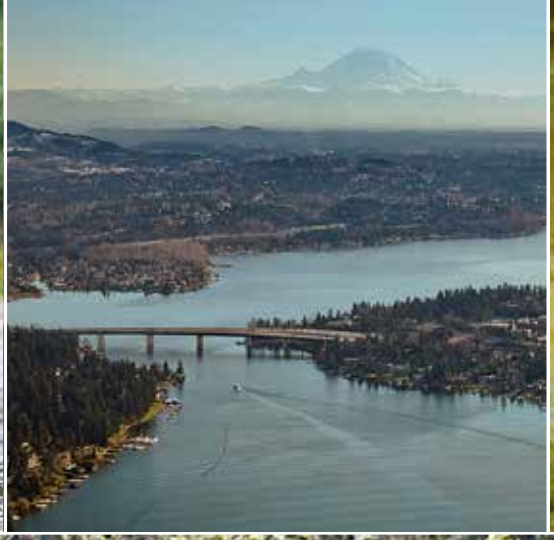


FEBRUARY 2016

Lake Washington/
Cedar/Sammamish
Watershed
Chinook Salmon
Conservation Plan

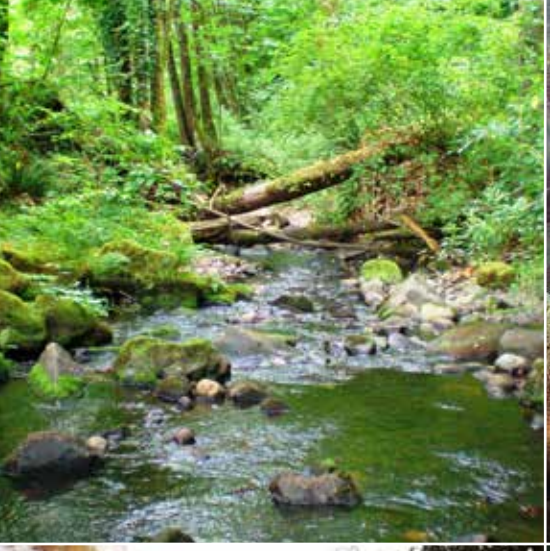
IMPLEMENTATION PROGRESS REPORT

2006–2015

SALMON & PEOPLE LIVING TOGETHER

Adapting to Change in our Watershed

LAKE WASHINGTON • CEDAR SAMMAMISH WATERSHED






Contents






Figures

SALMON & PEOPLE LIVING TOGETHER

The Lake Washington/Cedar/ Sammamish Watershed

The Lake Washington/Cedar/Sammamish Watershed Chinook Salmon Conservation Plan guides our efforts to create a future where people and salmon can live together. This report documents our progress during the first 10 years of plan implementation.

Introduction

This is an exciting time in salmon recovery. After more than a decade implementing habitat protection and restoration projects in the Lake Washington/Cedar/Sammamish Watershed (a.k.a. Water Resource Inventory Area, or WRIA 8), our partners have accomplished much and have learned many lessons along the way. Since 2006, over 85 projects have been completed, and another 90 projects are being implemented or advancing toward implementation. In that time, we have guided the investment of nearly $11.3 million in state and federal funding and over $13.4 million in local funding. What's more, we have many committed partners who have invested significant additional funding and resources to support recovery of Chinook salmon.

After 10 years we can report progress on many of our ambitious 10-year goals for Chinook salmon in our watershed. The number of juvenile Chinook produced in our watershed per returning adult has increased dramatically in recent years, exceeding our 10-year goals. The number of adult Chinook salmon returning to the watershed, while highly variable, is on an upward trend. This is encouraging. But we are still falling short of some near-term goals, and overall salmon population numbers are still far short of a level that would consistently support sustainable populations year-to-year and fulfill treaty-guaranteed tribal fishing rights. We are moving in the right direction, but there is still much to do.

We continually track and monitor our watershed's salmon populations and our progress implementing habitat protection and restoration projects. This allows us to see what is working and enables us to hone our strategies and priorities. Moving forward, we can build on progress to date, but we also know that our ability to recover salmon faces significant challenges.

"Salmon recovery in our watershed has galvanized local communities. I am proud of the partnership between local governments that is working to implement common priorities and how much has been accomplished. People recognize that working to protect and restore habitat for salmon and watershed health is essential to our region's vitality, health, and identity. If we are to keep the Pacific Northwest a place where people want to live and work, especially in the face of a changing climate, we need to build on our successes and strengthen our resolve to recover salmon."

- Larry Phillips,
King County Councilmember
and WRIA 8 Salmon
Recovery Council Chair

For example:

- Limited funding and the capacity of partners to develop projects continue to inhibit progress.
- Our watershed is the most populous in the state and our region one of the fastest growing in the country, putting pressure on areas important to healthy salmon runs.
- Land use decisions made here will determine whether we can protect and restore salmon habitat.

WRIA 8 partners have a unique opportunity to raise public awareness about the importance of salmon recovery, but we will face a tremendous challenge in maintaining political will and public support for salmon recovery as our population grows.

WRIA 8 is a leader in salmon recovery, and a regional model for collaborative, shared, and coordinated planning and implementation. Since 2000, members of the WRIA 8 Salmon Recovery Council, and its supporting staff and committees, have worked to ensure our watershed remains a quintessentially Northwest place where salmon return each fall—a place where salmon and people can live together. Trying to bring Chinook and other salmon back to harvestable levels in our urbanized watershed requires both optimism and resolve.

In 2015, recognizing the habitat protection and restoration progress made over the past decade, the resulting benefits to local communities, and the efficiency of working together, 28 local government partners in the watershed recommitted to coordinated salmon recovery for another 10 years. In 2016, WRIA 8 will update its Chinook Salmon Conservation Plan, incorporating new scientific information and lessons learned from over a decade of implementation.

People and salmon have interacted in this watershed for thousands of years. If we lose salmon in our local streams and rivers, we lose a part of what makes us Northwesterners. Salmon have shown they are resilient and adaptable. We must continue to adapt as well to give them a fighting chance.

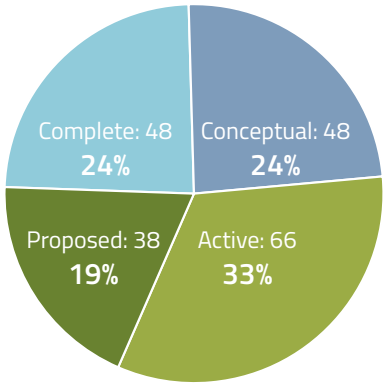
Habitat Implementation Progress

Progress implementing the habitat protection and restoration projects in the WRIA 8 Plan includes the following (Note: these figures likely under-represent actual progress due to the difficulty of tracking partner actions implemented without WRIA 8 funding):

- Acres protected through acquisition, conservation easement, or some other protective mechanism: **1,547** (plus acres protected before Plan: **1,281**)
  - Acres protected in the 100-year floodplain: **308**
- Miles of levee removed or set back: **0.90**
  - Acres of floodplain reconnected to a river: **76.6**
- Miles of streambank protected: **11.8** (plus miles protected before Plan: **2.3**)
- Acres of riparian areas treated for invasive species removal: **510**
- Miles of streambank treated for invasive species removal: **13.2**
- Linear feet of lakeshore armoring removed/ restored: **6,580**

Start List Implementation Progress

(Includes projects added since 2005)



The first 10 years of the WRIA 8 Plan – expectations and implementation

The Lake Washington/Cedar/Sammamish Watershed Chinook Salmon Conservation Plan (WRIA 8 Plan) offers a comprehensive set of recommendations for protecting and restoring salmon habitat throughout the watershed. It is an ambitious document, developed by watershed partners after Chinook salmon were listed as threatened under the Endangered Species Act (ESA) in 1999. After being adopted by 27 local governments in 2005, the plan was approved by NOAA Fisheries in january 2007 as a local chapter of the *Puget Sound Salmon Recovery Pla*n. The WRIA 8 Plan's recommendations focus on habitat protection and restoration, land use and planning, and outreach and education.

