**Acronyms and Abbreviations**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>ACOE</td>
<td>U.S. Army Corps of Engineers</td>
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<tr>
<td>BAS</td>
<td>Best Available Science</td>
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<tr>
<td>BIBI</td>
<td>Benthic Index of Biological Integrity</td>
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<td>BMPs</td>
<td>Best Management Practices</td>
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<tr>
<td>CAO</td>
<td>Critical Areas Ordinance</td>
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<tr>
<td>CARA</td>
<td>Critical Aquifer Recharge Area</td>
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<td>CFT</td>
<td>Conservation Future Tax Fund</td>
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<td>CIP</td>
<td>Capital Improvement Project</td>
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<td>CMZ</td>
<td>Channel Migration Zone</td>
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<td>Co</td>
<td>County</td>
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<td>Comp Plan</td>
<td>Comprehensive Plan</td>
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<td>CPPs</td>
<td>Countywide Planning Policies</td>
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<td>Corps</td>
<td>U.S. Army Corps of Engineers</td>
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<td>DNRP</td>
<td>King County Department of Natural Resources and Parks</td>
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<td>DOE</td>
<td>Washington Department of Ecology</td>
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<tr>
<td>Ecology</td>
<td>Washington Department of Ecology</td>
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<tr>
<td>EDT</td>
<td>Ecosystem Diagnosis and Treatment Model</td>
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<td>EIS</td>
<td>Environmental Impact Statement</td>
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<td>EMAP</td>
<td>Environmental Monitoring and Assessment Program</td>
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<td>EPA</td>
<td>U.S. Environmental Protection Agency</td>
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<td>ESA</td>
<td>Endangered Species Act</td>
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<td>ESU</td>
<td>Evolutionarily Significant Unit</td>
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<td>FEMA</td>
<td>Federal Emergency Management Act</td>
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<td>FTE</td>
<td>Full-Time Equivalent employee</td>
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<td>GIS</td>
<td>Geographic Information Systems</td>
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<td>GMA</td>
<td>Growth Management Act</td>
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<td>H</td>
<td>High</td>
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<tr>
<td>HCP</td>
<td>Habitat Conservation Plan</td>
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<td>ILA</td>
<td>Interlocal Agreement</td>
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<td>King County</td>
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<td>KCD</td>
<td>King Conservation District</td>
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<td>L</td>
<td>Low</td>
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<td>LEED</td>
<td>Leadership in Energy and Environmental Design</td>
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<td>LID</td>
<td>Low Impact Development</td>
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<td>Locks</td>
<td>Hiram M. Chittenden Locks</td>
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<td>LUSC</td>
<td>Land Use SubCommittee</td>
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<td>LWD</td>
<td>Large Woody Debris</td>
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<td>M</td>
<td>Medium</td>
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<td>MRCI</td>
<td>Municipal, Residential, Commercial, and Industrial Development and Redevelopment</td>
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<td>MRV</td>
<td>Marine Riparian Vegetation</td>
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<td>Acronym</td>
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<td>MUGA</td>
<td>Municipal Urban Growth Area</td>
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<td>NEPA</td>
<td>National Environmental Policy Act</td>
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<td>NGO</td>
<td>Non-Governmental Organization</td>
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<td>NLW</td>
<td>North Lake Washington Tributaries</td>
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<td>NMFS</td>
<td>National Marine Fisheries Service (same agency as NOAA Fisheries)</td>
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<td>NOAA</td>
<td>National Oceanic and Atmospheric Administration</td>
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<td>NPDES</td>
<td>National Pollution Discharge Elimination System</td>
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<td>NTAAG</td>
<td>Near-Term Action Agenda for Salmon Habitat Conservation</td>
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<td>OHWM</td>
<td>Ordinary High Water Mark</td>
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<td>PAA</td>
<td>Potential Annexation Area</td>
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<td>PBRVS</td>
<td>Public Benefit Rating System</td>
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<td>PFCs</td>
<td>Properly Functioning Conditions</td>
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<td>PIT tagging</td>
<td>Passive Integrated Transponder tags</td>
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<td>PSAMP</td>
<td>Puget Sound Ambient Monitoring Program</td>
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<td>PSAT</td>
<td>Puget Sound Action Team</td>
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<td>PSTRT</td>
<td>Puget Sound Technical Recovery Team</td>
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<td>QA/QC</td>
<td>Quality Assurance/Quality Control</td>
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<td>RFEG</td>
<td>Regional Fisheries Enhancement Group</td>
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<tr>
<td>RK</td>
<td>River Kilometer</td>
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<tr>
<td>RM</td>
<td>River Mile</td>
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<td>SASSI</td>
<td>Salmon and Steelhead Stock Inventory</td>
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<td>State Environmental Policy Act</td>
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<td>Shared Strategy</td>
<td>Shared Strategy for Puget Sound</td>
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<td>SSHIAP</td>
<td>Salmon and Steelhead Habitat Information and Assessment Project</td>
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<td>SnoCo</td>
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<td>SMA</td>
<td>Shoreline Management Act</td>
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<td>SMP</td>
<td>Shoreline Management Plan</td>
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<td>SPU</td>
<td>Seattle Public Utilities</td>
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<td>State Route</td>
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<td>Salmon Recovery Funding Board</td>
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<td>TDRs</td>
<td>Transfer of Development Rights</td>
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<tr>
<td>TMDL</td>
<td>Total Maximum Daily Load</td>
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<td>TIA</td>
<td>Total Impervious Area</td>
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<td>TriCo</td>
<td>Tri-County Salmon Conservation Coalition</td>
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<td>TRT</td>
<td>Puget Sound Technical Recovery Team</td>
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<td>UGA</td>
<td>Urban Growth Area</td>
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<td>UGB</td>
<td>Urban Growth Boundary</td>
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<td>USGS</td>
<td>U.S. Geological Survey</td>
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<td>USFWS</td>
<td>U.S. Fish and Wildlife Service</td>
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<td>UW</td>
<td>University of Washington</td>
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<td>VSP</td>
<td>Viable Salmonid Population parameters</td>
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<td>Acronym</td>
<td>Description</td>
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<td>WA</td>
<td>Washington</td>
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<td>WDFW</td>
<td>Washington Department of Fish and Wildlife</td>
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<td>WDOT/WSDOT</td>
<td>Washington Department of Transportation</td>
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<tr>
<td>WRIA 8</td>
<td>Water Resources Inventory Area 8 (also known formally as the Lake Washington/Cedar/Sammamish Watershed)</td>
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<tr>
<td>WSU</td>
<td>Washington State University</td>
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<tr>
<td>W8TC</td>
<td>WRIA 8 Technical Committee</td>
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<tr>
<td>65-10</td>
<td>Land use standard that requires 65% forest retention and limits impervious area to 10%</td>
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</tbody>
</table>
Acknowledgements

