Descriptions of Habitat-Related Terms
(provisional draft document for planning purposes only; subject to revision)

The following habitat definitions relate to habitat for young-of-the-year Chinook Salmon in the lower Willamette River. These definitions have been derived from a variety of sources and are meant to precisely describe types of habitat that are included in the Portland Harbor Natural Resources Trustees' Habitat Equivalency Analyses.

Active Channel Margin (ACM) That portion of the river's edge that is located at the interface of unwetted shoreline and shallow water, and occurs from the Ordinary High Water (OHW) mark to Ordinary Low Water (OLW). Young-of-the-year Chinook move in association with the shoreline edge, and persistent vegetation can be important. For the ACM to be considered vegetated it should contain an appropriate assemblage of water-tolerant trees and shrubs that will provide cover near the water and provide a source of prey.

Shallow Water Areas from water's edge at the ACM out to a maximum depth of 15 feet below OLW. This habitat is not present in any specific location in the ACM, but rather, moves with the rise and fall of river height (flow) and tidal period. In the lower Willamette, shallow water is only found in nearshore areas of the main channel, and could potentially occur in areas of off-channel habitat.

Deep Water Waters of the main channel deeper than 15 feet below OLW.

Banks That portion of the stream channel cross section that restricts the lateral movement of water at normal bank-full levels.

Beach A shallow, shelving shoreline consisting of sand, silt, or fine gravel up to 64-mm diameter. It may also include native bank materials in their natural position (e.g., clay bank). Vegetation cover varies but may include canopy, understory, and ground cover[1]. Beach habitat tends to accumulate large woody debris from upstream sources; large wood tends to develop microhabitats that can provide refuge and feeding areas for juvenile salmonids. These microhabitats may provide positive or negative advantages.[2]

Side Channel Flowing water bodies with clearly identifiable upstream and downstream connections to the main channel. In some cases, side channels are miles long and define the boundaries of big islands in the active floodplain; in others, they define small islands and are relatively short. Water in side channels is mostly derived directly from the main channel at the upstream connection; therefore, the water characteristics of side channels are very similar to main stem. Sometimes, there is also input from a hyporheic flow derived from subsurface water sources that flow up through gravelly substrate.

Slough A small blind channel off the main river that extends into a lagoon or floodplain area during high-flow episodes or during the influx of river water during a tidal cycle. Blind

[1] It is rare to find vegetation on the beach itself, since these areas are often impacted by waves of flow, forces that prevent the development of a vegetated community.

[2] It has been noted that large wood accumulations can produce twice the species diversity and up to five times greater fish abundance; however, unless water temperatures at these locations are less than 17.8 ºC (64 F), diversity and abundance are usually correlated with more introduced exotic fish species. (Source: a Total Maximum Daily Load—TMDL—approach to Water Quality Management, *http://www.nap.edu/openbook.php?isbn=0309075793*).

sloughs frequently drain off-channel wetted habitat, have muddy substrate, and are usually unvegetated. In the lower Willamette River they are likely found in low-lying off channel areas where the river height is influenced by the tide. Additionally, sloughs form long side channels of the mainstem Columbia River—they are open, but current flow in these side channels is slight or diminished.

Lagoon A shallow body of water, usually separated from the main channel by a sandbar or sill.

Tributary A stream or river that flows into the main stem river. (A tributary does not flow directly into a sea.) In the lower Willamette River, young-of-the-year Chinook primarily use only a tributary's confluence with the main channel, and usually occur in this area to escape the effects of strong currents during high flow events. Since juvenile Chinook only use lower portions of tributaries as refugia, the composition of a tributary's substrate is not important. Not all tributaries are equally valued by young-of-the-year Chinook: large streams off the lower Willamette (i.e., tributaries with considerable water volume) may be parent streams (e.g. the Clackamas River). Smaller streams may also be valued by juvenile Chinook because of cold water temperatures—Chinook prefer waters colder than 17.8ºC. Tributaries likely to have cold water are those that drain forested upland areas (e.g., streams in the Forest Park area).

Embayment (cove) An off-channel, shallow-water embayment with or without an associated tributary.

Alcove Water body that maintains a downstream connection to the main channel at summer low flow, but has no upstream connection during low flow. Alcoves exhibit either no downstream flow or only very low flow when derived entirely from groundwater. They are often formed when a mid-river gravel bar enlarges and connects to one of the banks, forming a point bar. As time passes, the point bar often elongates downstream and vegetation begins to develop. Older alcoves have streamside point bars that support mature woody vegetation. They are usually found in the Willamette upriver from Willamette Falls in areas where the streambed is dynamic and the channel is not dredged. Much of the lower Willamette main channel is in a basaltic trench and has few alcoves. An example in the lower river is the off-channel area between Swan Island and the remainder of Swan Island Industrial park upland. It is an extremely modified alcove that has been altered by dredging, seawalls and additional fill material that has reformed Swan Island into a peninsula.

