

**Habitat Protection  
and Restoration Plan  
for  
Water Resource Inventory Area 13,  
Deschutes**

**Thurston Conservation District Lead Entity**

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# Table of Contents

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Executive Summary .....	1
Chapter One: Introduction	
The WRIA 13 Vision for Salmon Habitat Protection and Restoration.....	3
Chapter Two: Strategic Goals	
Principles to Guide the Strategy .....	6
Chapter Three: Community Values	
Geographic Areas to Target .....	10
Chapter Four: South Puget Sound Area Description	
Area Overview.....	11
Appendix A	
WRIA 13 Salmonid Profiles and Strategies.....	29
Appendix B	
Stream Prioritization.....	44
Appendix C	
Overview of Subbasin/Nearshore Assessments and High Priority Habitat Projects & Programs .....	46
Watershed Summary.....	48
<u>Henderson Inlet</u>	
Woodland Creek .....	51
Woodard Creek.....	54
<u>Budd Inlet</u>	
Adams Creek .....	57
Ellis Creek .....	60
Mission Creek .....	63
Indian/Moxlie Creeks.....	66
Deschutes River .....	69
Capitol Lake.....	73
Percival Creek.....	77
Schneider Creek.....	80
<u>Eld Inlet</u>	
Green Cove Creek .....	83
McLane Creek.....	86

Appendix D  
Community Issues and Concerns..... 90

Appendix E  
Guiding Principles for Project & Program Development,  
Evaluation and Ranking ..... 95

Appendix F  
Salmon Recovery Funding Board Evaluation & Ranking Process ..... 99

Appendix G  
Nearshore Excerpts from the draft Chinook and Bull Trout Recovery  
Approach for the South Puget Sound Nearshore .....109

Appendix H  
Bibliography .....113

## Executive Summary

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The Salmon Habitat Protection and Restoration Plan for WRIA 13 is a comprehensive multi-species approach for developing habitat project lists that lead to restoring and protecting salmon habitat through voluntary projects.

The plan follows a stepwise approach to implements Chapter 77.85 RCW and subsequent guidance from the Salmon Recovery Funding Board. The approach entails:

- ▶ Relying on the best available science to understand the needs of salmon habitat protection and restoration in WRIA 13
- ▶ Developing prioritized projects and programs that follow a logical, sequential approach for sustaining healthy populations of salmon
- ▶ Using a user-friendly project development process that encourages local sponsors to undertake prioritized projects and programs
- ▶ Building community support for salmon habitat project lists

### **Regional Coordination**

Members of the LE have partnered with others in the South Sound to develop the regional recovery chapter for Puget Sound Chinook, to be adopted by NOAA Fisheries through the Shared Strategy for Puget Sound. The geographic area encompassed by this broader group, the South Sound Salmon Sustainability group (SSSS), is from the Narrows Bridge south. Chinook are known to take refuge and forage in the inlets throughout South Puget Sound, while few venture into the freshwater systems of WRIA 13. Therefore the intent of that recovery chapter is to capture the needs and identify the high-priority areas for Chinook within the nearshore environment of WRIA's 13 and 14, leaving the freshwater component of habitat recovery to the LE at this time. This LE strategy document has adopted the priorities of the regional plan for highlighting nearshore needs. The information within the chapter has been developed with members of the LE and applies to the geographic areas it encompasses. This LE strategy document serves as the freshwater component of the habitat recovery plan while the chapter prepared for Shared Strategy functions as the nearshore habitat recovery piece. The LE will continue to work with this group as it embarks on the next step, to broaden the focus of recovery beyond listed Chinook to include all species. This takes a proactive stance, one that will work to prevent the listing of Coho, whose numbers have been in decline, and work to ensure the continued success of chum, whose runs have been very strong.

This plan coordinates the efforts of the nearshore recovery group with the habitat protection and restoration projects recommended for the freshwater. While the entirety

of the LE area is not at this time incorporated into the regional recovery effort, the recommendations for freshwater and nearshore actions are interchangeable within each plan. Both work together to create a step-wise approach to habitat recovery in South Puget Sound.

## **-Introduction-**

The Salmon Habitat Protection and Restoration Plan for Water Resource Inventory Area 13 – Deschutes identifies and prioritizes projects that protect and restore habitat for salmonids that occur in the marine and freshwater environments of Water Resource Inventory Area (WRIA) 13. The strategy is intended to focus freshwater restoration efforts towards the benefit of coho salmon, which are in a downward trend in South Puget Sound, and preservation of freshwater habitats for the benefit of coho and chum salmon. Chum salmon in South Puget Sound are healthy and it is the WRIA 13 Habitat Workgroup’s intent to sustain these healthy populations.