The Steering Committee proposed Plan is the result of a collaborative effort among participants in the salmon conservation planning process for the Lake Washington/Cedar/Sammamish Watershed (WRIA 8). See Chapter 1 for a description of this process. The following individuals participated in the planning process for some or all of the period beginning January 2002. For a list of those who participated earlier, please see the Near-Term Action Agenda for Salmon Habitat Conservation.

The WRIA 8 Steering Committee, which is composed of elected officials, representatives from business and environmental interests, water and sewer districts, concerned citizens, scientists, and federal and state agencies, is overseeing the salmon conservation planning effort in WRIA 8.

WRIA 8 Steering Committee members (current and past):

- Councilmember Jim Compton, Committee Co-Chair, Seattle City Council (started ’04)
- Councilmember Larry Phillips, Committee Co-Chair, Metropolitan King County
- Steve Bell, Friends of Issaquah Salmon Hatchery (through ’02)
- Joanna Buehler, Save Lake Sammamish (through ’02)
- Joan Burlingame, Friends of Rock Creek Valley, Cedar River Council
- Walt Canter, Washington Association of Sewer and Water Districts
- Councilmember Dan Clawson, City of Renton
- Geoff Clayton, Greater Seattle Chamber of Commerce
- Michelle Connor, Seattle Citizen, Cascade Land Conservancy
- Councilmember Randy Corman, City of Renton (through ’03)
- Councilmember Don Davidson, City of Bellevue
- Troy Fields, Mid-Sound Fisheries Enhancement Group (started ’04)
- Mayor Ava Frisinger, City of Issaquah
- David Garland, Washington Department of Ecology
- Councilmember Dave Gossett, Snohomish County
- Councilmember Rich Gustafson, City of Shoreline
- Mayor Rosemarie Ives, City of Redmond
- Kirk Lakey, Washington Department of Fish and Wildlife
- Terry Lavender, Citizen (through ’03)
- Doug McClelland, Washington Department of Natural Resources
- Louise Miller, Citizen (started ’04)
- Willy O’Neil, Mid-Sound Fisheries Enhancement Group (through ’03)
- Margaret Pageler, former Co-Chair, former member, Seattle City Council (through ’03)
- Ray Power, The Boeing Company
- Max Prinsen, King Conservation District
- Linda Smith, U.S. Army Corps of Engineers
- Cleve Steward, Sustainable Fisheries Foundation
Frank Urabeck, Trout Unlimited

**Alternates:** Mayor Bob Bandarra, City of Bothell; Richard Bonewits, Greater Maple Valley Area Council; John Crull, Boeing Company; Mayor Patrick Ewing, City of Bothell; Deputy Mayor Don Gerend, City of Sammamish; Councilmember Gareth Grube, City of Woodinville; Councilmember Pat Hawkins, City of Clyde Hill; Councilmember Kathleen Huckabay, City of Sammamish; Mayor Laure Iddings, City of Maple Valley; Councilmember Jim Lauinger, City of Kirkland; Terry Lavender, Citizen; Councilmember Steve Litzow, City of Mercer Island; Councilmember Jim Pearman, City of Mercer Island; Councilmember Andrea Perry, City of Bothell; Councilmember Larry Springer, City of Kirkland; Deputy Mayor Cathy Wiederhold VonWald, City of Woodinville

**Facilitator for 2004 work sessions:** Tamie T. Kellogg, Consultant

The **WRIA 8 Forum** consists of elected officials representing each of the 27 local governments that signed an interlocal agreement to jointly fund salmon conservation planning in the Lake Washington/Cedar/Sammamish Watershed.