Habitat protection and restoration

The WRIA 8 Plan was created with input from numerous stakeholders and provides a science-based roadmap for protecting and restoring spawning, rearing, and migratory habitat for Chinook salmon. Local governments, tribes, and other partners had already been leading habitat protection and restoration efforts for many years; adopting the WRIA 8 Plan in 2005 established shared priorities for preventing further decline of Chinook habitat and restoring degraded habitat across the watershed.

The full list of restoration and protection projects in the WRIA 8 Plan is referred to as the Comprehensive List, comprising nearly 600 actions throughout the watershed considered necessary to achieve recovery in the long term. Projects include physical restoration (targeting instream, riparian, and floodplain processes), as well as property acquisition to protect functioning habitat and enable future restoration. In many cases,

The ambitious **Rainbow Bend** project, completed in 2013, took place in stages over 10 years, involved a diverse set of funding sources, and provided both flood risk reduction and salmon habitat restoration along the Cedar River. Large-scale restoration projects are often only possible following land acquisition, which requires a committed effort and significant resources.

especially along the Cedar River and larger stream systems, acquisition can help meet other objectives—including flood risk reduction and enhancing resilience to climate change.

To protect and restore the habitat necessary for salmon recovery in WRIA 8, the Plan set an ambitious funding goal of securing over $17 million annually from federal, state, and local sources. This goal assumed 2005 spending levels from these sources would not only continue, but would increase to bolster our ability to implement recovery actions.

Ten years of project implementation (2006 – 2015)

Project implementation has focused on the Start List, a subset of actions from the Comprehensive List intended to provide focus for the first 10 years of project work.

The Start List is a living list and is regularly updated to reflect changes in project status and add projects that are ready to advance. Currently the list contains 200 projects. Of these, 48—or 24%—are complete, 33% are either underway or partly complete, and 19% are proposed for implementation (see pie chart on page 6).

Tracking implementation of projects from the Start List does not tell the full story of WRIA 8 Plan implementation, however. Watershed partners have also completed an additional 40 actions from the Comprehensive List, bringing the total number of projects implemented from the WRIA 8 Plan to 88 (69 restoration projects and 19 acquisition projects). Another 25 projects on the Comprehensive List are actively moving toward implementation. Combined with the active projects from the Start List, 17% of nearly 600 Comprehensive List projects are actively moving toward implementation.

In general, implementation of Chinook recovery projects in WRIA 8 has proceeded more slowly than envisioned when the WRIA 8 Plan was adopted, largely due to inadequate funding, reduced capacity among partners to develop and prepare projects for implementation, and the complexities of implementing habitat protection and restoration projects—especially in an urbanized watershed. Nevertheless, WRIA 8 partners continue to make progress toward the watershed's habitat restoration and protection objectives, improving conditions for Chinook and other salmon species.

The City of Issaquah and the Washington Department of Fish and Wildlife worked together **to remove a deteriorating diversion dam from Issaquah Creek** in 2013. Built in the 1930's to supply water to the Issaquah Salmon Hatchery, the dam blocked salmon access to eleven miles of high quality habitat. The project replaced the dam with a series of rock weirs, and included streamside plantings, placement of woody debris, and construction of a new fish-friendly water intake for the hatchery.

In the early years of plan implementation, WRIA 8 partners focused on acquiring land to protect existing high quality habitat. Ten years later, property acquisition is still a priority, but is now focused on acquiring streamside parcels to facilitate restoration projects that reconnect rivers and streams to the floodplain. Floodplain reconnection provides important off-channel habitat for juvenile Chinook salmon looking for food and places to rest, and is one of the most important salmon recovery actions identified in the WRIA 8 Plan. Acquisitions have enabled significant progress on large-scale restoration activities in recent years that will offer enhanced rearing opportunities for young salmon within the watershed.

Some key efforts to remove barriers to fish passage have significantly improved access to habitat throughout the watershed:

- Since 2000, WRIA 8 has worked with the Army Corps of Engineers to make temporary infrastructure and operational improvements to improve fish passage at the Hiram M Chittenden (a.k.a. Ballard) Locks.
- In 2003, Seattle Public Utilities enabled Chinook to pass above the Landsburg Diversion Dam into the upper reaches of the Cedar River, making available more than 17 miles of high quality habitat.
- In 2012, Adopt A Stream Foundation and the City of Woodinville removed culverts on Little Bear Creek that improved salmon access to 32 miles of upstream habitat.
- In 2013, the City of Issaquah and Washington Department of Fish and Wildlife removed the Issaquah Hatchery Intake Diversion Dam, opening up over 11 miles of high quality spawning habitat in upper Issaquah Creek.

Funding for salmon recovery implementation

The WRIA 8 Plan acknowledges that its annual funding goal for implementation is ambitious, and recognizes the difficulties of maintaining long-term support for salmon recovery funding. Over the past 10 years, funding has fluctuated from one budget cycle to the next. While funding has fallen short overall, some promising trends have developed in the last few years.

Primary WRIA 8 grant funding

Grants are a key funding source for habitat protection and restoration projects in WRIA 8. Since the Chinook listing in 1999, the Washington State Salmon Recovery Funding Board (SRFB) has provided crucial funds for project implementation. This funding source includes federal dollars from the Pacific Coastal Salmon Recovery Fund (PCSRF) along with state

FiGURE 1. WRIA 8 map

WRIA 8 Project Status

- Completed
- Active

Priority Tiers

- Tier 1
- Tier 2

- WRIA 8 boundary
- River
- Stream
- Major road
- Lake
- Incorporated area

N

0 2 4 6 Miles

January 2016

REDMOND
BELLEVUE
SAMMAMISH
ISSAQUAH
MAPLE VALLEY
Lake Sammamish
Cedar River

WRIA 8 Facts:

Area: **692 square miles**

Marine shoreline: **38 miles**

Major river systems: **Cedar and Sammamish**

Lakes: **Washington and Sammamish**

Fish-bearing streams: **359 miles**

Protected forest and recreational lands: **100,000+ acres**

Salmon populations: **Chinook, coho, sockeye, steelhead, bull trout**

Population: **1.4 million**

Cites: **26**

Counties: **2**

Congressional districts: **1,2, 7, 8, 9**

Legislative districts: **1,5,11, 13, 21, 23, 31, 32, 36, 37, 38, 41, 43, 44, 45, 46, 47, 48**

matching funds. While SRFB funds have been available each year, the total is far less than the WRIA 8 Plan anticipated, due largely to reduced federal and state funding support. Since 2006, WRIA 8 has received over $4.2 million in SRFB funds to allocate to priority projects.