This strategy document was developed by the WRIA 13 Lead Entity Habitat Workgroup as a requirement by the Washington State Salmon Recovery Funding Board (SRFB) to guide identification, development, prioritization, and sequencing of habitat projects for the benefit of salmonids in WRIA 13. This product is intended to be used by project sponsors as a tool for the development of habitat restoration/preservation projects in WRIA 13 for submittal to the SRFB funding process. Although the main intent of this strategy is for SRFB eligible projects, it may also be useful for the development and rating of salmonid habitat projects submitted to funding sources other than SRFB.

Local citizens and salmon interest groups, area municipalities, the Squaxin Tribe and WA State Fish and Wildlife (WDFW) developed this plan through the coordination of the WRIA 13 lead entity, Thurston Conservation District.

### **Purpose**

The primary purpose of the Plan is to guide habitat protection and restoration actions through their development and ranking for Salmon Funding Recovery Board funding. The Plan serves to document scientific and community priorities for habitat protection and restoration efforts. It functions as a working document to maintain record of past local restoration and protection activities and summaries of scientific studies based on watershed and salmon habitat information.

The Plan also should inform other local priorities and project development using funding sources other than SRFB. This strategy puts strong value in supporting area-wide restoration and conservation activities because it is essential to building strong community support for all habitat recovery programs. The watershed summaries and history of past restoration efforts should provide scientific support for local voluntary projects in non-SRFB priority areas. All projects that maintain or restore ecosystem function are valued in this strategy.

## **Vision**

We envision natural watershed processes in the freshwater and marine environments of WRIA 13 that preserve or enhance biologically diverse runs of salmon capable of self-sustaining natural reproduction. We will achieve this by implementing strategic actions to maximize the productive capacity of the habitat.

We envision a community that supports these efforts through land-use and development choices that emphasize naturally functioning aquatic systems. We will do this by working with local partners to provide outreach and education information to the public in many different forms to reach and involve the broadest possible segments of the population.

The outcomes we intend to achieve through our efforts are:

- A process to rank and coordinate SRFB projects
- Integration of this salmon habitat restoration and protection plan into larger watershed plans and the larger South Puget Sound Salmon Recovery
- Increased public awareness of salmon habitat needs
- Increased predictability of success when applying for project funding
- Linkage of co-managers
- Renewed funding (need more explanation here)
- Building a positive reputation and strong relationships between the community and government organizations
- The full participation of citizens in restoring and protecting salmon habitat
- Maintaining and building momentum for salmon recovery
- Provide habitat conditions that support historical salmonid distributions (The Deschutes River is an exception because of the permanent fish ladder allowing fish access and the amount of habitat for potential fish production)

## **Regional Perspective**

Members of the LE have partnered with others in the South Sound to develop the regional recovery chapter for Puget Sound Chinook, to be adopted by NOAA Fisheries through the Shared Strategy for Puget Sound. The geographic area encompassed by this broader group, the South Sound Salmon Recovery group (SSSR), is from the Narrows Bridge south. Chinook are known to take refuge and forage in the inlets throughout South Puget Sound, while few venture into the freshwater systems of WRIA 13. Therefore the intent of that recovery chapter is to capture the needs and identify the high-priority areas for Chinook within the nearshore environment of WRIA's 13 and 14, leaving the freshwater component of habitat recovery to the LE at this time. This document has adopted the priorities of the regional plan for highlighting nearshore needs. The LE will continue to work with this group as it embarks on the next step, to broaden the focus of recovery beyond listed Chinook to include all species. This takes a proactive stance, one that will work to prevent the listing of Coho, whose numbers have

been in decline, and work to ensure the continued success of chum, whose runs have been very strong.

## **Constraints**

### **Financial constraints**

Restoration and preservation dollars are a limited commodity, with many needs present throughout the state.

### **Willingness of the land owner to participate in recovery efforts**

Several of our project sponsors are non-profits that work directly with landowners, attempting to make strong local contacts and engage the community in habitat recovery efforts. As these groups are grant funded, the amount of time that can be spent on outreach is limited. Their work, in tandem with that of many others, attempts to create an atmosphere of willingness amongst private landowners. Understanding that some of the most needed projects are on land where permission to access has been denied, we evaluate projects based upon their strategic nature and also their opportunity, as there are occasions when a landowner becomes cooperative and a long-shot project becomes one that must happen now.