**WRIA 8 Forum members (current and past):**

- Councilmember Don Davidson, Committee Chair (started ’04), City of Bellevue
- Councilmember Jean Garber, Committee Vice Chair (starting ’04), City of Newcastle
- Councilmember Angela Amundson, City of Mountlake Terrace
- Mayor Bob Bandarra, City of Bothell (through ’02)
- Mayor Jeanne Berry, Town of Yarrow Point
- Councilmember Tim Clark, City of Kent
- Councilmember Dan Clawson, City of Renton (started ’04)
- Councilmember Jim Compton, City of Seattle (started ’04)
- Councilmember Paul Demetriades, City of Medina (through ’02)
- Mayor Donald Doran, City of Mukilteo
- Councilmember Tika Esler, City of Kenmore (through ’03)
- Mayor Patrick Ewing, City of Bothell (in ’03)
- Councilmember Ted Frantz, Town of Hunts Point
- Mayor Ava Frisinger, City of Issaquah
- Deputy Mayor Don Gerend, City of Sammamish (started ’04)
- Councilmember Dave Gossett, Snohomish County
- Councilmember Gareth Grube, City of Woodinville (through ’03)
- Councilmember Rich Gustafson, City of Shoreline
- Councilmember Pat Hawkins, City of Clyde Hill
- Councilmember Kathleen Huckabay, City of Sammamish (through ’03)
- Mayor Laure Iddings, City of Maple Valley
- Mayor Rosemarie Ives, City of Redmond
- Councilmember James Lauinger, City of Kirkland (started ’04)
- Councilmember Steve Litzow, City of Mercer Island (started ’04)
Acknowledgements

Mayor Charles Lowry, Town of Beaux Arts Village  
Mayor Mary Odermat, City of Medina (started ’04)  
Councilmember Roger Olstad, City of Lake Forest Park  
Councilmember Margaret Pageler, City of Seattle (through ’03)  
Councilmember King Parker, City of Renton (through ’03)  
Councilmember Jim Pearman, City of Mercer Island (through ’03)  
Councilmember Andrea Perry, City of Bothell (started ’04)  
Councilmember Lora Petso, City of Edmonds (through ’03)  
Councilmember Larry Phillips, King County  
Councilmember Michael Plunkett, City of Edmonds (started ’04)  
Councilmember Marcia Schwendiman, City of Kenmore  
Mayor Larry Springer, City of Kirkland, former committee chair (through ’03)  
Councilmember Jack Start, City of Mill Creek  
Deputy Mayor Cathy Weiderhold VonWald, City of Woodinville (started ’04)

Alternates:  Councilmember Carolyn Armanini, Lake Forest Park; Councilmember Betty Heckendorn, Beaux Arts Village; Councilmember John Hendrickson, City of Kenmore; Councilmember John Hudgins, City of Mill Creek; Councilmember David Irons, King County; Councilmember Jim Lauinger, City of Kirkland; Councilmember Conrad Lee, City of Bellevue; Councilmember Richard Marin, Edmonds; Councilmember Greg Misenar, Redmond; Councilmember Bob Ranson, Shoreline; Councilmember Marcia Schwendiman, Kenmore; Councilmember Ben Varon, City of Newcastle; Councilmember Nancy Whitten, City of Sammamish

The WRIA 8 Service Provider Team is housed in the King County Department of Natural Resources and Parks, and reports to the WRIA 8 Forum. The team was hired to provide watershed-based salmon conservation planning services under the interlocal cost-sharing agreement.

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Linda Grob, WRIA 8 Administrative Coordinator  
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Sally King, WRIA 8 Land Use Coordinator  
Jane Lamensdorf-Bucher, WRIA 8 Watershed Coordinator  
Debbie Natelson, WRIA 8 Outreach and Stewardship Coordinator  
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Julie Hall, City of Seattle

February 25, 2005
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Sarah McKearnan, City of Seattle
Brian Murray, King County
Debbie Natelson, WRIA 8 Outreach and Stewardship Coordinator
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Dennis Canty, Evergreen Consultants
Mike Schiewe, Anchor Environmental

Graphics staff:

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Sandy Kraus, King County Department of Natural Resources and Parks
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Cover photo: King County Water and Land Resources

The following committees, subcommittees, and working groups contributed to developing portions of the draft plan. Each is described briefly.

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Kit Paulsen, City of Bellevue
David St. John, King County

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Rika Cecil, City of Shoreline
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Laurie Devereaux, City of Bellevue
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February 25, 2005
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Kathy Minsch, Seattle Public Utilities  
Doug Rice, King County  
Dave Ward, Snohomish County  

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Chrys Bertolotto, City of Issaquah  

February 25, 2005
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Rika Cecil, City of Shoreline
Geoff Clayton, Greater Seattle Chamber of Commerce
Pam Cobley, consultant to City of Medina
Debra Crawford, City of Woodinville
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Maggie Glowacki, City of Seattle
Julie Hall, City of Seattle
Will Hall, formerly with Snohomish County
Keith Kurko, City of Seattle
Kirk Lakey, Washington Department of Fish and Wildlife
Terry Lavender, Citizen
Frank Leonetti, Snohomish County
John Lombard, Steward & Associates
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Linda Smith, U.S. Army Corps of Engineers
David St. John, King County
Ron Straka, City of Renton

