Habitat Utilization by Smallmouth Bass in the Littoral Zones of Lake Washington and Lake Union/Ship Canal

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The utilization of littoral zones in Lake Washington and the Lake Washington Ship Canal by smallmouth bass (Micropterus dolomieui) was studied in 2000-2003 in order to determine if anthropogenic habitat features (e.g., docks, rip-rap) affected distribution of this species. Our overall objective was to provide insight into whether development of the shoreline in this watershed could increase predation by smallmouth bass and other piscivores on juvenile salmon species, especially chinook salmon (Oncorhynchus tshawytscha). Using SCUBA divers, a variety of sites, each approximately 333 m long, in Lake Washington and the Lake Union/Ship Canal were surveyed. At each site, the position of adult smallmouth bass along three different depth contours in relation to different habitat features was mapped using GPS. Habitat characteristics that were mapped included dock features, structure, substrate types, vegetation, and shoreline protection. This presentation includes results of studies completed in 2000 and 2001 but only part of the information obtained in 2002.

Adult smallmouth bass exhibited distinct seasonal movements in Lake Washington. They initially moved into littoral zones in May as water temperatures warmed to 50 F. In general, smallmouth bass abundance peaked in June and declined thereafter until surveys were completed in mid August. Although the occurrence of smallmouth bass in littoral areas coincides with the peak abundance of juvenile chinook salmon in littoral areas, we do not believe smallmouth bass movements are in response to changes in juvenile salmon abundance. Rather, their occurrence in the littoral zone in later spring and early summer is most likely related to the warming of littoral areas for spawning and seasonal shifts in invertebrate and vertebrate food items. In Lake Washington, fish apparently move from deeper waters into littoral areas as they warm. In Lake Union it is not clear where the bass are coming from (e.g., are they residents in Lake Union or are they migrating in from Lake Washington). The salmon species that overlaps the most with smallmouth bass in littoral areas of Lake Washington is juvenile chinook salmon as most sockeye salmon (O. nerka) and coho salmon (O. kisutch) have passed through Lake Washington by the time the water temperature has warmed sufficiently for smallmouth bass to become abundant. In Lake Union, all species are at risk to bass predation.

Most of the adult smallmouth bass occurring at sites in both Lake Washington and Lake Union were classified as small (< 25 cm total length); most of these fish were associated with the shallowest transect (1m in depth). We found that the numbers of smallmouth bass occurring at sites both in Lake Washington and the Lake Union/Ship Canal varied considerably. There were large-scale (lake scale) factors in Lake Washington that help determine whether or not an area is used by smallmouth bass. Of the factors that we measured, the amount of mud and cobble present at the site were most important. Smallmouth bass abundance was negatively correlated to the amount of mud and positively correlated to the amount of cobble. In addition, we noted that some unique habitat features at some sites affected distribution.

At sites in Lake Washington, the presence of structure had an important influence on the distribution of smallmouth bass as 72% of the bass that were seen were within 2 m of some sort of structure; 68% of all adult smallmouth bass were observed within 2 m of a dock. Smallmouth bass did not use dock habitat (defined as within 2 m of a dock) in proportion to its availability. While the amount of area at a site within 2m of a dock ranged between 4% to 12% at the four sites with the most smallmouth bass, the percentage of the bass observed within 2m of a dock ranged from 27% to 62%. Smallmouth bass did not use docks equally but preferred some structures over others, preferring large docks with large numbers of pilings. At two of the sites where smallmouth bass were most abundant, we found that substrate was selected in proportion to its availability; at the other two sites that had large numbers of bass, this was not the case.

At this point in our study, we conclude that the addition of structure (e.g., docks, complex wood) to sites where smallmouth bass are rare or absent in Lake Washington will have little affect on the abundance of smallmouth bass at this site. Further, we believe that such changes should also have little affect on predation mortality by smallmouth bass on juvenile chinook salmon in Lake Washington. However, at sites in Lake Washington where smallmouth bass are abundant, we recommend managers should seek to reduce the amount of dock structure at sites, especially in the shallowest areas.