Riparian Land shoreward from OHW that forms a buffer with vegetation[3]. This habitat performs a range of functions: traps/removes sediment from runoff; stabilizes stream beds and reduces channel erosion; as well as traps/removes phosphorus, nitrogen and other nutrients that can lead to eutrophication of aquatic ecosystems. Vegetated riparian habitat also traps/removes contaminants; stores flood waters; provides important wildlife habitat; maintains habitat for fish and other aquatic organisms (by moderating water temperatures and providing shelter during high- flow events), and it acquires woody debris for the ACM by snagging vegetation floating by and providing windfalls and deadfalls from trees in this zone. The width of riparian habitat is often defined as two times the height of mature indigenous trees: roughly 200 ft in the Pacific Northwest. For the ACM and shallow water habitat to be fully functioning there must be a riparian buffer of sufficient width. Much of the ecological benefit to aquatic habitats from the adjacent riparian buffer is likely achieved with a minimum width of 100 feet, and is fully functional at 200 feet. Because many sites in Portland Harbor are constrained, the Trustees are considering a 100-foot buffer the minimum needed to allow adjacent aquatic habitats to be adequately functional for juvenile Chinook. If a minimum 100-foot buffer is not

[3] Wetlands less than 200 ft from the ACM are included in this category for the purposes of this analysis.

present, the ACM may be given a reduced value as was done in the Hylebos case (Iadanza 2002). Time to full ecological function for woody riparian is 40 to 80 years. Riparian functions of floodplain stability and refuge will take place after about 40 years, but large wood will not yet be supplied . Grasses and shrubs have about half the value of forested vegetation. Anything in the historical floodplain of the river can be important riparian habitat. Woody vegetation is more beneficial than other vegetation types. The mix of coniferous and deciduous trees should be based on site-specific considerations and reference sites.

Upland Uplands beyond the riparian (>200 ft from ACM) and outside the currently existing floodplain[5]. Upland may contain trees and/or vegetated-grass/shrub (with or without invasive species), and can also be unvegetated, but coverage with native vegetative communities, structure such as snags and downed wood, and connectivity to other habitats can be beneficial for wildlife. This habitat provides indirect ecological services to juvenile Chinook, and may provide significant benefits for wildlife.

Historic Floodplain That portion of land adjacent to the river that experiences periodic flooding during high-flow episodes. For the purposes of this HEA, this area should fall within the perimeter of historic flood events. The functional value of this habitat increases with connectivity and native vegetation.

Native forest A dense stand of tall (usually greater than about 9 feet at maturity) woody vegetation that is dominated by species that would occur naturally at the site. If a forested area on a site has an overstory dominated by native trees and an understory dominated by invasive plants, a reduced value may be given to a portion of the area's acreage dominated by invasive plants.

Native grass/shrub Woody and non-woody vegetation usually shorter than about 9 feet at maturity that is dominated by species which would occur naturally at the site. If shrubs and grasses are growing under a forest canopy, the area will be considered forest and valued accordingly.

Native plants Plant species that are indigenous to an area. The Trustee Council has developed a list of preferred native plants to guide selection of plant species for Portland Harbor restoration sites (add link). Native plants should be selected based on site-specific conditions to maximize the likelihood of plant survival and minimize the need for long-term maintenance.

Invasive vegetation Plant species that are not indigenous to an area and/or plants that dominate colonization of a habitat and disrupt the colonization of a diverse plant assemblage. Oregon's Department of Agriculture provides a list of recognized noxious plants at: http://egov.oregon.gov/ODA/PLANT/WEEDS/lists.shtml .

Habitat Complexity Habitat complexity is provided by aquatic and terrestrial structural elements. Structural elements are site-specific and may include large wood, boulder piles, snags, or burrows. The microtopography and diversity created by these structural elements, whether in a stream channel or in a terrestrial habitat, aids species' avoidance of predators through escape or hiding, increases food source availability through insect diversity, provides increased terrestrial soil moisture, decreases water temperature, provides cover from predators and weather, and provides spawning or nesting sites. Site-appropriate habitat complexity increases overall habitat function for both aquatic and terrestrial habitats.

[5] Wetlands greater than 200 ft from the ACM are included in this category for the purposes of this analysis.

Rock Outcrop Natural bedrock formations consisting of angular ledges, protrusions, and sheer rock faces. May include some associated boulders.

Rock Natural, round river rock >64 mm in diameter.

Riprap Continuous stone revetments placed on a river bank to curtail erosion and prevent alterations to the main channel. Vegetative cover varies but may include canopy, understory, and ground cover that occupy a minimum of 20% of the bank below flood stage. This artificial substrate provides almost no ecological value to young-of-the-year Chinook. Placing these structures on top of finer substrate not only diminishes potential food sources for juvenile salmon but additionally provides crevices and pockets to hide predators.

Seawall Impervious vertical retaining walls, generally composed of concrete, timber, or sheet pile, that extend below the OLW level. Habitats along seawalls are uniformly deep and homogenous (i.e., building foundations, and/or bulkheads) and are of very low functional value for young-of-the-year Chinook.

Covered Shallow water or ACM habitat with a floating or suspended structure built over it. A structure is considered to be floating when it sits directly on the water surface. A suspended structure is built up off the water often using pilings. Neither of these structure types are considered to allow light penetration and may or may not be connected to land.

Fill Areas that have been filled with miscellaneous unconsolidated materials (e.g., cement slabs). The surfaces of banks composed of fill have not been covered with engineered riprap or structures. Such banks generally contain debris of various types and may be unstable due to erosion. This habitat provides almost no ecological value to young-of-the-year Chinook.

Pilings Stationary support structures consisting of concrete, metal, or timber used to elevate docks, buildings, or other structures above the water. Functional value of habitat with pilings varies with piling density and structural material. Creosoted wood pilings have lowest functional value of any pilings; their chemistry may contribute to natural resource injuries. Functional value of habitat with pilings is diminished when density of pilings exceeds one per 100 square feet. Detrimental value of pilings also varies with flow, substrate, bank condition, etc.

Sources

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