The Puget Sound Acquisition and Restoration (PSAR) fund is another essential source of funding for salmon recovery in Puget Sound watersheds. Consistent with their focus on restoring the health of the Sound, the state legislature has supported PSAR in each biennial budget since 2007—a much-needed funding source for salmon recovery. However, the amount of funding for PSAR has varied dramatically. To date, WRIA 8 has received over $7 million in PSAR funding for priority projects.

Both SRFB and PSAR are vital sources of funds to implement priority recovery actions, but neither is guaranteed. Support at the federal level for PCSRF and at the state level for salmon recovery capital funding and PSAR is essential to salmon recovery in the years ahead.

Grant funds from local sources are equally important to funding WRIA 8 implementation and can help leverage federal and state grants. From the late 1990s until 2011, the King Conservation District (KCD) provided a substantial local investment in salmon recovery—nearly double the amount anticipated by the WRIA 8 Plan. Like SRFB and PSAR funding, KCD dollars were allocated to WRIA 8 and awarded through a competitive grant process involving local technical review and WRIA 8 Salmon Recovery Council approval.

Since 2012, the King County Flood Control District has provided this local funding through its Cooperative Watershed Management (CWM) grant program. Notably, the Flood Control District instituted annual adjustments to keep pace with inflation beginning in 2014, significantly boosting local grant funds. In addition to protection and restoration, the CWM program funds outreach and education as well as critical monitoring needs.

Other grants and funding trends

In addition to the grant programs for which WRIA 8 is directly involved in review and approval, other funds are available for salmon habitat restoration and protection. Most importantly, local jurisdictions contribute significant amounts from utility and surface water management fees and use these funds to leverage grants that advance recovery priorities. Other important local funding sources include the King County Conservation Futures and Parks Levy grant programs. State and federal grants that can help advance recovery goals include the Estuary and Salmon Restoration Program, Aquatic Lands Enhancement Account, Washington Wildlife and Recreation Program, and National Estuary Program.

In the last two state funding cycles, the legislature set aside significant amounts for the Coordinated Investment in Puget Sound Floodplains, now called Floodplains by Design. The program awarded $4.1 million in 2013-15 and $5 million in 2015-17 for priority floodplain acquisition and restoration on the Cedar River.

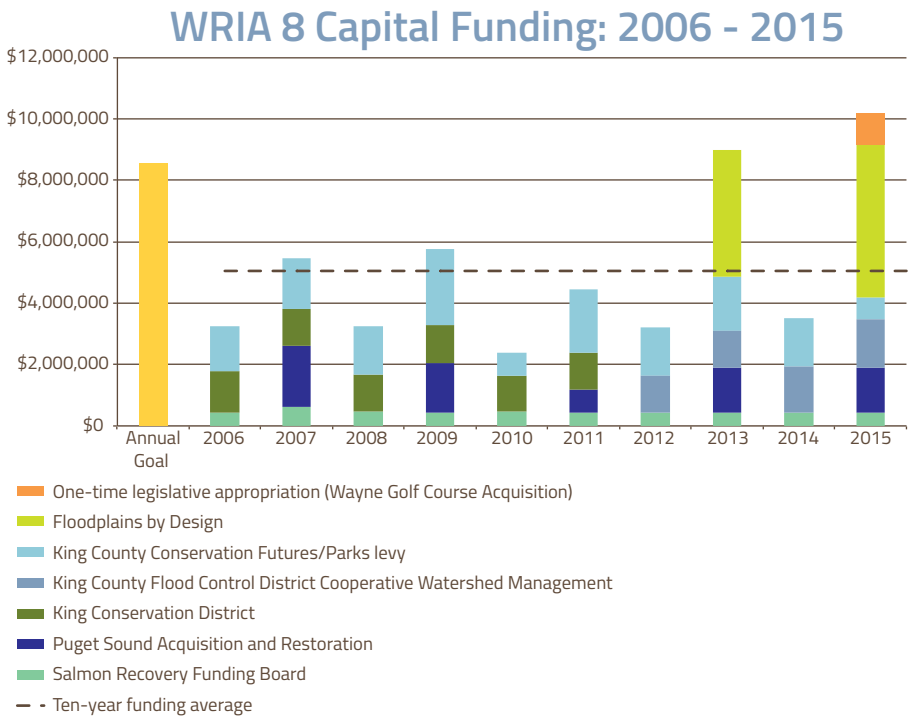


FIGURE 2. WRIA 8 capital funding

Funding challenges and prospects

Salmon recovery funding and, as a consequence, implementation of the WRIA 8 Plan, have not consistently kept pace with the ambitious goals set 10 years ago. The plan's funding strategy offered an optimistic view of the future that, until recently, was largely unrealized. Moreover, WRIA 8 partners have not had sufficient staff to develop restoration concepts into viable projects to implement and manage them. Additionally, local priorities may not always favor voluntary restoration activities over other capital projects or mitigation needs, especially when budgets are tight.

In the 2013 and 2015 state legislative funding cycles—both challenging budget years—new funding emerged that helped us achieve our watershed restoration and protection funding goals for the first time. While not focused explicitly on salmon recovery, the new Floodplains by Design program provided a significant injection of funding that supports our efforts, specifically those projects intended to restore floodplain processes. Changes are also underway that will guide the allocation of the Environmental Protection Agency's National Estuary Program funding, which may offer opportunities to further advance our work.

We will continue to rely on state and federal lawmakers to provide critical resources and on local leaders to champion our restoration and protection projects. The pace of habitat restoration and protection will continue to be subject to resource availability, and as project complexity increases, funding challenges may become more apparent. Nevertheless, a solid foundation is in place to enable us to expand on our progress so far.

"Strong investments in a sustainable salmon population are critically important to the economic, cultural and recreational identity of Washington State, and they're also an important part of our federal obligation to meet tribal treaty protected fishing rights."

- Senator Patty Murray

Progress toward salmon recovery through land use, education & outreach

In addition to on-the-ground habitat projects, the WRIA 8 Salmon Conservation Plan also calls for actions related to land use, education and outreach (sometimes called "programmatic" actions). In our highly urban—and rapidly growing—watershed, how we manage our growth, and whether we can inspire watershed residents to protect salmon, are key factors in salmon recovery.

Actions by jurisdictions

In 2015, the WRIA 8 team surveyed our partner jurisdictions and non-profits to assess progress made in implementing the programmatic actions most important for salmon recovery in our watershed. Jurisdictions reported a high rate of implementation for:

- Enforcing Critical Areas Ordinances and Shoreline Master Plans
- Promoting and protecting trees
- Providing education about streamside restoration and natural landscaping
- Minimizing stormwater runoff through permitting and other regulations
- Promoting rain gardens, Low Impact Development and Natural Yard Care (implementation of these programs has increased since 2011)
- Providing water quality education and outreach to businesses and individuals
- Involving citizens in restoration and stewardship, often with non-profit partners
- Encouraging soft shoreline techniques and protecting shoreline vegetation for lakeshore properties, primarily through regulation.

