EXECUTIVE SUMMARY

Duwamish Blueprint:
Salmon Habitat in the Duwamish Transition Zone

Prepared for the Green/Duwamish and Central Puget Sound (WRIA 9) Watershed Ecosystem Forum

Photo:
North Wind's Weir, 2014

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Introduction

Salmon recovery in the Green/Duwamish watershed depends on improving the quality and quantity of estuarine habitat in the Duwamish estuary. In particular, migrating juvenile Chinook salmon need more and better habitat in the "transition zone" where they can feed, take shelter, and osmoregulate as they transition from being freshwater fish to salt water fish. The habitat types most needed are intertidal mudflats, with low gradients and silt substrate, ringed by tidal marsh. These habitats produce high volumes of fish food and slow water conditions that allow juvenile fish to escape high flows and predators, and feed.

This Duwamish Blueprint (Blueprint) is a working draft that intends to provide guidance to governments, businesses, Natural Resource Trustees, and citizen groups as they improve the aquatic ecosystem of the Duwamish estuary, with a focus on the area between river miles 10-1, generally from Tukwila, near the I-5/599 interchange, downstream/north to almost Harbor Island and the West Seattle Bridge. The Blueprint has been developed to implement Program D-3 (page 7-82) from the 2005 "WRIA 9 Salmon Habitat Plan: Making Our Watershed Fit for a King" (WRIA 9 Steering Committee 2005). The Blueprint was originally drafted in 2006 by WRIA 9 staff and multiple stakeholders. In 2014, the Duwamish Blueprint Working Group, which consisted of WRIA 9 stakeholders and staff familiar with the Duwamish and estuary restoration, updated the 2006 draft using more recent information about the Superfund Cleanup and related mitigation efforts, scientific data, and experience implementing Duwamish habitat projects.

The key parts of this Blueprint are:

1. Summary of the problem, including challenges and opportunities
2. Characteristics of transition zone habitat that will benefit salmonids (salmon and trout)
3. List of potential, completed, and in progress habitat projects (Appendix A)
4. Evaluation criteria for potential projects
5. Strategy for moving projects forward
6. Recommendations for habitat maintenance, monitoring and adaptive management

The Blueprint, appendices, and maps are available online at:
http://www.govlink.org/watersheds/9/plan-implementation/DuwamishBlueprint.aspx

Foundation

The Blueprint recognizes the following significant facts:

- A healthier Duwamish estuary will contribute to the improvement of the health of the Puget Sound ecosystem and the health of animal populations that are listed as threatened or endangered under the federal Endangered Species Act;
- The Duwamish corridor is the industrial heart of western Washington, providing valuable goods and services, serving as a vital transportation link, and supporting thousands of above-average wage jobs;
- The Duwamish is a living river that provides cultural and social value to the community in addition to economic goods and services;

- There are a variety of other activities and planning efforts that will influence and can be influenced by salmon habitat recovery efforts, most significantly, the Superfund designation of the lower 5.3 miles of the river and the cleanup of contaminated sediments;
- Because of the extensive urbanization in this part of the watershed, opportunities to restore or create habitat are limited, but they do arise; and
- Past efforts have shown that habitat can be restored and created in the Duwamish and that salmonids will make use of these habitats.

The Blueprint rests on the following assumptions:

- Creating more transition zone habitat is a necessary condition for recovery of Chinook salmon populations in the Green/Duwamish River;
- While scientific understanding of salmonid use of the Duwamish estuary is evolving, enough is known to be able to take actions during 2014-2025 that will build on previous efforts and contribute to a healthier river;
- Restoration of the estuary to pre-development conditions is not possible but ecological functions can be improved in a heavily urbanized setting;
- Governments, businesses, and citizens can continue to work together to improve the health of Duwamish estuarine ecology without significantly impairing other non-ecological uses;
- Habitat projects from river mile 10 to river mile 1 will provide transition zone habitat for salmonids; [*]
- Habitat projects will provide cultural and social values by increasing the number of green spaces and access points to the river; and
- Adding approximately 40 acres of new shallow water habitat in the Duwamish transition zone during 2014-2025 will significantly contribute to increased productivity of the Green/Duwamish watershed for the fall Chinook salmon population.

Transition Zone Defined

For the purpose of this Blueprint, the transition zone is defined as extending from river mile 10 (upstream of the Interstate 5 crossing of the Duwamish) to river mile 1 (between Kellogg Island and the West Seattle Bridge) (Figure 1). This definition is based on information available to date and the conclusions of the majority of scientists who have provided input. Additional information and/or further analysis may lead to adjustments in the transition zone definition.

Because of the importance of the transition zone and the high cost of improving habitat in the Duwamish, it should be a goal of monitoring and adaptive management to further refine our understanding of the scope and nature of the transition zone, and how fish use the habitats there.