### **Urbanization limits many natural processes beyond habitat**

The urban areas of Olympia, Lacey and Tumwater have 15% urban cover (TRPC, 2002). Although "imperviousness" is a poor indicator of "stream health", there is a relationship between the function of natural ecosystem processes and urbanization. At impervious coverage beyond 10%, studies show progressive impacts to stream health (Booth, 1997). Olympia Storm and Surface Water Utility anticipates some decline in stream health in the urban areas as a result of growing infrastructure, despite continued efforts in stormwater treatment, regulation and education (City of Olympia, 2004). However, by establishing protective regulations and exploring new technology, stream health may be improved in the long term.

Streams supporting urban development may have seriously impaired natural processes. Altered stream hydrology from existing impervious areas, developed buffers, channel modification are a few of the conditions that are found impacting WRIA 13 urban streams. These streams, however, by virtue of their proximity to neighborhoods, offer good opportunities to involve and educate the public on the importance of salmon protection. While restoration actions may not fully restore natural processes, enhancement and protection of existing conditions is possible.

Urban stream rehabilitation will usually not hold a high priority in the Plan for SRFB funding, however, local volunteer organization and municipalities will continue to develop and implement projects in urban areas.

## **Lack of knowledge**

There are many things we don't know that would help us in ranking and project development: potential salmon populations (carrying capacity), stream conditions, biological processes, spatial extent of stock etc... These are priority data gaps.

## **-Strategic goals-**

1. Protect habitat through conservation easements and acquisition where the habitat is intact
2. Restore functions in areas where natural processes can be recovered, not just symptoms treated
3. Address gaps in our knowledge of fish populations, fish use, and condition of natural processes
4. Give priority to projects that directly benefit high priority salmonid stocks
5. Give priority to intact watersheds

## **Conceptual approach**

The conceptual approach to this plan is to develop projects with the greatest community support and likelihood of success in priority areas containing priority species.

Support: The biggest constraints are opportunity and money. Many projects opportunities are on private land, that require participation and monetary match from private citizens. Developing relationships with private landowners takes time, but the rewards are many-fold. It increases awareness, encourages advocacy, provides a sense of ownership and pride for those participating. Opportunities to work with private landowners must take priority because of this effort.

Projects on public land require political support gained from public support. This requires momentum from outreach activities, etc. Opportunities are created through a string of effort, or convergence.

Likelihood of success: Can't jeopardize effort on projects with lots of barriers to success. Likelihood success in getting the project through development and funding (not certainty that fish will benefit based on BAS). This plan is about results, getting things done.

## **WRIA-wide Stressors**

Across the watersheds of WRIA 13, the freshwater systems are void of LWD and disconnected from their floodplains, making many of them incised in numerous places. This inhibits natural gravel sorting, limiting spawning habitat for salmon. Pools and riffles are limited as well due to the lack of LWD, with many of the streams having more runs. Urbanization has affected the riparian corridors, encroaching on the natural green

spaces that surround the streams, thereby creating the absence of LWD in the systems. These problems are connected. Opening up blocking intact habitat for Coho usage, creating LWD jams, planting riparian corridors and protecting habitat are priority actions within the area.

### **Principles to Guide the Strategy**

1. The strategy uses best available scientific information.
2. The strategy incorporates an understanding of local community interests.
3. The strategy addresses habitat needs in sequential order based on salmonid stock status and geographic area priorities.

Logical project sequencing will also be implemented to maximize project benefit (resource/financial) and not negate previously implemented projects.

### **Principles to Guide Project Development, Evaluation and Ranking**

The WRIA 13 Lead Entity Technical Committee adopted a series of guiding principles for evaluating and ranking projects and programs for inclusion on Habitat Project Lists, which it submits to the Salmon Recovery Funding (SRF) Board for potential funding. These guiding principles are also useful in evaluating applications to other grant funding programs that require the endorsement of the Lead Entity.

The guiding principles that follow below blend the integration of science-based protection and recovery priorities with community values. While it is not necessary for all projects to display every one of these principles, each will play a consideration within a formal ranking process.

#### **The project or program achieves optimum cost benefit.**

Project costs are well within the range of previous similar projects. Resources are limited and competition with other WRIAs for funding is high. Therefore, projects must demonstrate a reasonable cost/benefit ratio and be within scale with other projects proposed within the WRIA 13.