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Curt Crawford, King County
Debra Crawford, City of Woodinville
Kathy Creahan, King County
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Hilary Culverwell, Puget Sound Action Team
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Chandler Felt, King County
Jonathan Frodge, King County
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Julie Hall, City of Seattle
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Glenn Kost, City of Bellevue
Terry Lavender, Citizen
Frank Leonetti, Snohomish County
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Brian Murray, King County
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Lisa Olson, Dept. of Ecology
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Michael Paine, City of Bellevue
Kit Paulsen, City of Bellevue
Harry Reinert, King County
Paul Reitenbach, King County
Kerry Ritland, City of Issaquah
Steve Roberge, City of Sammamish
Ann Root, Adolfson & Associates (consultant to Kenmore)
Peter Rosen, City of Issaquah
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David St. John, King County
Ron Straka, City of Renton
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Patrice Tovar, City of Kirkland
Richard Tucker, King County
Phyllis Varner, City of Bellevue
Brian Ward, City of Bellevue
Jeff Watling, City of Sammamish
Nancy Whitten, City of Sammamish
Craig Young, Snohomish County

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Scott Brewer, former Co-Chair, formerly with King County
Geoff Clayton, Greater Seattle Chamber of Commerce
Jeff Dillon, U.S. Army Corps of Engineers
Eron Drew, Northwest Indian Fisheries Commission
Maggie Glowacki, City of Seattle
Fred Goetz, U.S. Army Corps of Engineers
Julie Hall, City of Seattle
Ray Heller, King County
Kollin Higgins, King County
Doug Houck, King County
Keith Kurko, City of Seattle
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Andy Loch, City of Shoreline
John Lombard, Steward & Associates
Keith MacDonald, City of Redmond
Mike McDowell, MCS Environmental, Inc.
Mary Maier, King County
Alan Olson, R2 Resource Consultants, Inc.
Kit Paulsen, City of Bellevue (former co-chair)
Kerry Ritland, City of Issaquah
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Mike Schiewe, Anchor Environmental
Linda Smith, U.S. Army Corps of Engineers
Tom Waller, Washington Dept. of Transportation

Ad-hoc Site Specific Project Working Groups (groups of local jurisdiction staff and other experts convened, by subarea, to identify and evaluate site specific habitat protection and restoration projects for inclusion in the plan):

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Hans Berge, King County
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Leslie Betlach, City of Renton
Anne Bikle, King County
Richard Bonewits, Citizen
Duane Bowman, City of Edmonds
Dave Boyd, Groundswell NW
Geoff Bradley, City of Bellevue
joan burlingame, Cedar River Council
Terry Butler, King County
Carol Cap, City of Bellevue
Rika Cecil, City of Shoreline
Geoff Clayton, Greater Seattle Chamber of Commerce
Michelle Connor, Cascade Land Conservancy
Mike Crandell, King County
Laurie Devereaux, City of Bellevue
Paul DeVries, R2 Resource Consultants
Dan Dewald, City of Bellevue
Jeff Dillon, U.S. Army Corps of Engineers
Dan Eastman, King County
Sean Edwards, Snohomish County
Jim Erckmann, City of Seattle
Nancy Faegenburg, King County
Jonathan Frodge, King County
Bob Fuerstenberg, King County
Dave Garland, Wash. Dept. of Ecology
Maggie Glowacki, City of Seattle
Fred Goetz, U.S. Army Corps of Engineers
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Glossary

Adaptive management: Monitoring or assessing the progress in achieving specific objectives and incorporating what is learned into future management plans.

Adipose-clipped (ad-clipped): In order to distinguish hatchery origin fish, many hatchery managers remove the small fin on the back of hatchery raised fish.

Allee effects: Phenomenon wherein low population densities lead to further reduced fertility. In the presence of low population densities reduced fertility may result from, for example: (1) increased problems with locating mates in areas of low density, (2) increased inbreeding in areas of low population density, or (3) increased susceptibility to catastrophic events in low population densities.

Altered trophic interactions: Any change, either natural or unnatural, that results in a change in the feeding relationship of species in a community.

Altered hydrology: The influence of urbanization, and associated impervious surfaces, on infiltration of precipitation (rainfall) that increases the amount (volume) and rate (speed) that surface water runoff reaches aquatic areas.

Anadromous fish: Species that hatch in freshwater, mature in saltwater, and return to freshwater to spawn.

Anaerobic conditions: When water has low dissolved oxygen.

Anthropogenic modifications: Changes caused by humans.

Bank armoring or hardening: The addition of material to a shoreline that is not natural to the site. Bank armoring or hardening structures range from vertical walls to sloped rock rubble, and are put in place to prevent the loss of property landward.

Baseflow: That component of streamflow derived from groundwater inflow or discharge. Can be presented in a variety of measurement units including cubic feet per second (cfs) and inches (in).

Basin: The area of land that drains water, sediment, and dissolved materials to a common point along a stream channel.