[*] River mile marking systems vary for the Duwamish. River miles in this document are based on those in the WRIA 9 Strategic Assessment (WRIA 9 Technical Committee, 2005) and Salmon Habitat Plan (WRIA 9 Steering Committee, 2005). For maps showing river miles, see the map in this document and http://your.kingcounty.gov/dnrp/library/2005/kcr1876/FIGS_11X17/Fig7-4.pdf

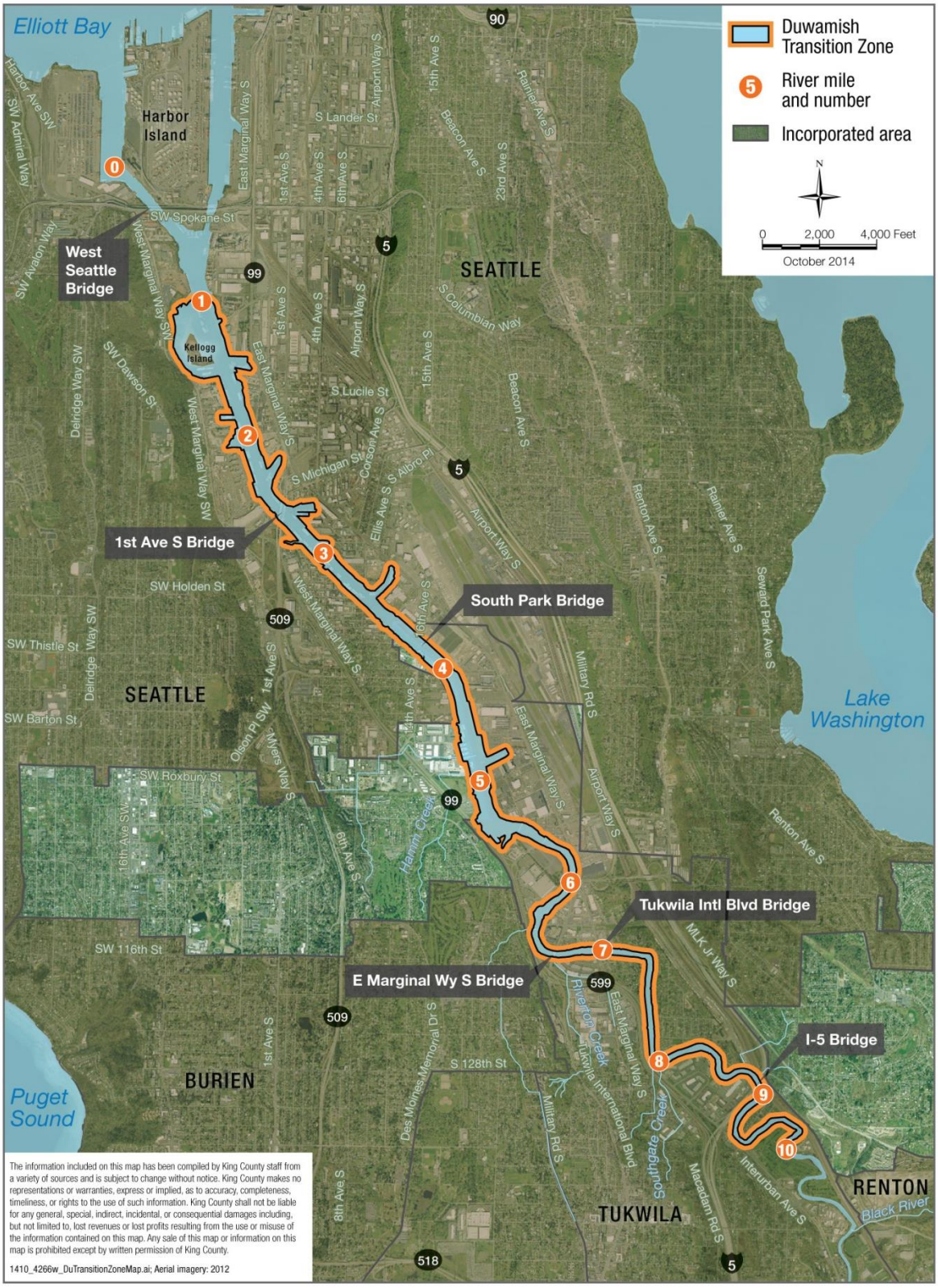

Figure 1. The Duwamish transition zone, the area most critical for migrating juvenile salmonids, is located between River Miles 1 and 10, from just downstream of Kellogg Island to just upstream of the I-5 crossing.