As the watershed changes and population grows, WRIA 8 partners need to continue rigorous implementation of these programs, and find ways to better assess their effectiveness.

Other actions of high importance to WRIA 8 Plan success are not being implemented as widely. Jurisdictions report a lower rate of implementation of the following high-priority activities:

- Outreach about the benefits of large wood in streams
- Incentives like reduced permit fees or streamlined permitting to protect/restore ecological function
- Programs that provide tax breaks for salmon-friendly land uses
- Water conservation and reuse programs

Growing salmon need small creek mouths in Lake Washington for rearing habitat as they make their way out to Puget Sound. But many historic creeks have vanished or been directed to drainage pipes. In 2014, the City of Seattle re-established 440 feet of stream channel through Beer Sheva Park to reconnect Mapes Creek to Lake Washington—one of a series of shoreline "rest stops" Seattle is recreating for juvenile salmon. The first year of post-project monitoring shows that juvenile Chinook salmon, other salmonids, and other native fishes are already using the creek.

Actions by non-profits

Nearly all non-profit partners who responded to the survey have active volunteer programs involving citizens in restoration, stewardship and/or monitoring. Another area of strength for our watershed non-profits is education about salmon conservation to K-12 audiences, elected officials and other stakeholders. Both volunteer stewardship and educational programs are top priorities for these groups and they report high levels of effectiveness.

Photo by Ray Lapine

Working together

WRIA 8 partners work collaboratively on the Plan's programmatic actions. The City of Redmond, King County, Puget Sound Partnership, Department of Ecology and others are working with the Washington State Department of Commerce on an EPA-funded project called Building Cities in the Rain to find approaches to manage stormwater and protect/restore priority habitat in urban areas. Project partners aim to keep development economically feasible in densely populated areas, thus reducing sprawl and protecting air and water quality, while still meeting stormwater management goals to recover the health of aquatic ecosystems.

With WRIA 8's increased focus on the importance of streamside forest cover to salmon, non-profits have also partnered with local governments to control invasive species and plant native trees and shrubs. Local governments sometimes lack staff for this work, which typically crosses jurisdictional boundaries.

Connecting people and salmon

People are more likely to protect salmon and habitat when they feel connected to the resource. For nearly a decade, WRIA 8 has helped thousands of people witness salmon return to local streams and rivers each fall. This "in-person" experience is supported at sites around the watershed through the Salmon SEEson program, which in recent years has expanded to include more than a dozen sites. Several jurisdictions and non-profit partners collaborate to identify sites, some of which have trained interpreters available; others are self-guided.

WRIA 8 has also supported the Cedar River Salmon Journey, Beach Naturalists, and Salmon Watchers programs to raise awareness of salmon and habitat restoration in our watershed. These programs train volunteers about the watershed's natural resources, who in turn teach and engage others.

A tremendous amount of work has been done to recover Chinook salmon in WRIA 8 in the last 10 years through education and outreach, regulating land use and protecting and restoring salmon habitat. An important part of our recovery effort is assessing whether our actions are working as intended and if there is new information we should consider to help adjust our strategies.

Through partnerships with non-profits, local governments enhance their capacity to restore habitat and engage citizen volunteers. For example, Mountains to Sound Greenway Trust turned out hundreds of people to plant native trees and shrubs along Issaquah Creek in late 2015 at the City of Issaquah's Confluence Park restoration project. Issaquah and Mountains to Sound also partner to provide ongoing stewardship of city-implemented restoration projects.

For more information about population diversity, see the online version of the Progress Report at http://www.govlink.org/watersheds/8/

Are our actions working?

Ten years is a very brief period in salmon recovery time. Salmon advocates must secure funding for restoration, acquire property from willing sellers, and mobilize construction resources within a short building season. Completed projects may take years to mature, as plants take root and grow. Many projects must be coordinated and combined in this manner to have an ecological effect. And after all that, effects on a given cohort of salmon may not be detected until four years later, when they return as adults to spawn. Therefore, even under the best of circumstances, 10 years is not much time to expect measureable results for salmon recovery.

Fortunately, planning and implementation of salmon recovery actions in WRIA 8 began well before 2005. Many partners had worked to protect and restore salmon habitat in the watershed as early as the mid-1990s, and some long before that. In addition, agreements such as the Cedar River Habitat Conservation Plan (2000) helped preserve and restore habitat in critical areas for our highest priority Chinook population. Because of these and many more habitat protection and restoration actions, we are beginning to see some signs of progress.

The WRIA 8 Technical Committee collects information on Chinook population status and habitat conditions to gauge whether our actions are resulting in a trajectory toward Chinook recovery. These monitoring efforts are essential to salmon recovery as we determine whether course corrections are necessary (i.e., adaptive management). The following sections summarize information we have compiled to date.

WRIA 8 Chinook Salmon Recovery Goals

	AVERAGE PRIOR TO PLAN		10-YEAR GOAL (2006-2015)		10-YEAR AVERAGE RESULTS (2006-2015)		50-YEAR GOAL	
	Cedar	Sammamish	Cedar	Sammamish	Cedar	Sammamish	Cedar	Sammamish
Abundance*								
Adult Abundance	643	1,056	1,680	1,083	**1,250****	**1,337****	**2,000-8,000**	**1,000-4,000**
Juvenile Abundance‡	113,213	17,397	‡	‡	551,564	31,174	‡	‡
Productivity‡‡								
Adult Productivity	2.6 r/s	1 r/s or less	3.1 r/s	1 r/s or more	‡‡	‡‡		
Juvenile Productivity	9.2%	2.9%	13.8%	4.4%	**24.0%**	**8.8%**	**20%**	**10%**
Spatial Distribution								
	1 blockage	1 partial blockage	no blockages historic distribution		**no blockages historic distribution**		**no blockages historic distribution**	
	Spawning area limited to lower river	Spawning in NLW tribs inconsistent	Maintain or expand spawning area	Expand spawning distribution in NLW tribs	**Maintain or expand spawning area**	**Expand spawning distribution in NLW tribs**	**Recapture historic distribution**	**Recapture historic distribution**
Diversity								
Juvenile Life-History Diversity (instream rearing)	34%	n/a	40%	n/a	**8%**	n/a	**50%**	n/a
Hatchery-Origin Spawners	unknown	unknown	less than 20%	status quo or decrease	**20%**	90% ‡	**10% or less**	**(not established)**
Hatchery Operations (Sammamish population only)	n/a	n/a	n/a	Operations meet HSRG§ goals	n/a	**Operations meet HSRG goals**	n/a	**Operations meet HSRG goals**

Notes
r/s = adult returns per previous year's spawner
* Abundance data from WDFW and Seattle Public Utilities. Current year data are provisional.
** Adult abundance has exceeded 10-year Cedar goal of 1,680 adults in three of the last 10 years.
‡ Goals not established.
‡‡ Updated adult productivity data not available at time of printing; juvenile productivity data from WDFW.
§ Hatchery Scientific Review Group

Meeting goals
Approaching goals
Not approaching goals
No assigned goals

FIGURE 3. Status of Chinook salmon in WRIA 8

Chinook salmon monitoring in WRIA 8

The general approach to conserving Chinook salmon in the Puget Sound region is the Viable Salmonid Population (VSP) concept. A viable salmonid population is defined as an independent population with a negligible (less than five percent) risk of extinction over a 100-year period. WRIA 8 supports two distinct Chinook populations: the Cedar and Sammamish populations. Each population has its special challenges and needs, and recovery priorities differ. The attributes used to evaluate the status of Chinook salmon are **abundance, population productivity, spatial distribution, and diversity.**

Our short-term (10-year) goals for Chinook salmon in WRIA 8 were meant to stabilize both populations and improve measures of abundance, productivity, spatial distribution and diversity (FIGURE 3). Long-term goals are intended to keep Chinook populations in our watershed at sustainable, harvestable levels. While some short-term indicators are meeting—or approaching—our 10-year goals, we are still short of this long-term objective.