Beach nourishment: Addition of sand to shorelines for recreational and shore protection benefits. Initiated by the Army Corps of Engineers in the 1960s the projects continue to place millions of sand of shorelines. Biological monitoring studies are currently being conducted on potentially adverse impacts, which include: reduced abundance of animals that inhabit the sediment, altered animal community structure, increased turbidity, and altered feeding habits among fishes of commercial, recreational, or ecological importance.
**Benthic:** Of, or pertaining to, animals and plants living on or within the substrate of a water body.

**Benthic invertebrate (B-IBI) monitoring:** Continuous assessment of the benthic environment to determine seasonal and annual variability and trends. B-IBI is a parameter or formula that describes in a single number the relative health of the benthic community. Invertebrates are animals without a backbone that lives on or below the surface of the sea bottom.

**Best management practices:** Methods, measures, and practices selected to reduce or eliminate adverse impacts, such as the introduction of pollutants from diffuse sources into receiving waters. Usually applied as a system of practices rather than a single practice.

**Bioengineering:** Combining structural, biological, and ecological concepts to construct living structures for erosion, sediment, or flood control.

**Biofiltration:** The process of reducing pollutant concentrations in water by filtering the polluted water through biological materials such as vegetation or bacteria in the soil column (e.g., water seeps through thick vegetation in a wetland buffer, through the wetland, and then into a stream).

**Biological diversity (biodiversity):** Variety and variability among living organisms and the ecological complexes in which they occur; encompasses different ecosystems, species, and genes.

**Buffer, riparian or wetland:** A designated area adjacent a stream or wetland that is a integral part of the stream or wetland ecosystem. The critical functions of a buffer (associated with an aquatic systems) include shading, input or organic debris and coarse sediments, uptake of nutrients, stabilization of banks, interception of fine sediments, stormflow attenuation during high water events, protection from disturbance by humans and domestic animals, maintenance of wildlife habitat, and room for variation of aquatic system boundaries over time due to hydrologic or climatic effects.

**Channel:** A surface feature that conveys surface water and is open to the air. Channels can either be artificially constructed or natural systems such as streams, creeks, or swales.

**Channel complexity:** In streams, LWD increases the complexity of pool and riffle sequences and alters stream gradient on a local scale. The increase in channel complexity helps retain gravel as well as organic and inorganic particulate matter. Increased channel complexity is particularly important for fish species that use pools and gravel deposits for spawning and rearing.

**Channel confinement:** Bank armoring or hardening by levees or rip rap confine the river or stream channel. This prevents interaction with the floodplain area.
**Channel migration zone:** Those areas subject to risk due to stream bank destabilization, rapid stream incision, stream bank erosion, and shifts in location of the channel.

**Channel incision:** Downcutting of the stream or river channel below normal shoreline banks causing separation from floodplain and riparian areas.

**Channel stability:** Tendency of a stream channel to stay within its existing location and confinement.

**Channelization:** Straightening the meanders of a river; often accompanied by placing riprap or concrete along banks to stabilize the system.

**Channelized stream:** A stream that has been straightened, runs through pipes or revetments, or is otherwise artificially altered from its natural meandering course.

**Coded wire tagging:** Single tags are cut from rolls of wire by a device that hypodermically implants them into the snout of juvenile Chinook salmon.

**Connectivity:** A measure of the extent that conditions between different areas of similar or related habitat provide for successful movements of fish or wildlife species, supporting populations on a landscape level.

**Conservation easement:** A legal agreement between a landowner and a qualified conservation organization that permanently limits a property’s uses in order to protect its conservation values.

**Core production subarea:** Subarea where chinook salmon are present on an annual basis. The core production subarea represents the center of (highest) abundance for each population affiliation (for spawning, rearing, and migration areas).

**Cumulative effectiveness monitoring:** Monitoring to determine if the sum of all actions within a basin or across the watershed are improving habitat and salmon population conditions.

**Deciduous vegetation:** Trees or shrubs that shed leaves at the end of their growing season.

**Degradation:** The lowering of the streambed or widening of the stream channel by erosion. The breakdown and removal of soil, rock and organic debris.

**Depensatory (allee) effects:** By inoculating a significant proportion of potential hosts, programs seek to cause the extinction of the disease organism. When the density of disease organisms is low enough, a positive feedback between density reduction and the rate of population decline leads to eradication. A potential depensatory mechanism
in sturgeons and other broadcast spawners is the decline in egg fertilization rates as
spawning aggregations become smaller.

**Direct effectiveness monitoring:** monitoring to determine if actions are having the
anticipated outcomes.

**Diversity:** Variation that occurs in plant and animal taxa (i.e., species composition),
habitats, or ecosystems.

**Ecosystem:** A natural system composed of component organisms interacting with their
environment.

**Ecosystem Diagnosis and Treatment (EDT) Method:** EDT includes a model that
computes the relative survival of salmon populations along life history pathways and across
habitat conditions. To do this, the model assesses the “biological performance” (including
life history diversity, productivity, and capacity) of salmon in response to approximately 45
habitat attributes. Using these relationships between habitat and survival, EDT can be
used to evaluate the relative effectiveness of actions proposed to meet watershed goals.
EDT by itself does not provide population predictions – rather, it evaluates the potential of
habitat to support the population.

**Effective impervious surface:** A surface area that either prevents or retards the entry of
water into the soil mantle as under natural conditions prior to development; and/or a surface
area that causes water to run off the surface in greater quantities or at an increased rate of
flow from the flow present under natural conditions.

