 2000). The Portland Harbor site was placed on the National Priorities List in December 2000 (USEPA 2000).

Because industrial activity is within 300 m (328 yd) of the lower Willamette River, direct surface discharges, spills, and groundwater transport are the most likely pathways for the migration of contaminants to NOAA trust resources (Weston 1998). Leaking underground storage tanks have been documented at several of the industrial sites (NOAA 1999b). Detailed information on groundwater characteristics at the Portland Harbor site was unavailable at the time of this report.

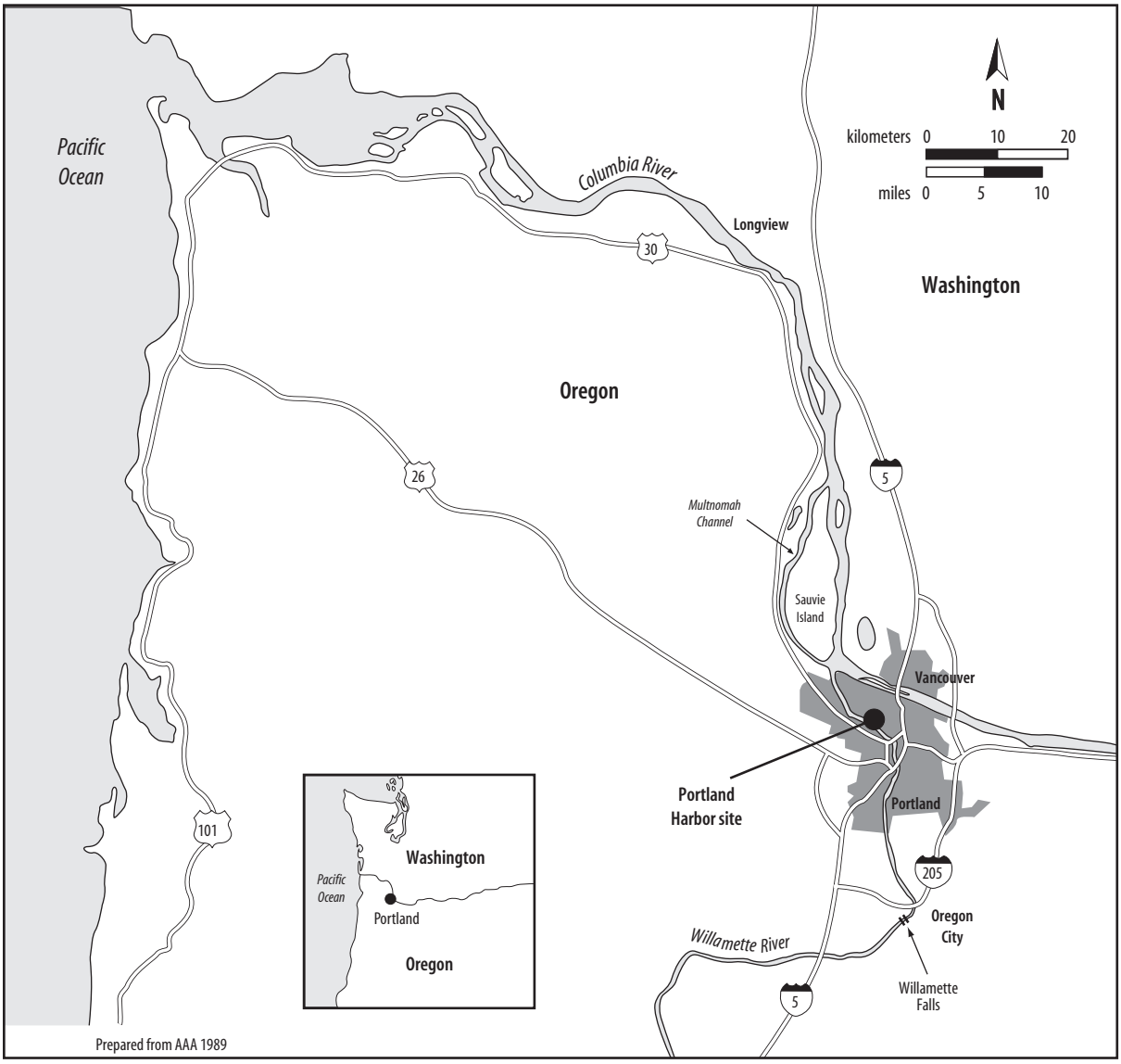

Figure 1. Location of Portland Harbor site, Portland, Oregon.

NOAA Trust Resources

The NOAA trust habitats of concern are the lower Willamette River and the Columbia River downstream of the site. NOAA trust resources potentially at risk include anadromous fish species such as American shad, chinook salmon, coho salmon, Pacific lamprey, sockeye salmon, steelhead, and white sturgeon (Table 1) (NOAA 1999b). Anadromous fish spawn throughout the upper river basin, upstream of the Portland Harbor site. The lower Willamette River is a migratory corridor for juvenile and adult anadromous fish and provides rearing habitat for several juvenile anadromous fish species (NOAA 1999b).

