



## "Shorezone" Structures and Salmon

### Food Chain Support

During the freshwater stage of their life cycle, salmon eat mainly very small invertebrate animals that depend on natural shoreline habitats for food and shelter.

Removing vegetation from the shoreline means removing potential meals for fish as well as protection as they migrate through lakes and streams to the ocean.

In recent years many studies and discussions have centered on the effects of docks, piers, and erosion control structures on salmonids, especially those listed as endangered. It is now widely accepted that simplifying the shoreline by installing these artificial structures and removing the native vegetation does have an adverse effect on salmon habitat.

### The Trouble with Docks and Piers

Juvenile salmonids and other small fish rely on the complex structure of submerged trees with branches, rootwads, and other forms of natural cover as a refuge from predators. Docks and piers are relatively simple structural elements, providing very little protection. The difference is critical to the survival of small fish. Scientists have determined that docks and piers provide the ideal shade and overhead cover for ambush predators. Largemouth and smallmouth bass are most likely to benefit from shorezone structures. Also, bass utilize piers, piles, and other artificial structures for nesting in lieu of natural cover or structure. While anglers may applaud the availability of bass near docks, many juvenile salmonids find it to be deadly.

But it's not just introduced species of bass preying on our salmon. According to recent studies done in Lake Washington, cutthroat trout are effective predators on juvenile

salmonids in the nearshore from February through June, and in the offshore for the rest of the year. The loss of complex refuge habitat resulting from shoreline development has given mobile predators such as cutthroat trout a distinct advantage over juvenile salmonids. According to researchers studying the cumulative effects of shoreline development, any project that would reduce the structural complexity of the shoreline area should be considered likely to adversely affect ESA-listed salmonids. That being the case, the removal of vegetation should be avoided.



*Complex shoreline features such as woody debris, and submerged vegetation provide ideal habitat for salmon.*

### Bulkheads

Shallow water functions as a refuge for small fish from predation, especially in the absence of complex habitat features such as woody debris or submerged vegetation. Modern bank stabilization involves various forms of erosion control structures. The most common is

known as a bulkhead, which is typically a tall concrete, wood, or metal structure placed along the shoreline. Many believe that bulkheads affect predation of juvenile salmonids by eliminating shallow-water refuge habitat or, indirectly, by the elimination that generally accompanies bulkhead construction of shoreline vegetation and in-water woody debris. In situations where hard shoreline armoring is necessary, riprap, which provides interstitial spaces that can be utilized by a variety of invertebrate and fish species, would be preferred over the vertical walls typical of bulkheads for fish habitat.

### **Cumulative Impacts**

Shoreline development, whether constructing bulkheads, adding docks and piers, or both, does have a cumulative impact on salmon. For example, over 80 percent of the Lake Washington shoreline is developed with artificial erosion control structures. In addition, at least 4 percent of the shallow-water habitat on the lake is also covered with residential piers and docks. The potential for cumulative adverse impacts on salmon is significant.

Lake Washington is not the only lake experiencing a decline in its salmon population. In many of the smaller developed lakes in King County, piers and docks have become the dominant structural features at the expense of natural complex structures such as woody debris and emergent vegetation. This contributes to the decline of many species of fish. The fact that bass and other predators



## **Shoreline Practices for a Healthy Lake, River, or Creek**

A strip of natural plants between the water and buildings, lawns, or cleared areas keeps your lake, river, or creek healthy. Wider “buffers” of native plants are better for the water and the creatures living in it. Natural vegetation:

- filters sediment and nutrients out of surface runoff
- provides cooling shade for salmon, trout, and the aquatic creatures they depend on for food
- provides food and a home for a variety of other wildlife
- stabilizes banks
- helps stop erosion and dissipates floodwaters
- discourages resident Canada geese from moving in

gain an advantage over prey fish in structurally simple environments is substantiated by researchers who found that bass (especially small-mouth) persist or thrive along developed shorelines, while other species decline.

### **Something Else to Consider**

In addition to the above, the care and maintenance of docks, piers, and bulkheads can create other problems. Relatively little is known about the total impacts of chemicals and wood preservatives on aquatic organisms. However, it should not be considered trivial. Creosote, a protective coating, is primarily composed of polycyclic aromatic hydrocarbons (PAHs) which are known carcinogens. A study done in 1998 in British Columbia found that significant PAH sediment contamination occurred within 7.5 meters of newly installed creosote piles in a marine inlet.

Household or industrial cleaning and preserving agents applied to piers and docks could have adverse effects

on aquatic organisms as well. A recent fish kill in Thornton Creek was suspected to have been caused by a concrete cleaner.

The best bet for maintaining shorezone structures is to use less toxic, more natural products. A new product on the market called “Natural Deck Oil” is odorless and non-toxic and can even be applied when wood is damp. For more information on this product, go to their website at <http://www.biowash.com>. Another source for information is the Washington Toxics Coalition. Reach them at (206) 632-1545 or visit them online at <http://watoxics.org>.

Much of the information for this fact sheet came from shorezone development literature and reports posted on the City of Bellevue website at <http://www.ci.bellevue.wa.us>



For information on the Lake Stewardship program, volunteer opportunities, or other fact sheets, call (206) 296-1959 or visit us online at <http://dnr.metrokc.gov/wlr/waterres/smlakes>.