**Egg incubation:** Egg development in all five species of Pacific salmon is similar. At a
constant temperature of 10°C the incubation period among eggs of the five species of
salmon ranges from about 47 - 65 days. There are thirty stages of embryonic
development from fertilization to hatching and characteristics identifying each stage.

**Endocrine:** Refers to the system of glands that secrete hormones directly into the
bloodstream. These hormones regulate many body processes.

**Episodic:** Chinook salmon are present infrequently and may not be present or observed
during the typical 4- to 5-year life cycle. This indicates that when fish are observed, they
are strays from another production area and not necessarily the progeny of natural
production from the area in question.

**Escapement Index:** The number of fish that have survived all causes of mortality and
will make up the spawning populations.

**Estuary:** A partly enclosed coastal body of water that has free connection to open sea,
and within which seawater is measurably diluted by fresh river water.
**Evapotranspiration:** Soil evaporation is a direct pathway for water to move from soil to the atmosphere as water vapor. Plant transpiration is evaporation of water from leaf and plant surfaces. Transpiration is the last step in a continuous water pathway from soil, into plant roots, through plant stems and leaves, and out into the atmosphere.

**Evolutionarily significant unit (ESU):** The geographic scale used by the National Marine Fisheries Service to distinguish salmon populations that share similar genetic, ecological, and life history traits, but differ in important ways from salmon in other ESUs.

**Factor of decline:** Natural and anthropogenic factors that contribute to the decline of salmonids. These not only include climate and ocean conditions and natural predation but also the factors that are more commonly thought to be within human control such as habitat modification, harvest, hatchery practices, and introduction of non-native species.

**Fingerlings:** A life-cycle stage when young salmonids are one pine-needle, or finger, in length. Some fingerlings begin their journey to the ocean, others mature in the rivers of lakes.

**Flashiness:** The ratio of flow that is exceeded 90% of the time to the flow exceeded 10% of the time (90:10 ratio) is indicative of the flashiness of variability.

**Flow gauging:** In stream mechanical or electronic equipment for measuring stream flow values: velocity measurements, backwater calculations, or high flows.

**Flow regime:** Characteristics of stream discharge over time. Natural flow regime is the regime that occurred historically.

**Freshwater lens:** The hydrographic structure of the surface water column used by juvenile salmon. A freshwater lens (water layer) over a colder, more saline (denser) layer may change to mixed structure throughout the period that juvenile salmon use the nearshore and strait habitats.

**Fry:** A free-swimming, juvenile salmonid that has recently emerged from the gravel and has fully absorbed its yolk sac.

**Fry colonization:** Stocking programs using fry for salmon colonization of river or stream reaches.

**Geographic information systems (GIS):** Computer based mapping systems for spatial data.

**Geomorphology:** Study of the form and origins of surface features of the Earth.

**Groundwater:** Underground water stored in aquifers. Groundwater is created by rain that soaks into the ground and flows down to a point where the ground in not permeable. Groundwater then usually flows laterally toward a river, lake, or other receiving water.
Glossary

*Groundwater inflow:* The subsurface flow of water.

*Habitat:* The specific area or environment in which a particular plant or animal species lives. An organism’s habitat must provide all the basic requirements for life and should be protected from harmful contaminants. A species may require or use more than one type of habitat to complete its life cycle.

*Habitat assessments:* the biological and physical inventory of a site that is evaluated for its habitat values.

*Habitat capacity:* Maximum average number or biomass of organisms that can be sustained in a habitat over the long term. Usually refers to a particular species, but can be applied to more than one.

*Habitat complexity:* The number of habitat components that work together to form habitat determine the complexity, such as pools, large woody debris, and riparian edge habitat.

*Habitat Conservation Plan (HCP):* As defined under Section 10 of the federal Endangered Species Act, a plan required for issuance of an incidental take permit for a listed species. HCPs can address multiple species, both listed and unlisted. HCPs provide for the conservation of the species addressed, and provide certainty for permit applicants through an implementation agreement between the Secretary of the Interior, or Secretary of Commerce, and a non-federal entity.

*Headwaters:* The source of a stream or stream system.

*Hydrograph:* Chart of water levels over time.

*Hydrology:* Study of the properties, distribution, and effects of water on the Earth’s surface, subsurface, and atmosphere.

*Hydromodification:* The channelization and armoring of natural banks to prevent flooding or to protect stream-adjacent property and structures from erosion; navigation activities (ditching, dredging, and channel straightening); anthropogenic alterations in channel morphology (platform, cross-sectional area, bed and bank configuration); and anthropogenic changes in the amount of in-channel large woody debris.

*Hypothesis:* A theory needing investigation; a tentative explanation for a phenomenon, used as a basis for further investigation.

*Impervious surface:* Any surface that does not allow water to percolate naturally into the ground.

*Implementation monitoring:* Monitoring to determine if actions are being implemented as planned.
Independent populations: Any collection of one or more local breeding units whose population dynamics or extinction risk over 100-year time period are not substantially altered by exchanges of individuals with other populations.

Infiltration: The process of a fluid permeating (passing through) a substance, such as soils, gravels, or vegetative matter.