Recreational fishing is common throughout the Willamette River basin. The most desired species are the coho and spring chinook salmon, steelhead, and white sturgeon (NOAA 1999b). Spring chinook salmon support the largest recreational fishery in the lower Willamette River, between Oregon City and the confluence of the Willamette and Columbia rivers and throughout the

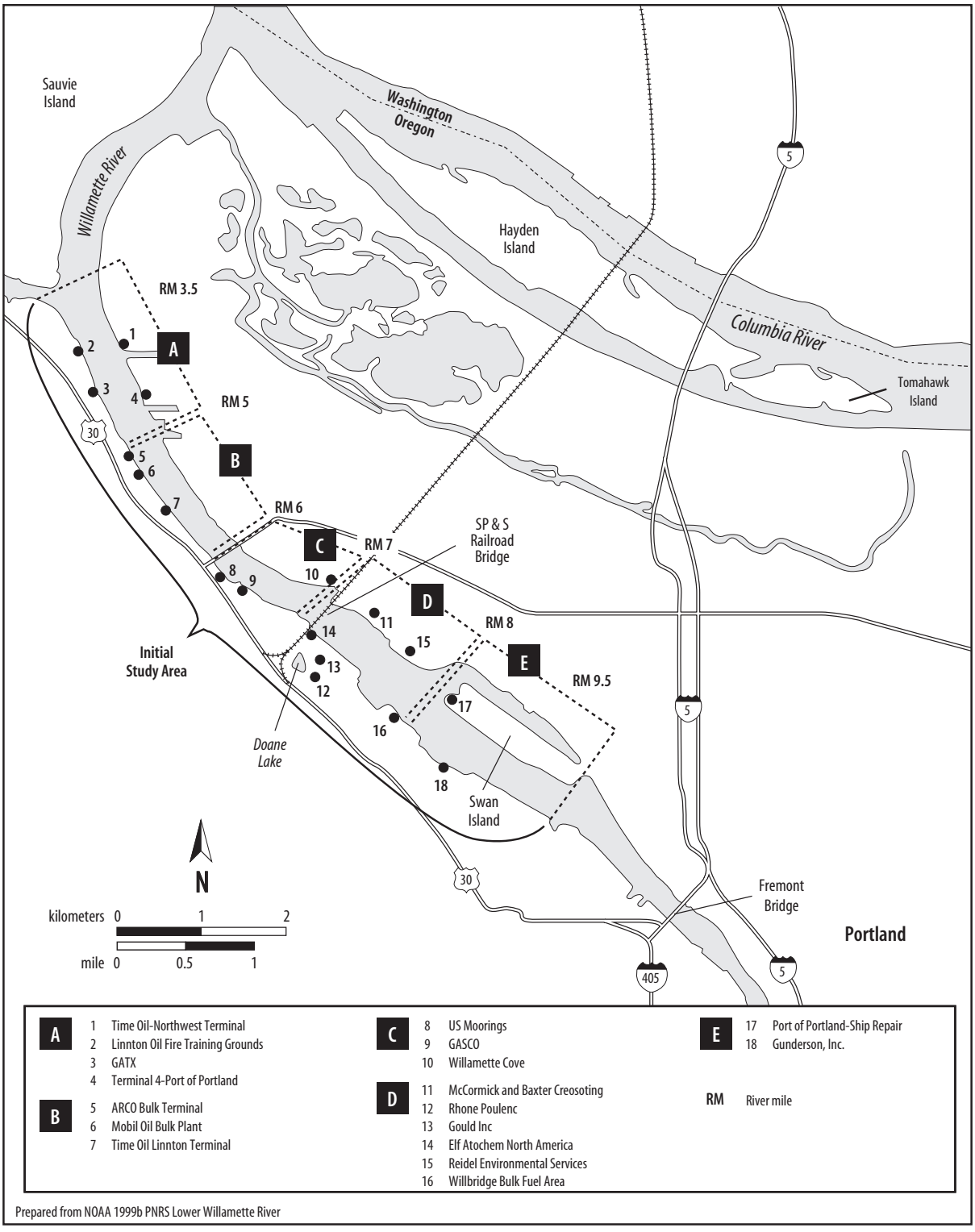

Figure 2. The Initial Study Area investigated by the USEPA in 1998, with the river reach sections (lettered) and individual sites (numbered) within each section.

Multnomah Channel. The Portland Harbor site is located within this 75 km (47 mi) reach, and recreational angling is permitted there (NOAA 1999b). There are no commercial fisheries for anadromous fish species on the Willamette River. However, the Columbia River supports many commercial fisheries that are closely regulated due to declining stocks and conflicting uses of the river. Spring chinook contribute substantially to the mainstream Columbia River sport fishery.

Table 1. NOAA trust resources present in the lower Willamette River (NOAA 1999b).