#### **The project or program protects or restores natural stream functions.**

##### **Protection**

Protection effort in WRIA 13 will focus on areas of functional habitat that have a high threat of development or land use changes that will deleteriously impact and/or have the potential to lead to aquatic habitat degradation. Protection projects will conserve critical aquatic habitats and/or landscape features that directly influence the natural processes within a watershed/marine shoreline. These efforts will also target key

habitat that provides the most benefit to salmonids. Restoration of vital habitat functions may also be a component of a protection project.

### Restoration

Restoration efforts in WRIA 13 will focus to restore the natural watershed functions. These efforts will take place in the freshwater watersheds and marine shorelines where it is most attainable to successfully restore the natural processes to benefit salmonids.

Potential restoration areas within WRIA 13 will include those watersheds systems that have a greater potential to restore habitat functions. Restoration efforts will address the problems impacting the natural processes rather than their symptoms.

## **Species and Geographic Area Priorities for Salmon Recovery Funding Board Funding**

### **Table X. Priority designations for WRIA 13 salmonid stocks**

#### **The project or program considers all stocks and life stages. Stock Priorities**

Subbasins and marine shorelines having restoration potential must incorporate habitat functions for all life history phases, which include spawning, rearing, and migration.

WRIA 13 gives strong consideration to projects that benefit salmonids listed under the Endangered Species Act and those ranked as critical or depressed under SaSI. With the declining Coho populations and risk of ESA listing, Coho are a priority stock for both restoration and protection. This headwater species is dependent upon the freshwater for major portions of its lifestages for spawning adults and rearing for juveniles as they spend up to two years in the streams before out-migrating to the marine waters it remains committed to its vision of a multi-species approach.

Additionally, to ensure the continued health of chum runs within South Sound, chum are a priority for restoration and preservation activities.

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**The project or program increases the potential for natural productivity.**

The long-term health of salmonids in WRIA 13 depends on self-sustaining salmon reproducing at sustainable levels. Ultimately, successful projects must provide a direct

Species	Stock	Native/non-native	Status	Priority
Chinook	Immigrant juvenile	Native	critical - ESA	x
Bull trout	Immigrant juvenile	Native	critical - ESA	x
Chum	Eld	Native	healthy	X
Coho	Deep South Sound	Mixed	healthy-depressed	<b>X</b>
Chum	Henderson	Mixed	unknown	X
Steelhead	Eld	Native	unknown	
Pink	Immigrant juvenile	Native	??	
Coho	Deschutes	non-native (hatchery)	critical	
Chinook	South Sound Tributary	non-native (hatchery)	not rated	
Steelhead	Deschutes	non-native (hatchery)	unknown	
Cutthroat	Western South Sound	Native	unknown	

or indirect link to an increase in salmon numbers.

**Table 1: WRIA 13 Priority Species**

**The project or program has the potential for long-term success.**

Projects and programs must demonstrate a certainty of success by relying on proven best available science and best management practices in their design and implementation.

There must also be a clear commitment towards monitoring and maintenance of a project or program to guarantee long-term duration of the benefit to salmonids.

Adaptive management entails relying on scientific methods to test the results of a project or program so that adjustments can happen appropriately to provide the greatest opportunity for project success. Good projects and programs employ a strong adaptive management approach within its design, along with the capacity to accommodate the need for change when necessary.

**The project or program addresses priority data gaps.**

The limiting factors analysis clearly communicates the breadth of information still missing about existing conditions in WRIA 13 subbasins. This prevents biologists and communities alike from making the best decisions that adequately address the habitat needs in a logical, prescriptive, and efficient manner.

WRIA 13 encourages projects and programs that address information gaps identified as “High Priority Projects and Programs” within individual subbasins.

**The project or program capitalizes on site-specific opportunities.**

Habitat Project Lists submitted for SRFB review and funding normally reflect the Top High Priority Projects and Program Strategy. However, there are times when the exception to this rule makes sense for the WRIA as a whole.

The WRIA will endorse high priority projects within a subbasin that does not make the High Priority Projects and Program Strategy when an “opportunistic” event arises. However, the opportunistic event must still be scientifically sound and approved by the Technical Advisory Group and Citizen Advisory Committee for submittal to the SRFB.

**-Community Values-**

Although a salmon habitat protection and restoration project or program must pass a review regarding its technical merits, simultaneously it must deal with community issues and concerns in an effective and appropriate manner.