Integrated hatchery management: A hatchery program is an integrated type if the intent is for the natural environment to drive the adaptation and fitness of a composite population of fish that spawns both in a hatchery and in the wild.

Land-cover classification: The allocation of items to groups according to land-cover types, e.g., forest, rock, agricultural lands, wetlands, urbanized.

Large woody debris (LWD): Large pieces of wood in or partially in stream channels, including logs, pieces of logs, rootwads of trees, and other large chunks of wood. LWD provides streambed and bank stability and habitat complexity. LWD is also referred to as coarse woody debris (CWD). Either term usually refers to pieces at least 20 inches (51 cm) in diameter.

Levees: An artificially elevated portion of the riverbank, built to contain floodwaters.

Lentic systems: Systems of standing waters, such as lakes, ponds, and some wetlands.

Life history diversity: Patterns of variation seen among species that indicate the existence of very different life history strategies.

Limiting factor: Single factor that limits a system or population from reaching its highest potential.

Littoral zone: The shallow region of a lake or pond, to a depth of about 3 feet, which may have highly productive emergent macrophytes (large plants) that utilize the resources of both the terrestrial and aquatic habitats.

Lotic: Flowing water, such as streams and river systems.

Low flows: Flow volume is below the natural flow regime, stream discharge over time, that occurred historically.

Mass marking: see adipose-clipped.

mg/L: milligrams per liter. For dissolved oxygen concentrations in water it may also be expressed as parts per million (ppm).

Migratory corridors: Any area through which fish migrate on their way upstream or downstream.
**Mitigation:** Methods of reducing adverse impacts of a project. The use of any or all of the following actions (listed in descending order of preference (KCC 21.04)): (1) Avoiding the impact altogether by not taking a certain action or parts of an action; or (2) minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts; or (3) Rectifying the impact by repairing, rehabilitating, or restoring the affected sensitive area; or (4) reducing or eliminating the impact over time by preservation or maintenance operations during the life of the development proposal; or (5) compensating for the impact by replacing, enhancing, or providing substitute sensitive areas; or (6) monitoring the impact and taking appropriate corrective measures.

**Mitigative factors:** see above.

**Multi-spectral analyses:** The spectral signatures (reflected light data for each pixel recorded in aerial imagery) of various vegetation and substrate types (for example, mud and sand) help identify areas to determine the composition of the plant community. High levels of spectral resolution (19 values or more) enable scientists to differentiate between key vegetative species, such as sedges and rushes, to distinguish potentially high-quality salmonid habitat.

**Native:** Occurring naturally in a habitat or region; not introduced by humans.

**Natal stream:** Stream of origin where salmon are hatched.

**Nearshore marine zone:** Habitats that lie between the lower limit of the photic zone (approximately at minus 30 meters mean lower low water) and the upland-aquatic interface.

**Non-native species:** A species that does not occur naturally in a habitat or region.

**Non-point source pollution:** Polluted runoff from sources that cannot be defined as discrete points, such as areas of timber harvesting, surface mining, agriculture, and livestock grazing.

**Noxious weeds:** Non-native plants that have been introduced accidentally or as ornamentals that spread quickly, displace desirable plant species, and are extremely difficult to control.

**Nutrients:** Essential chemicals needed by plants or animals for growth or sustaining life. Excessive amounts of nutrients can lead to degradation of water quality and the growth of excessive numbers of algae. Some nutrients can be toxic at high concentrations.

**Phenotypic attributes:** Phenotypic/genetic differences that characterize hatchery stocks and natural-origin fish. These attributes help determine if rearing environment (hatchery or wild) is the principal factor that directs early physiological and
immunological development - with respect to population viability - irrespective of population ancestry.

**Physiological transitions:** See transition zone.

**PIT tags:** PIT tags are tiny identification chips which are injected into specimens for permanent identification. The chip is read by means of a reader which provides a unique code read out of the chip implanted in the specimen.

**Planning targets:** The planning target provides a specific measure within a range that is helpful for evaluating Chinook populations recovery actions in habitat, harvest, and hatcheries. The target predicts the abundance and productivity of a salmon population based on a fully functioning estuary, improved freshwater conditions, restored access to blocked habitats, and poor ocean conditions.

**Populations:** The group of fish spawning in particular lake(s) or stream(s) at a particular season that to a substantial degree do not interbreed with any group spawning in a different place, or in the same place at a different season

**Pre-spawn migrants:** The life stage of a salmon when moving into freshwater areas to spawn.

**Pre-spawn holding:** The life stage of a salmon just prior to spawning when they have returned to spawning grounds.

**Properly functioning conditions (PFC):** State of the physical, chemical, and biological aspects of watershed ecosystems which will sustain a healthy salmonid population(s). Properly functioning condition defines a range of values for several measurable criteria rather than specific, absolute values. The range of these values may vary from watershed to watershed based upon a variety of factors, e.g., geology, hydrology, and stream geomorphology, and the improved understanding of how these factors shape ecosystem functions.

**Reach:** see stream reach.

**Redds:** Nests made in gravel (particularly by salmonids); consisting of a depression that is created and then covered.

