



READER'S GUIDE TO SEATTLE'S URBAN BLUEPRINT FOR HABITAT PROTECTION AND RESTORATION

This document describes Seattle's approach to applying a scientific methodology to assessing actions the City might consider to protect and restore chinook habitat along its urban shorelines. The discussion includes the most recent research information regarding chinook salmon in the urban landscape. By developing a structured scientific approach, the City is seeking to adapt the actions it takes, whether of a public investment or regulatory nature, to most effectively improve the survival of chinook salmon as this species utilizes the waterways of Seattle. This report is the third in a series which is meant to document and explain the developing science of salmon recovery in Seattle.

The report will eventually also be incorporated in a larger regional document which brings together the work of major urban jurisdictions in the I-5 corridor: Portland, Tacoma, Seattle, Bellevue, Everett and Bellingham. This group of jurisdictions has worked together because we believe we share similar challenges as we approach salmon recovery in highly urban environments, and because we are all dedicated to doing our part in salmon recovery. Working together allows us to challenge each others assumptions, more critically evaluate scientific approaches, and share scientific data.

The regional document will include a preface which lays out foundational ecological principles and principles appropriate for the various aquatic environments through which salmon pass as they migrate through our urban areas (rivers, lakes, streams, estuaries, and man-made waterways). It is from these principles that our understanding of the natural systems derive.

The Seattle Chapter has five main sections.

- ❑ Seattle's Salmon Recovery Policy Framework
- ❑ Seattle's Scientific Methodology
- ❑ Seattle's Aquatic Environments
- ❑ Seattle's Inventory/Assessment Strategy
- ❑ Seattle's Regulations Which Will Influence the Future

Seattle's Salmon Recovery Framework traces the history of Council actions directing salmon recovery efforts by the Salmon Team.

Seattle's Scientific Methodology describes the analytic process which Seattle's science team has developed to link the scientific knowledge about salmon in Seattle's aquatic environments to possible City actions that have a high likelihood of contributing to salmon recovery.

Seattle's Aquatic Environments describes the historic modifications which have occurred in each environment, examines the most recent scientific information about chinook utilization of that area, and applies the science methodology to each of our aquatic areas. The conclusions from this examination suggest preliminary focus areas for possible interim actions and research priorities suggested by identified scientific uncertainties. Those preliminary focus areas are:

Lake Washington:

the protection and restoration of the shallow littoral habitat

Lake Union/Lake Washington Ship Canal System:

the protection and restoration of the shallow littoral habitat

Hiram M. Chittenden Locks/Salmon Bay/Elliott Bay

increase the safe passage of both juvenile and adult chinook past the Locks and reduce the effects of the abrupt transition between the marine and freshwater environments



Duwamish Estuary

the protection and restoration of estuarine wetlands and upper and middle intertidal habitats

Marine Nearshore Environment

the protection and restoration of beach forming processes, habitat diversity, and marine vegetation

Each aquatic environment section also includes a description of projects which have been done, or are underway, or which may be good candidates, to improve chinook habitat. A map showing the location of those projects is included.

Key scientific uncertainties for each environment are listed below. These uncertainties form the basis for a research agenda which Seattle may wish to encourage in order to increase the likelihood that our actions will be effective toward increasing habitat beneficial to chinook.

Lake Washington:

1. The role of overwater structures (docks and piers) as they influence prey availability and predation on juveniles.
2. The role of woody debris and other structural complexity in predation on juveniles.
3. The role of creek mouths as potential preferred habitat along the lake shoreline and associated water quality impacts on juveniles.
4. Whether prey availability, especially for early migrant chinook fry from January through March, is a factor of decline in the lake.
5. Methods for altering the balance between juvenile chinook and their predators to favor chinook.

Lake Union/Lake Washington Ship Canal System:

1. Overall habitat use by juveniles
2. The role of overwater structures (docks and piers) as they influence prey availability and predation on juveniles.
3. The role of woody debris and other structural complexity in predation on juveniles.

4. Whether food availability is a factor of decline in the lake.
5. Impact of water quality and sediment on juveniles.
6. Methods for altering the balance between juvenile chinook and their predators to favor chinook.

Hiram M. Chittenden Locks

1. Continue evaluation of implemented improvements related to smolt passage through the Locks. Monitoring and evaluation has occurred in 1996, 1997, 1998, 2000, and will again in 2001.
2. Determination of the best usage of available freshwater through the Locks to provide maximum smolt passage. In most years there is little available water for spill after mid to late June.
3. Investigate ways to increase the amount of freshwater available for fish passage in late June and July.
4. Further investigate ways to improve the saltwater/freshwater interface for both adult and juvenile passage.
 - a. Evaluate salinity levels upstream of the Locks
 - b. Evaluate freshwater input into Salmon Bay downstream of the Locks
 - c. Evaluate salinity levels in the fish ladder for upstream migration
 - d. Evaluate adult use of the saltwater drain into the Locks

Duwamish Estuary

1. The identification of specific habitat needs related to wild chinook through the entire Green/Duwamish River, including the estuary.
2. Quantification of mortality of wild chinook at each life stage.
3. The role of predation on juvenile chinook in the estuary.
4. Impact of contaminated sediments on juvenile chinook survival.
5. Habitat preference in nearshore areas of wild versus hatchery juvenile chinook.



6. The characterization and distribution of various life-history strategies for wild chinook in the basin.
7. The effect of overwater structures on juvenile salmonid mortality in the estuary.

Marine Nearshore Environment

1. Determine the presence, distribution, and periodicity of juvenile chinook within marine nearshore and estuary habitats.
2. Identify preferences in nearshore areas by juveniles and sub-adults for specific types of habitat.
3. Identify potential impacts of predation on the survival and habitat use of juvenile chinook salmon migrating and rearing in nearshore areas.
4. Evaluate the effects of overwater structures on predator abundance and efficiency, the distribution of submerged vegetation including eelgrass beds, and food availability.
5. Identify and evaluate the use of specific nearshore areas within the City by forage fish species used by subadult and adult chinook.
6. Evaluate long-term water and sediment quality trends near Seattle and the effect of water quality issues on chinook.

These research question will help us understand what is beneficial to chinook in Seattle. At the same time we will need to develop a better database of habitat features in Seattle. This work is described briefly in a section on our *Seattle's Inventory Assessment Strategy*.

Seattle's Regulations Which Will Influence the Future describes two major bodies of regulation, Land Use and Stormwater, which will govern many ways that future development and redevelopment will impact habitat. It describes changes in the processes for implementing these regulations, and in the regulations themselves, which support Seattle's salmon recovery efforts.

Seattle also is involved in salmon recovery efforts in the watersheds in which we have a utility presence-Cedar, Tolt, Skagit and Pend Oreille. The Blueprint includes a brief discussion of our habitat improvement work in each of these watersheds.

Other Activities that are not described in the Blueprint: Seattle has also worked on changes to best management practices for park management, pesticide use, and road maintenance. These efforts are not described in this draft of the Blueprint but are available. Please refer to: <http://www.cityofseattle.net/environment/gmtf.htm>.

Seattle also provides numerous education and incentive programs that help citizens understand what they can do as individuals to provide for a better environment and assist salmon specifically. For more information please refer to

<http://www.cityofseattle.net/salmon/>

<http://www.cityofseattle.net/util/proipm/>

<http://www.cityofseattle.net/util/RESCONS/plantNaturally/salmonfriendly.htm>