There are areas throughout the LE that present pockets of opportunity for outreach, places that have historically been difficult to perform restoration activities but could house the keystone landowner that is pivotal for recovery of a given system. The known areas are, but not limited to: McLane creek landowners; landowners along the upper Deschutes, downstream from the falls and from McIntosh Lake to Lake Lawrence; agricultural landowners adjacent the Deschutes River; and community associations that collectively own large pieces of land along the nearshore. Projects that address concerns and incorporate outreach in these areas will be given priority during the ranking process.

The LE encourages and supports projects that have the opportunity to incorporate an educational element to some extent, whether it be active or indirect. These opportunities are important to share information to the community about why salmon habitat protection and restoration is crucial.

Actions incorporated into projects that provide opportunities for more effective education are:

- ▶ Publicizing good stewardship practices and actions
- ▶ Getting the word out about salmon habitat recovery and restoration efforts through a website, educational signs, radio ads, written information distributed in high traffic areas, public access TV shows, and interpretive trails
- ▶ Giving presentations before community groups during and after completion of projects

## **-South Puget Sound Area Description-**

WRIA 13 lies within the South Puget Sound, a broad, low-lying region situated between the Cascade mountain range to the east and the Olympic Mountains to the west. For discussion purposes within this document, South Puget Sound includes the marine waters located south of the Tacoma Narrows Bridge. The area is dominated by numerous freshwater streams and dissected by seven shallow salt-water inlets comprising 394 square kilometers (152 mi<sup>2</sup>). From north to south, they consist of: Carr Inlet; Henderson Inlet; Budd Inlet; Eld Inlet; Totten / Little Skookum Inlet; Oakland Bay / Hammersley Inlet; and Case Inlet.

These blind-end inlets present a unique set of physical, chemical and biological interactions. Because of their depth and closed nature, water does not mix or flush nutrient inputs well, resulting in a greater amount of biological productivity and diversity within these tidal inlets. A downside of this decreased dilution is an increased risk of pollutant concentration from land derived sediments, which can result in low dissolved oxygen levels. The shallow, still water nature of the inlets, particularly Budd Inlet, make them susceptible to episodic plankton bloom which results in further oxygen depletion.

The intertidal region of South Puget Sound experiences twice-daily tide exchanges that expose large sand or mud flats, emergent salt marshes and beaches in estuaries, deltas and along shorelines. The mud and sand flats are typically devoid of emergent vegetation, but support eelgrass and benthic invertebrates that are essential food for higher order organisms. The emergent salt marsh has plants such as *Carex*, *Scirpus*, *Salicornia*, *Triglochin*, and *Distichlis*, among others.