**Refuge areas:** Areas that provide protection to a species from predators.

**Resident fish:** Fish species that complete their entire life cycle in freshwater.

**Retention/detention facilities:** A type of drainage facility designed either to hold water for a considerable length of time and then release it by evaporation, plant transpiration, and/or infiltration into the ground, or to hold surface water and stormwater runoff for a
short period of time and then release it to the surface water and stormwater conveyance system.

**Revetments:** An artificially protected or armored portion of the riverbank, typically a rock-lined face, that helps prevent erosion but does not provide protection from overtopping.

**Riparian:** Type of wetland transition zone between aquatic habitats and upland areas. Typically, an area on or by land bordering a stream, lake, tidewater, or other body of water.

**Riprap:** A facing layer or protective mound of stones placed to prevent erosion or sloughing of a structure or embankment due to the flow of surface water and stormwater runoff.

**Runoff:** Water originating from rainfall and other precipitation that is found in drainage facilities, rivers, streams, springs, seeps, ponds, lakes, and wetlands as well as shallow ground water.

**Salmon:** Includes all species of the salmonid family.

**Salmonid:** Fish of the family Salmonidae, including salmon, trout, char, and bull trout.

**Satellite streams:** Chinook salmon are present most years (more than half the years of a typical 4- to 5-year life cycle) but are less abundant than in core areas. Records are more incomplete, conservation efforts are inconsistent among potential satellite areas, and methods of enumeration vary.

**Sediment load:** Material carried in suspension by water, which will eventually settle to the bottom.

**Sediment transport:** The act of transporting a load of sediment from a stationary source location through a channel by streamflow to a location of deposition.

**Segregated hatchery management:** A segregated stock is intended to have minimal influence from and on surrounding natural stocks; interbreeding between hatchery and wild fish is minimized.

**Side channel:** A portion of an active channel that does not carry the bulk of stream flow. Side channels may carry water only during high flows, but are still considered part of the total active channel.

**Shoreline accretion:** The geologic process of filling and raising shoreline by depositon of material eroded and transported from other areas.
**Shoreline softening:** A nonstructural approach to preventing loss of upland property. Usually refers to the placement of beach material or vegetation management at the shore.

**Smolt:** Juvenile salmon migrating seaward; a young anadromous trout, salmon, or char undergoing physiological changes that will allow it to change from life in freshwater to life in the sea. The smolt state follows the parr state.

**Smolt flumes:** Fish passage facilities installed at the Ballard Locks to improve safe passage of juvenile salmon through the Locks area.

**Smolt traps:** A smolt trap is a standardized method of quantifying how many fish are moving through a water system.

**Snorkel surveys:** An in stream survey method using snorkel equipment to view fish use of habitat such as log jams.

**Source control best management practices:** Water pollution control best management practices that address adverse impacts from point source (direct) and non-point source (diffuse) pollution. See also best management practice.

**Spawning aggregations:** Geomorphic features (barriers, canyons, large tributary junctions and eroding cliffs) were strong determinants of the location of Chinook spawning areas.

**Strays:** Non-native fish from hatchery escapements.

**Stock:** Group of fish that is genetically self-sustaining and isolated geographically or temporally during reproduction. Generally, a local population of fish. More specifically, a local population – especially that of salmon, steelhead (rainbow trout), or other anadromous fish – that originates from specific watersheds as juveniles and generally returns to its birth streams to spawn as adults.

**Stream reach:** A segment of a stream that has beginning and end points selected for some specific characteristic.

**Substrate:** Refers to the class or type of material (for example, sand, gravel cobble) beneath the water column.

**Temperature stratification:** Refers to the stratification of lakes and reservoirs into layers of water with different temperatures and densities. Usually occurs in spring and early summer when the combination of solar heating and mixing of near-surface water layers by the wind brings about the warming of the upper portion of the lake water column.
**Thermal migration barriers:** Impediments to fish migration caused by high water temperatures.

**Transition zone:** Refers to an area in which species migrating between ecological zones undergo biological changes in order to adapt to another ecosystem. For Northwest salmon, the nearshore zone is known as a transition zone as salmon acclimate to more saline waters (if out-migrating) or non-saline waters (if in-migrating).

**Urban growth area:** A political boundary in which urban growth is encouraged and concentrated via management plans.

**Validation monitoring:** Monitoring to determine if the salmon population is increasing in productivity, abundance, distribution, and diversity; and what are the cause and effect relationships between actions and fish population changes.

**Viable Salmonid Population (VSP):** An independent population of any Pacific salmonid that has a negligible risk of extinction due to threats from demographic variation, local environmental variation, and genetic diversity changes over a 100-year time frame.

**Watershed:** Entire area that contributes both surface water and underground water to a particular lake or river.

**Watershed rehabilitation:** Used primarily to indicate improvement of watershed condition or certain habitats within the watershed. Compare watershed restoration.

**Watershed restoration:** Reestablishing the structure and function of an ecosystem, including its natural diversity; a comprehensive, long-term program to return watershed health, riparian ecosystems, and fish habitats to a close approximation of their condition prior to human disturbance.

**Weir:** Device across a stream to divert fish into a trap or to raise the water level or divert its flow. Also a notch or depression in a dam or other water barrier through which the flow of water is measured or regulated.

**Wild stock:** A stock that is sustained by natural spawning and rearing in the natural habitat regardless of origin.
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