Transition Zone Habitat Recommendations

The Blueprint makes the following recommendations regarding potential habitat projects:

- The creation of at least 40 acres of new habitat that supports transition zone functions by 2025. Habitat potential is further specified for five different reaches in the transition zone (Appendix A, Table 1). Approximately 31 acres of habitat were created in the Duwamish transition zone between about 1988 and 2014 (WRIA 9 Implementation Technical Committee 2012 and unpublished data).
- Larger projects – that is, two acres in size or greater – are highest priority because they are more likely to support a diverse ecosystem and because of the economies of scale associated with design, permitting, construction, maintenance, and monitoring. However, smaller projects are still welcome as much needed incremental additions of habitat.
- Projects that incorporate "more landscape-based approaches, such as merging with existing restoration sites, linking to upland drainages, development of tidal channels and sloughs, and addition of natural estuarine wetland attributes, such as large woody debris" are preferable (Simenstad et al., 2005).
- The habitat feature *most needed* in the Duwamish below RM 5.5 from a salmonid perspective is mudflat within the entire intertidal range between -4 and +12 ft. Mean Lower Low Water (MLLW), with an emphasis on mudflats in the low intertidal between -4 to +4 ft. MLLW. These mudflats would ideally have a relatively shallow grade of less than 5% (20:1), a silt/clay to fine sand substrate, and be unvegetated. Elevations of planned habitat features should be determined by surveying elevations of existing mudflats and marsh as close to the project site as possible.
- The habitat feature *most needed* in the Duwamish above RM 5.5 from a salmonid perspective is shallow-water, off-channel habitats where juvenile salmonids can shelter, hold in low-salinity water, and feed (Ruggerone et al. 2006). Ideally, these habitats would feature a relatively shallow grade, a silt/clay to fine sand substrate, and be ringed with emergent vegetation and mixed riparian in the uplands.
- Larger and/or multiple openings to the main channel may be preferable to smaller/single openings (Cordell et al. 2011). This design feature will need to be balanced against the need to protect the habitat from wave and/or current energy.
- Projects should be sited where the water is more brackish than saline (Cordell et al. 2011), and where there are freshwater inputs to provide small-scale habitats of mixed salinity within the larger estuarine ecosystem.
- Habitat improvements may be obtained by linear treatments of the river bank.
- In a few circumstances, it may be possible to connect the project with upland habitats to expand the project size and/or benefit other aquatic and terrestrial wildlife.
- Projects should be revegetated using appropriate soil preparation, native plantings, maintenance and monitoring to ensure successful development of trans-successional states stages of intertidal, riparian and terrestrial habitat as appropriate for the site (Appendix C).

- Trees should be planted across the Duwamish subwatershed, targeting residential neighborhoods and areas where people work. Trees in the urban landscape can help clean runoff by reducing the amount and temperature of runoff, and capturing airborne pollutants. They also have social benefits, including improving health (Donovan et al. 2011 and 2013) and reducing crime rates (Donovan and Prestoman 2012).

This Blueprint does not evaluate or rank potential projects because of the need to act when one of the limited opportunity areas becomes available. Projects can be evaluated in the future if there are two or more projects that need conceptual development or full funding.

Implementation Strategy

To move forward with creating the habitat projects listed in this Blueprint, the partners should adopt the following strategy:

1. Pursue all habitat opportunities located on publicly-owned properties. The project list (Appendix A) includes potential, in progress, and completed projects. All potential projects on the list are not likely to be completed, and likewise, other opportunities for habitat may arise that are not on the list.
2. Encourage partnering to leverage resources and maximize the size of restoration sites.
3. Identify privately-owned properties that offer the greatest potential.
4. Contact private property owners. This could be done by governmental agencies, a non-profit, or WRIA staff.
5. Develop conceptual design and budget for selected properties.
6. Work to arrange funding in advance to allow timely purchase when properties desired for habitat projects come onto the market.
7. Stewardship, maintenance, and monitoring and adaptive management should be prioritized to maintain quality habitat, track project implementation and effectiveness, and improve future efforts. Stakeholders should consider meeting on a regular basis to facilitate collaboration and coordination.

Key Recommendations

- Streamline permitting processes for habitat restoration.
- Track project implementation and the areas of shallow water and native riparian vegetation in the transition zone to make sure there is a net gain over time.
- Pursue new funding sources to allow timely purchase when transition zone parcels are for sale.
- Prioritize purchase, design and construction funds for the largest potential properties.
- Determine whether Chinook fry voluntarily migrate to the lower Duwamish estuary; whether the size of the opening to the main river influences fish use of off-channel habitats; and how much juvenile fish rely on the area between river miles 8.5 and 11 for smoltification;
- Research whether pass-through or flow-through channels vs. blind channels (channels that don't connect back to the river) are more beneficial to juvenile salmonids.
- Hire a part-time Duwamish Basin Steward to speed up and track Duwamish habitat improvements.
- Monitor projects to determine whether they are functioning as intended. Adjust habitat approaches as needed and share with project sponsors.