Adult abundance

Adult abundance is measured by counting the number of adult salmon that have escaped all other sources of mortality to return to their natal stream to spawn (i.e., "escapement"). Abundance goals for Chinook salmon in WRIA 8 were adopted in the WRIA 8 recovery chapter in 2005. These and other goals were further refined in the 2008 WRIA 8 "H-Integration" process, which brought together local hatchery, harvest and habitat managers to improve coordination among these three principal factors affecting Chinook recovery in the watershed.

The 10-year WRIA 8 abundance goals were 1,680 and 1,083 adults returning each year to the Cedar and Sammamish populations, respectively.[1,2] The average returns for those populations for the last 10 years (2006-2015) are 1,250 adults for the Cedar[3] population and 1,337 for the Sammamish population (FIGURE 4 AND FIGURE 5). **While promising in the short term, these returns are not yet to a level that would allow a local fishery or signal sustainable populations.**

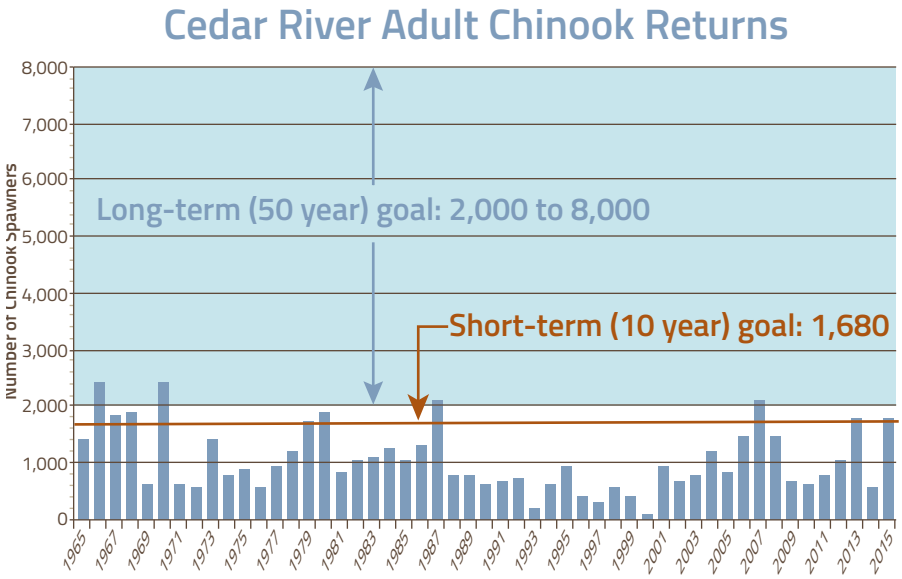


FIGURE 4. Chinook salmon escapement (Cedar population) (Data source: WDFW and Seattle Public Utilities)

While promising in the short term, WRIA 8 Chinook salmon returns are not yet to a level that would allow a local fishery or signal sustainable populations.

[1] Cedar population: http://www.govlink.org/watersheds/8/pdf/HI-CedarPopVSPGoals12-07-09.pdf

[2] Sammamish population (including Issaquah Creek): http://www.govlink.org/watersheds/8/pdf/HI-SammPopVSPGoals12-07-09.pdf

[3] NOTES ON ABUNDANCE: 1) Abundance (escapement) data for 2015 are provisional and subject to change. 2) Abundance estimates are provided by WDFW.

For more information about juvenile abundance, see the online version of the Progress Report at http://www.govlink.org/watersheds/8/

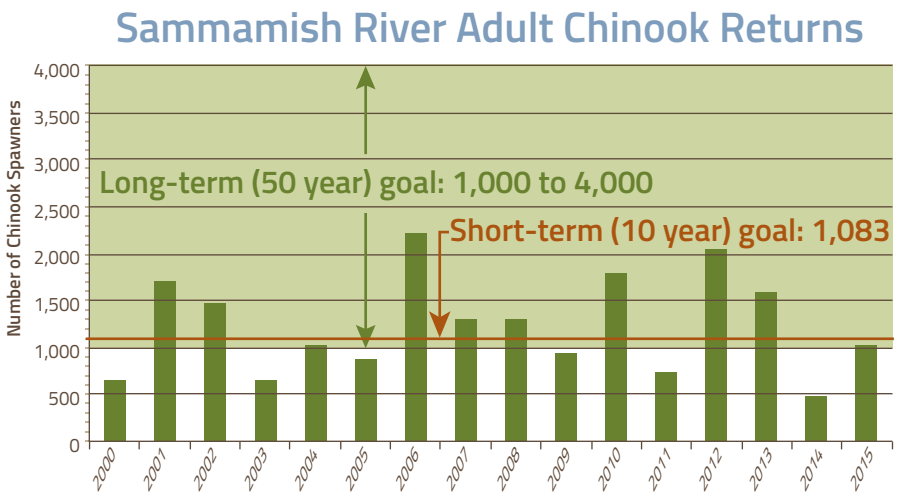


FIGURE 5. Chinook salmon escapement (Sammamish population). (Data source: WDFW)

Productivity

Productivity indicates whether a population is growing or shrinking over time. Given the very low overall abundance of Chinook salmon in WRIA 8, high productivity is necessary to restore the population to historic, harvestable levels. Overall Chinook productivity is influenced by factors throughout the full salmon life cycle—including elements outside the control of WRIA 8 jurisdictions, such as marine survival.

Juvenile productivity, however, reflects habitat factors within the control of WRIA 8 partners—for example, watershed hydrology and juvenile rearing habitat quantity and quality. Therefore, WRIA 8 considers juvenile productivity a more useful indicator of progress for local plan implementation.

Adult productivity is assessed and reported by the NOAA (National Oceanic and Atmospheric Administration) Fisheries Science Center, generally at five-year intervals. The last official assessment was performed in 2010, and a new assessment is due in early 2016.

WRIA 8 uses **egg-to-migrant survival** as its primary indicator of juvenile productivity. Egg-to-migrant survival is the estimated number of young salmon migrating from streams to Lake Washington divided by the estimated number of eggs deposited. The 10-year egg-to-migrant survival rate goals for WRIA 8 Chinook were set at 13.8% and 4.4% for the Cedar and Bear populations, respectively. The average egg-to-migrant survival rates for the last 10 years (brood years 2005-2014) are 24.0% for the Cedar population and 8.8% for the Bear population, which meet our present short term and long-term goals.