Species		Habitat Use		Fisheries	
Common Name	Scientific Name	Nursery Area	Migratory Route	Comm. Fishery	Recr. Fishery
ANADROMOUS FISH					
American shad	*Alosa sapidissima*	◆	◆		◆
Chinook salmon	*Oncorhynchus tshawytscha*	◆	◆		◆
Coho salmon	*Oncorhynchus kisutch*	◆	◆		◆
Pacific lamprey	*Lampetra tridentata*	◆	◆		◆
Sockeye salmon	*Oncorhynchus nerka*	◆	◆		
Steelhead[a]	*Oncorhynchus mykiss*	◆	◆		◆
White sturgeon	*Acipenser transmontanus*	◆	◆		◆

a: The term steelhead is applied to a sea-run rainbow trout and some populations from lakes.

Spring chinook and steelhead are listed as federally threatened under the Endangered Species Act. Coho salmon in the lower Columbia River and southwest Washington are candidates for listing because of concerns about the health of their runs (NOAA 1999a). The Pacific lamprey is a culturally important resource to Native American tribes in the Pacific Northwest. Historically, Pacific lamprey have been harvested for subsistence, ceremonial, and medicinal purposes (BPA 1995).

Two fish advisories are in effect for the Willamette River. One advisory bans the commercial harvest and sale of shellfish within a 305 m (1,000 ft) radius of the McCormick and Baxter site (Figure 2) because of arsenic, creosote, and pentachlorophenol (PCP) contamination (NOAA 1999b; USEPA 2002). The other advisory recommends moderate consumption of resident fish species from the mainstem of the Willamette River because of elevated concentrations of mercury and several organic compounds. This advisory does not apply to anadromous fish species (ODHS 2002).

Site-Related Contamination

PAHs and metals have been detected in all reaches of the Portland Harbor site. Chlorinated pesticides and PCBs, although not as widespread, have also been detected at elevated concentrations. During the SI, 150 surface sediment samples, 37 subsurface sediment cores, and 28 sediment porewater samples were collected (NOAA 1999b). All samples were analyzed for metals and semivolatile organic compounds, which include the PAHs. In addition, 61 surface sediment samples were analyzed for PCBs and pesticides. Table 2 summarizes maximum concentrations of contaminants of concern in sediment samples, along with appropriate screening guidelines, in this case the threshold effect levels (TELs), for comparison.

Table 2. Maximum concentrations of contaminants of concern in Portland Harbor sediment (Weston 1998; NOAA 1999b).

	Sediment (mg/kg)	
Contaminant	Site Sediment	TEL[a]
TRACE ELEMENTS		
Arsenic	16	5.9
Cadmium	2.2	0.6
Chromium	68	37.3
Copper	540	35.7
Lead	260	35
Mercury	0.86	0.17
Nickel	39	18
Silver	1.9	NA
Zinc	540	123.1
PAHs		
Acenaphthylene	3.6	NA
Acenaphthene	51	NA
Anthracene	26	NA
Benz(a)anthracene	72	0.032
Chrysene	100	0.057
Dibenz(a,h)anthracene	25	NA
Fluoranthene	110	0.11
Fluorene	22	NA
2-Methylnaphthalene	44	NA
Naphthalene	130	NA
Phenanthrene	170	0.042
Pyrene	140	0.053
PESTICIDES and PCBs		
DDT	3.1	0.0070[b]
DDE	0.22	0.0014
PCBs (as Aroclors)	0.58	0.034

a: Threshold Effects Level is the geometric mean of the 15th percentile of the effects data and the 50th percentile of the no-effects data. The TEL is intended to represent the concentration below which adverse biological effects rarely occurred (Smith et al. 1996).

b: Expressed as total DDT.

NA: Screening guidelines not available.

PAHs were the most widely detected contaminants in sediment at the Portland Harbor site. Eleven of the 12 PAHs of concern were detected at maximum concentrations in Reach C (Figure 2). Three bulk petroleum facilities, located on the western bank of the river in this reach, have been identified as potential sources. Only five of the detected PAHs (benz(a)anthracene, chrysene, fluoranthene, phenanthrene, and pyrene) have established freshwater TELs. Maximum concentrations of these PAHs exceeded their TELs by three orders of magnitude.

The maximum concentrations of arsenic, chromium, copper, mercury, nickel, silver, and zinc in sediment were detected in Reach E near the Port of Portland Ship Repair facility. The maximum concentrations of cadmium and lead were detected in Reach A. Maximum concentrations of all detected metals exceeded their respective freshwater TELs by less than one order of magnitude, except copper, which exceeded the TEL by one order of magnitude, and silver, for which there is no TEL.

The pesticides DDT and DDE were detected at maximum concentrations in sediment from Reach D near the Rhone Poulenc facility, which produced and distributed agricultural chemicals. The maximum concentrations of DDT and DDE exceeded their respective TELs by two orders of magnitude.

The greatest number of surface sediment samples with detected concentrations of PCBs in excess of the TEL were collected in Reach E. Concentrations of PCBs exceeded the TEL at 17 different sampling stations near Swan Island. PCBs were also detected in sediment samples from Reaches C and D at concentrations exceeding the TEL. The maximum PCB concentration was detected in Reach E and exceeded the TEL by one order of magnitude.

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