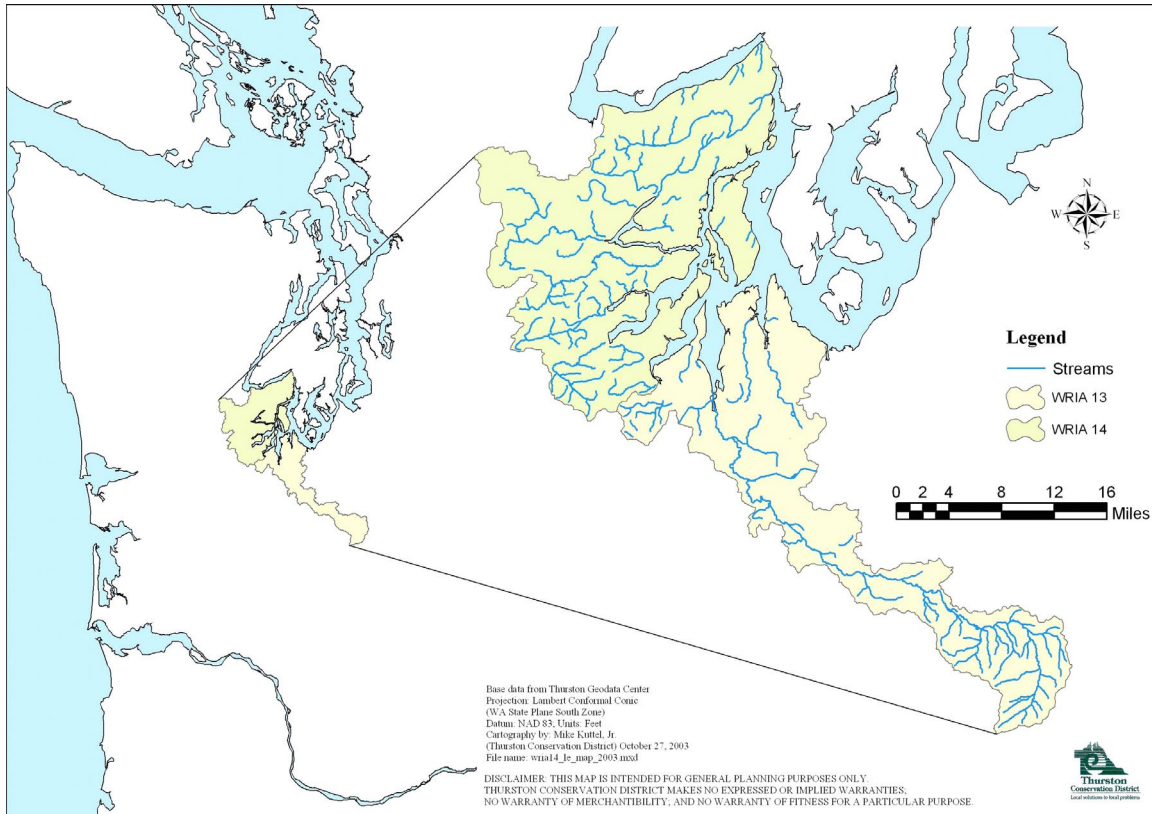
Salinity, substrate texture and the frequency and duration of floods govern these highly productive habitats. They also provide critical spawning habitat for many species of fish including salmonids and the forage fish on which they depend. The flat, sandy areas of the nearshore are also home to flounders, shrimp and worms, as well as seaweed beds that provide food and hiding places for millions of other creatures integral to the South Puget Sound food web. These distinct and highly productive intertidal zones provide critical habitat for many animal and fish species.

The South Puget Sound area is comprised of five WRIAs:

- WRIA 11 – Nisqually
- WRIA 12 – Chambers-Clover
- WRIA 13 – Deschutes
- WRIA 14 – Kennedy-Goldsborough
- WRIA 15 – Kitsap

The salmonid stocks of South Puget Sound spawn and rear across these boundaries.

WRIA 13 (Deschutes) is adjacent to WRIA 14 (Kennedy-Goldsborough) to the west, WRIA 12 (Nisqually) to the east, and WRIA 15 (Kitsap) to the north. The nearshore portions of WRIA 13 are geographically similar to WRIA 14.



## Significance to Salmonids

South Sound salmonid stocks are identified by their specificity to a particular geographic area (and genetic information). With the exception of Deep South Sound Tributary coho, which is a mixed stock with a broad geographic range, stocks are identified by their relationship to large rivers or to blind-end inlets. This strategy considers the stocks specificity to these areas, that is, it considers the relationship between streams discharging to a specific inlet and the relationship between these streams and the adjacent nearshore habitat at its mouth. Conceptually, this is similar to the relationship of numerous tributaries of a larger river system.

The South Puget Sound is a significant spawning and rearing area for many salmonid and forage fish species. The nutrient-rich waters are ideal forage areas particularly for estuary-dependent ones such as Chinook, Chum and cutthroat. The shallow, inter-tidal areas provide optimal rearing conditions for these species, including vegetated cover and abundant prey.

In addition to the widely distributed Deep South Sound Tributary coho, several other species are of some significance to this region. Chum salmon spawn extensively in WRIA 14 and the western portion of WRIA 13. Several runs of steelhead are also observed in the small drainages of this area. Resident cutthroat are found in all but the smallest drainages.

The Nisqually and the Deschutes rivers are the largest rivers in the South Puget Sound. The two major river systems are unique to each other in that the Deschutes did not historically have native salmon runs because the falls in Tumwater acted as a natural barrier to upstream migration. Artificial runs of coho and chinook, have been established since the 1950's by the WDFW hatchery program.

Forage fish such as sand lance, surf smelt and pacific herring use the sandy beaches extensively for spawning and forage. The abundance of forage fishes in the South Puget Sound are known to attract juvenile chinook from waters as far north as the Green River. The health of the shorelines in the South Sound is significant not only to local fish runs but also to salmonid species throughout the greater Puget Sound.

### **Data Gaps**

Shoreline health and forage fish health are significant unknowns in the South Puget Sound. Current nearshore studies by Herrera and Anchor are assessing the distribution and abundance of these forage species. Understanding forage fish and their habitat is critical to understanding how to recover salmonid populations in this area.