Juvenile productivity reflects habitat factors within the control of WRIA 8 partners—for example, watershed hydrology and juvenile rearing habitat quantity and quality. Therefore, WRIA 8 considers juvenile productivity a more useful indicator of progress for local plan implementation.

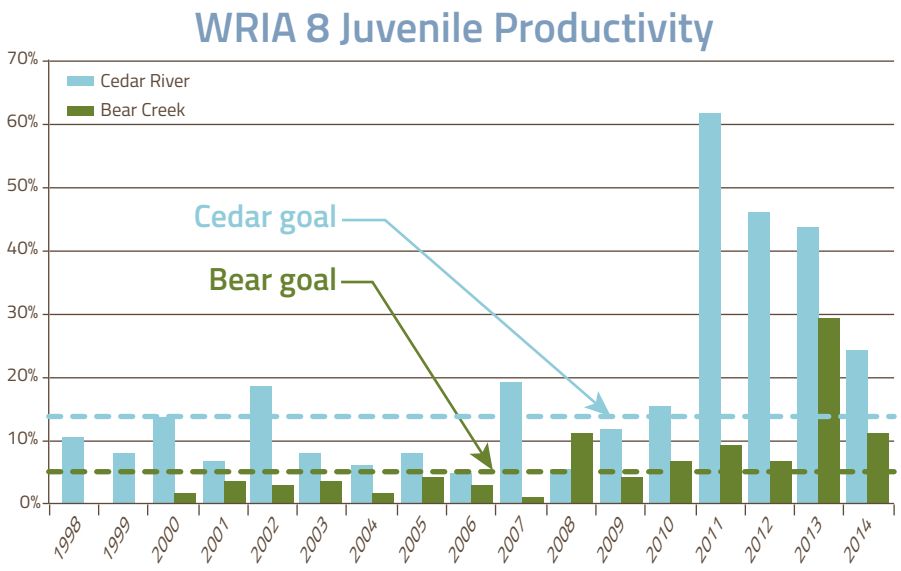


FIGURE 6. WRIA 8 Chinook egg-to-migrant survival. Survival is estimated at Bear Creek and Cedar River traps (i.e., does not incorporate survival through Lake Washington or Ship Canal). (Data source: WDFW)

Spatial distribution

The distribution of a population throughout a landscape provides an insurance policy against localized catastrophes, such as floods or landslides. WRIA 8 salmon populations have a greater chance of long-term survival if they are able to spawn and rear successfully throughout the watershed and not just in one stream. A healthy population can colonize nearby basins in times of high abundance. During periods of low abundance, however, a small, widely-dispersed population may mean returning adults cannot find a mate.

In WRIA 8, the 10-year goal was to maintain and (where opportunities existed) increase the spawning and rearing distribution of Chinook salmon throughout the watershed. Annual spawning ground surveys indicate increasing use of the Cedar River above the Landsburg diversion dam since creation of a fish passage facility there in 2003. Removal of the Issaquah Hatchery Dam in 2013 improved fish passage on Issaquah Creek and will likely increase use of habitat in the upper reaches of the creek. Elsewhere in WRIA 8, with the exception of Kelsey Creek, Chinook spawning has been highly variable since surveys began in 2000 (FIGURE 7).

The number of Chinook salmon has declined precipitously in Kelsey Creek after two very strong years in 2006 and 2007. It is unclear what contributed to the strong runs there in 2006 and 2007 or led to the absence of returning adults in recent years.

The City of Redmond's Citywide Watershed Management Plan, adopted in 2013, is an **integrated, watershed-based approach to stormwater management and aquatic habitat restoration** in urban areas. Adopting a broader watershed perspective encourages the development of solutions for stormwater management and salmon recovery that can satisfy several regulatory requirements at once, meaning more efficient and effective recovery of salmon habitat in developed areas. Customized strategies to address cumulative impacts to urban waters emerge when a local government takes a holistic watershed approach.

More information and charts about forest cover and water quality are available in the online version of the Progress Report at http://www.govlink.org/watersheds/8/

CREEK	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Bear	137	30	42	25	24	25	40	12	20	44	9	1	17	41	16	5	60
Cottage	171	103	96	102	120	96	82	119	69	88	39	59	38	106	32	55	78
EF Issaquah	NS	NS	NS	0	3	25	11	3	30	13	19	29	18	15	28	31	12
Little Bear	1	1	1	3	3	1	0	0	5	1	1	0	0	0	NS	NS	7
North Creek	2	4	6	10	1	5	4	9	3	5	7	3	5	14	NS	NS	4
Kelsey Creek	NS	8	4	4	0	0	4	72	77	8	3	0	0	0	0	0	0
May Creek	0	1	3	NS	5	9	1	0	12	5	2	1	1	2	NS	NS	0
Rock Creek (Lower)	0	0	0	0	0	0	0	0	0	0	0	3	0	2	7	0	0
Taylor Creek	0	0	7	12	11	8	7	1	30	0	0	1	2	11	9	5	4
Peterson Creek	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0
Walsh Creek	0	0	1	0	6	12	0	0	10	0	0	X	X	X	X	X	X
Cedar River Mainstem (and tribs above L'burg)	182	53	390	269	319	490	331	587	859	599	285	262	322	420	724	227	713

FIGURE 7. WRIA 8 Chinook redd survey results, 1999-2015. "NS" represents years in which those tributaries were not sampled. (Data source: King County, WDFW and Seattle Public Utilities).

Habitat monitoring in WRIA 8

The historic and ongoing destruction of habitat is the most significant threat to Chinook salmon recovery in WRIA 8 as well as throughout Puget Sound. Therefore, the monitoring of habitat conditions is crucial to track our progress in conserving and restoring salmon habitat. In WRIA 8, we monitor changes in forest cover, stream habitat conditions, and water quality throughout the watershed.

Forest cover

Healthy, intact forests support natural watershed processes and high water quality necessary for salmon survival. Especially important is intact forest cover next to streams where salmon migrate, spawn, and rear. Forests buffer the stream from human impacts and provide shade and cover for fish. In addition, areas draining to Chinook streams can heavily influence conditions further downstream. WRIA 8 monitors overall forest cover throughout the watershed, as well as forest cover specifically next to salmon-bearing streams. Starting with 2011 forest cover data, technological advances now allow a much finer assessment of forest cover over a broader area than in past years. As subsequent years are processed, we will be able to report on trends in forest cover along our salmon-bearing streams.

Using high-resolution data and not counting streams in the upper Cedar River Municipal Watershed (where they are protected from development), we estimate that in 2011, 32.6% of the area within 200 feet of WRIA 8 salmon streams was forested. We will be able to compare future years to this benchmark, and track changing conditions over time.

WRIA 8 also tracks overall forest cover in the watershed using coarser-scale satellite data. Between 1991 and 2011, overall forest cover in our highest-priority salmon basins inside the Urban Growth Area (UGA) boundary declined by 35%. The majority of that decline (about 19%) occurred during the period from 2006-2011. This decline is expected, since areas inside the UGA take the majority of development pressure throughout the area. However, other studies indicate that forest cover along *streamside areas* inside the UGA (which are more likely to be protected by regulations) are also declining. Outside the UGA boundary, forest cover in salmon-bearing watersheds declined by 4.75% between 1991 and 2011. The majority of that decline (4.5%) occurred during the latest reporting period, from 2006-2011.

Stream habitat conditions

WRIA 8 monitored habitat status and trends in and along small streams in the watershed between 2010 and 2013 (King County, 2015). Some stream habitat conditions considered important for salmon (wood volume and water temperature) were found to be below standards considered supportive of salmon use, even in rural areas of the watershed. Wood volume was consistently below standards, and summer water temperatures frequently exceeded state standards. Other important indicators of stream habitat quality, such as pool area, riparian cover and sediment composition, were also assessed, though regional standards for these are not currently available. This monitoring project indicated that salmon recovery priority areas inside Urban Growth Area boundaries are most at risk of further degradation in the short term. Further degradation of these areas will impair their ability to support Chinook salmon.

Habitat status and trends monitoring is currently unfunded in WRIA 8. A power analysis of monitoring requirements indicates that a small program will need ten to twenty years of annual monitoring to reliably detect watershed-wide trends in habitat conditions.

Adaptive management

Implementation of the WRIA 8 Plan has been "adaptively" managed by linking monitoring to decision-making through reports and presentations by the Technical and Implementation Committees to the WRIA 8 Salmon Recovery Council. As new information becomes available, partners can use it to inform implementation strategies. For example, findings from a 2011 report on forest cover loss prompted WRIA 8 to develop a "Trees for Streams" initiative to increase emphasis on working with public and private land owners to protect and restore streamside areas and promote education and outreach efforts to improve stewardship. This initiative helped lead to a $250,000 National Estuary Program grant from the Department of Ecology to help public and private landowners control invasive knotweed and reforest the banks of the Cedar River.

WRIA 8 partners work on similar basin-scale streamside restoration efforts in other priority areas of the watershed, including Issaquah Creek and Bear Creek. More recently, a 2015 habitat status and trends report concluded that certain salmon recovery priority areas located inside Urban Growth Area boundaries are at the highest risk of further degradation in the short term. The report recommended, among other actions, that WRIA 8 consider additional management activities in those areas.

In 2013, with support from the Puget Sound Partnership, WRIA 8 initiated a process to more comprehensively and clearly document monitoring and adaptive management practices and priorities, identify gaps, and work to directly link monitoring to the WRIA 8 Plan's habitat protection and restoration strategies. This work is ongoing and will serve as a foundation for the WRIA 8 Ten-Year Plan Update in 2016 that will include management recommendations and decision points for Salmon Recovery Council partners.

The **Cedar River Stewardship-in-Action** partnership between Seattle Public Utilities, King County Noxious Weed Control Program, and Forterra works to improve riparian habitat systematically on the lower Cedar River by controlling knotweed and other invasive species and replanting native species on public and private properties. Successful coordination with streamside residents is the program's backbone—over 420 private landowners have been engaged since 2009. To date, the knotweed infestation along the lower Cedar River has been reduced by 85%, and over 80,000 trees and shrubs have been planted.

WRIA 8 Technical priorities going forward

In late 2015, the WRIA 8 Technical Committee hosted a forum of fisheries scientists and technical experts working in the watershed. Participants heard about the latest research on Chinook salmon recovery challenges and brainstormed priority actions and areas of investigation for consideration in the WRIA 8 Ten-Year Plan Update. They ranked the most important uncertainties and technical barriers limiting recovery as follows:

First-tier priorities

- Ballard Locks and Ship Canal operations – effects of high temperature and decreased dissolved oxygen on migration with potential for resistance to disease/parasites
- Juvenile rearing and refuge (especially on the Cedar River) and floodplain connectivity
- Lake survival – especially artificial light and predation effects on juveniles
- Temperature – especially in the Ship Canal and Sammamish River

Second-tier priorities

- Water quality – stormwater, including toxic loading of phthalates and dialysis drugs (potentially a first-tier priority in Lake Union)
- Stream flows – both winter and summer
- Invasive aquatic plants

Other potential limiting factors

- Piers and docks
- Mixing of wild and hatchery stocks or other hatchery issues

The WRIA 8 Technical Committee will use this information in 2016 to develop monitoring and research priorities for the WRIA 8 Ten-Year Plan Update.

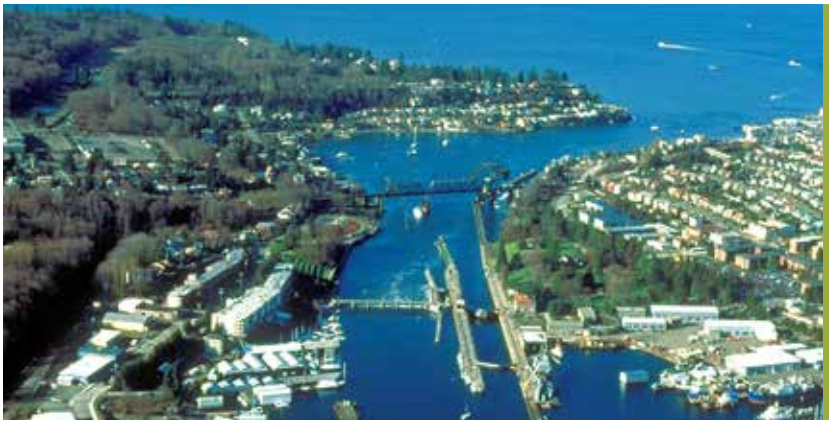
What has the past decade taught us?

Successes

Shared vision and decision-making

Organizing at a watershed scale to plan and implement salmon recovery provides many benefits. First and foremost, the WRIA 8 partnership is a forum for shared decision-making, and the WRIA 8 Plan provides a shared salmon recovery vision. The WRIA 8 partnership has proven an effective and efficient way for local governments to address the ESA listing of Chinook salmon collectively and has engendered an understanding among partners that all communities in the watershed benefit from implementing the highest priority salmon recovery actions.

Guided by hypotheses in the WRIA 8 Plan, WRIA 8 has supported project sponsors in developing project concepts and strategies to secure funding. This watershed vision also helps integrate other priority regional efforts, like floodplain management, water quality improvement, shoreline and riparian area stewardship, invasive weed control, and operational improvements to the Hiram M. Chittenden (Ballard) Locks.



Locks need repair. Major repairs are needed to the 100-year-old Hiram M. Chittenden (Ballard) Locks to ensure the safe passage of adult and juvenile salmon into and out of the watershed. Failure of key infrastructure at the Locks would have significant economic and environmental consequences for the entire region. Funding for this federal facility has been limited.

Partnerships

WRIA 8 has had great success working through partnerships to advance restoration and stewardship priorities, and partnerships have enabled several existing programs to continue and new programs to develop. In particular, non-profit and local government partnerships have helped advance WRIA 8's priority focus on riparian area restoration and stewardship in the Cedar River and Issaquah Creek basins. Creating a partnership between regulatory agencies, local governments, and non-profit groups also enabled WRIA 8 to more effectively promote soft-shore alternatives to bulkheads and other shoreline armoring around Lake Washington and Lake Sammamish.