### **Geographic Priorities**

Nearshore areas throughout South Puget Sound have been prioritized by the South Sound Salmon Sustainability (SSSS) group during the development of the recovery chapter for Shared Strategy for Puget Sound. The LE has adopted these priorities. The information within the chapter has been developed with members of the LE and apply to the geographic areas it encompasses. This strategy document serves as the freshwater component of the habitat recovery plan while the chapter prepared for Shared Strategy functions as the nearshore habitat recovery piece. Both work together to create a step-wise approach to habitat recovery in South Puget Sound.

### **WRIA 13: Deschutes Description**

WRIA 13 is composed of three primary inlets and their associated freshwater sub-basins: Henderson, Budd and Eld. It covers a watershed area of 171,275 acres and has 192 miles of freshwater streams and shoreline. It is dominated by three types of geographic features: intertidal shoreline, one major river, the Deschutes, and several small lowland streams discharging to the Puget Sound.

The relatively small size of the Lead Entity (LE) area presents a unique challenge: to define priority areas without selecting everything and choose priority stocks while

acknowledging non-native and native, healthy and endangered stocks all utilize the freshwater and nearshore areas. Additionally, realizing that opportunities to work with private landowners limit the ability to perform projects, making it harder to develop projects if small priority areas are defined. Therefore, we must balance opportunity with the size of priority area.

**Table 2.** Stream miles of habitat for salmonid stocks in WRIA 13. *Data from WRIA 13 LFA.*

	<b>Chum</b>	<b>Coho</b>	<b>Chinook</b>
Henderson Inlet streams	11	17	3
Budd Inlet streams	6	11	8
Eld Inlet streams	8	11	2
Deschutes River and tributaries	0	73	47
<b>Total</b>	<b>25</b>	<b>112</b>	<b>60</b>

**Table 3.** Shoreline and stream miles of habitat for salmonid stocks in WRIA 13. *Data from WRIA 13 LFA for anadromous habitat – this doesn't include headwater cutthroat miles, upstream limit is typically for coho as published in LFA*

<b>Geographic Area</b>	<b>Marine Shoreline (mi)</b>	<b>Salmon-bearing streams (mi)</b>
Eld Inlet	37.9 (east shore only = 17.2)	11.2
Henderson Inlet	21.4	17.8
Budd Inlet	18.4	10.6
Dana Passage	8.4	Unknown
Nisqually Reach	11.9	unknown
Deschutes River	none	73.7
<b>Total</b>	<b>98.0</b>	<b>113.3</b>

WRIA 13 lies almost entirely within Thurston County, with a small portion at the headwaters of the Deschutes in Lewis County. Three major municipalities are present within the WRIA: the Cities of Lacey, Olympia and Tumwater. With approximately 10% of the total area having urban cover (14,182 of 149,136 ac), WRIA 13 continues to be

under tremendous growth pressure (TRPC, 2002). This is particularly felt along the marine shorelines, and less developed basins such as Green Cove and McLane.

Many of the urban streams in WRIA 13 have riparian areas in good condition, but water quality and altered hydrology are significant threats to salmonid health. Stormwater management is a high priority in each of the urbanized areas including outreach and education efforts, infrastructure upgrades and low impact development demonstration projects. Reducing runoff volume and quality from existing development continues to be a challenge for each of the local jurisdictions.

### **Significance to Salmon**

The freshwater systems in WRIA 13 support four native species of salmon: Coho, chum, cutthroat, and steelhead. In addition to these species, the nearshore areas support native Chinook and bull trout that immigrate from other areas of Puget Sound. There are also hatchery Chinook present within the Deschutes River, with some strays found in Woodland and Percival Creeks. (South Sound Tributary Chinook are not considered to be historically self-sustaining in South Sound independent tributaries.)

Habitat along the nearshore and in pocket estuaries that dot the inlets is especially significant for estuary dependent species such as Chinook, Chum and cutthroat juveniles that feed upon the forage fish that spawn along the beaches. Similarly, pool habitat in smaller streams is critical for overwintering coho and resident fish.

The Salmon and Steelhead Inventory (SaSI) status of these species within WRIA 13 is listed in Table xx. The condition of WRIA 13 stocks varies widely and several are unknown. The most notable stocks are the two coho stocks: the Deschutes River stock listed as critical and the Deep South Sound Tributaries Coho at risk of being listed as depressed if a continuing decline in returns is not reversed in the next several years. The Eld chum is listed as "healthy" (as are most of the chum in South Sound). The status of steelhead and cutthroat stocks throughout WRIA 13 are unknown, as is Henderson Inlet chum.