Bulkheads and rip rap that line the shores of Lakes Washington and Sammamish have greatly reduced essential habitat for juvenile Chinook salmon. WRIA 8 and its **partners encourage homeowners to "soften" their shorelines** by replacing bulkheads with beaches and native plants. WRIA 8 sponsored green shorelines workshops in 2009 and sends periodic mailings to educate lakeshore property owners about salmon-friendly shoreline practices. WRIA 8 also developed a Green Shorelines website with shoreline restoration resources and a map of publicly accessible demonstration projects.

Multiple benefits

Recognizing the limited dollars available for salmon recovery, WRIA 8 partners have worked to improve coordination across programs and develop projects that bring multiple benefits. For example, a habitat restoration project may also support flood risk reduction, water quality, and recreation objectives. Similarly, a project to remove or replace a culvert can meet salmon restoration and flood risk reduction goals. The state legislature and other funding sources are increasingly showing a preference for multi-benefit projects. Identifying opportunities to integrate salmon recovery with other complementary objectives will be an important strategy for salmon recovery into the future.

Continued challenges

Land use and population growth

Because of their responsibilities for land use, local governments are key to habitat protection and restoration efforts. The WRIA 8 Plan offers land use recommendations for local governments—including regulations and incentive programs—to protect salmon habitat and complement restoration actions by protecting forest cover, streamside and lakeshore buffers, and water quality. Surveys conducted by WRIA 8 staff in 2009 and 2015 show that local governments are implementing land use regulations and best management practices. While there are some indications that land use regulations may protect habitat sufficiently, it will be important to improve our understanding of regulatory effectiveness.

As our region grows, land use pressures will continue to threaten the quality and function of remaining salmon habitat. Expanding programs and incentives for developers that reward the use of sustainable materials, reduced water use, and innovative stormwater management will be essential.

Stormwater management

With new research and information implicating stormwater directly in salmon mortality, it will be important to more closely link stormwater management and salmon recovery. Through the National Pollutant Discharge Elimination System (NPDES) permit requirements, local governments are taking actions to manage stormwater more effectively. Stormwater managers should give greater consideration to salmon recovery objectives in their management decisions and outreach activities, and salmon recovery managers should identify and prioritize addressing stormwater as part of recovery.

Photo from City of Redmond

Resources for continued implementation and communicating progress

Sustainable Funding: Securing adequate funding to keep salmon recovery progress on pace with our WRIA 8 Plan has been, and will continue to be, a fundamental challenge. The long-term nature of salmon recovery requires dedicated, predictable funding. Local communities, the state, and the federal government have invested significant resources in protecting and restoring salmon habitat to date, and WRIA 8 will need more to build on this initial investment.

Adequate Staffing: Many local governments and other partners also lack capacity to develop projects in time to take advantage of funding opportunities that arise. During the past decade, many local governments reduced staff, which has limited their project planning and management capability. We need to appropriately build the human infrastructure that supports effective project development and management.

Measuring Success and Inspiring Ongoing Efforts: It is challenging to implement and report on habitat projects when it may take decades to fully realize their benefits. Similarly, we may know of areas we need to protect, but it takes time to cultivate willing sellers. To support and inform project implementation and incorporate lessons learned, we must monitor project effectiveness and trends in salmon and habitat health.

Communicating Regional Benefits: We must continue to demonstrate how salmon recovery benefits other regional priorities and better promote habitat restoration progress to make the case for funding this work.

Recovering salmon in a changing climate

Healthy, functioning ecosystems can help support a sustainable future for salmon and people, which is even more critical as we face the anticipated effects of climate change. Fortunately, many of WRIA 8's habitat protection and restoration strategies, including restoring stream corridors and lakeshores and reconnecting floodplains, will make ecosystems and communities more resilient to a changing climate. However, we need to better understand, assess, and adaptively manage for these changing conditions to sustain salmon and ourselves.

For example, the lack of snowpack and spring rain in 2015, combined with high summer temperatures, reduced stream and river flows to record lows and increased temperatures to lethal levels in many streams. If such conditions become more common in the future, we must develop strategies to address them to support salmon recovery.

High temperatures and low stream flows experienced in the summer of 2015 pose challenges to salmon migration and survival and may become more common in the future under various climate change scenarios.

Conclusion

After 10 years of coordinated implementation, the commitment to salmon recovery remains strong in WRIA 8. Much progress has been made but significant challenges remain. For our efforts to continue toward the ultimate goal of achieving sustainable and harvestable salmon runs, maintaining and strengthening the WRIA 8 partnership among local governments and stakeholders is of paramount importance. As we reflect on the first 10 years of implementing recovery actions and consider priorities for the next decade and beyond, we know that telling the salmon recovery story is critical. Raising public awareness as the region's population grows and nurturing political will to stay the course as decision-makers come and go is essential. We must build on existing partnerships and foster new ones to coordinate messaging and leverage the collective capacity of our watershed coalition.

Salmon are the canary in our coal mine. As Billy Frank, Jr., member of the Nisqually Tribe, long time Chairman of the Northwest Indian Fisheries Commission, and recent winner of the Presidential Medal of Freedom, said, "Salmon are the measuring stick of well-being in the Pacific Northwest." In recovering salmon, we save ourselves. In how and where we build our communities, in the choices we make about what products to buy and use, and the ways we manage our impacts on the land, streams, rivers, and lakes, we determine whether salmon can return. If we don't choose wisely, salmon may eventually be only a memory in a place they once defined. WRIA 8 partners remain hopeful and committed to recovering salmon. If we succeed, our watershed will continue to be both a place of natural beauty and a home for thriving, sustainable human communities.

A complete version of this Implementation Progress Report, with additional information about the status of Chinook salmon and habitat conditions in WRIA 8, is available at:
http://www.govlink.org/watersheds/8/

Additional copies of this report are available from:

King County

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File name: 1601_5087m_W8-2015ProgressReport.indd
King County IT Services, DNRP, GIS/Visual Communications & Web

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SALMON & PEOPLE

LIVING TOGETHER

Financial support to coordinate implementation of
The Lake Washington/Cedar/Sammamish Watershed Chinook Salmon Conservation Plan
is provided by the following local governments and the Washington State Salmon Recovery Funding Board:

Town of Beaux Arts Village
City of Bellevue Washington
City of Bothell
City of Clyde Hill
City of Edmonds Inc. 1890
Town of Hunts Point Serving Our Residents
City of Issaquah
City of Kenmore By the Lake
City of Kent Washington
King County
City of Kirkland Washington
City of Lake Forest Park Incorporated 1961
The City of Maple Valley
City of Medina Washington
City of Mercer Island Washington
City of Mill Creek Parks & Recreation
Mountlake Terrace
City of Mukilteo
The City of Newcastle
PSAR Fund Puget Sound Acquisition and Restoration
City of Redmond Washington
City of Renton
City of Sammamish Washington
City of Seattle
City of Shoreline
Snohomish County
The City of Woodinville
Washington State Recreation and Conservation Office Salmon Recovery Funding Board
Town of Woodway Washington
Town of Yarrow Point

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