Within the saltwater inlets Chinook and bull trout from Northern Puget Sound rear and forage. Puget Sound Chinook and Bull Trout are federally listed as endangered species.

**Table 4.** WRIA 13 salmonid stocks and their status.

Species	Stock	Origin	Production	Status	Priority
Bull trout	Immigrant juvenile	native	wild	critical - ESA	x
Chinook	Immigrant juvenile	native	wild	critical - ESA	x
Chinook	South Sound Tributary	hatchery	hatchery	not rated	
Chum	Eld	native	wild	healthy	X
Chum	Henderson	mixed	wild	unknown	
Coho	Deep South Sound	mixed	composite	healthy (depressed)	<b>X</b>
Coho	Deschutes	non-native	wild	critical	<b>X</b>
Cutthroat	Western South Sound	native	wild	unknown	
Pink	Immigrant juvenile	native	wild	??	
Steelhead	Deschutes	hatchery	wild	unknown	
Steelhead	Eld	native	wild	unknown	

Deep South Sound Coho inhabit the broadest and most diverse geographical extent. Their range spans across more than 212 miles of stream habitat, 39 miles (18%) of which are in WRIA 13 (Table xx). A significant proportion of coho's freshwater habitat exists in WRIA 14 and 15, having 52 and 29% of the streams, respectively. Specificity of this broad ranging stock to WRIA 13 inlets is a factor in this strategy; while there is good habitat elsewhere in the South Sound, preserving local sub-populations of this stock is an important concern.

**Table 5.** Number of streams and stream miles of the Deep South Sound Tribs coho habitat.

Coho habitat area	Number of streams*	Total stream miles*	% of total stream miles
WRIA 13	25	39	18.4 %
WRIA 14	80	111	52.4 %
WRIA 15	45	62	29.2 %
<b>Total</b>	<b>150</b>	<b>212</b>	<b>100 %</b>

\*Data from LFA (WRIA 13), LE Strategy (WRIA 14), and WDFW SalmonScape map (WRIA 15).

Coho runs have been in decline in recent years and are considered a species of concern (SaSI, 2002) if their returning numbers don't increase. Therefore it is the intent of the WRIA 13 LE to focus much of our restoration and preservation efforts towards restoring these runs to the extent of our purview.

**Geographic / Project Priorities**

As a general approach, lowland freshwater habitat suitable for chum spawning is a priority for protection and restoration as the chum runs within WRIA 13 are healthy and maintaining that health is a priority.

With the declining Coho populations, Coho are a priority stock for both restoration and protection. This headwater species is dependent upon the freshwater for major portions of its lifestages for spawning adults and rearing for juveniles as they spend up to two years in the streams before out-migrating to the marine waters.

In order to better evaluate habitat conditions in WRIA 13 a strong priority will be given to address data gaps in both freshwater and marine shoreline areas.

The Co-managers (WDFW, Squaxin Island Tribe) have recently developed a stream ranking model for the South Sound (2005), based on basin size and intactness and species use, among other parameters (Table 6). Detailed explanation of the model can be found in Appendix B. While this ranking identifies the largest healthiest streams capable of producing the most fish, using the ranking in the strategy is not as simple as limiting projects to these “key streams”. This strategy considers the output of the ranking, but more significantly, it considers needs of specific stocks within their specific geographic range as the main framework to develop priorities.

**Table 6.** Stream ranking using the Co-manager’s model, as adopted by the LE.

<b>GENERAL STREAM PRIORITY</b>	<b>Tier</b>		
	<b>A</b>	<b>B</b>	<b>C</b>
	Deschutes	Adams	Indian – Moxlie
	Green Cove	Ellis	Mission
	McLane	Percival	Other Puget Sound Tribs
		Woodard	
		Woodland	

**Table 7.** Lengths of natural and bulkheaded marine shoreline in WRIA 13 from Thurston Regional Planning Council 2004.

<b>Geographic Area</b>	<b>Marine Shoreline (mi)</b>	<b>Length of Bulkheads (mi)</b>	<b>Percentage of bulkheaded shoreline</b>
Eld Inlet	37.9 (east shore only = 17.2)	13.7 (east shore only = 5.7)	36.1 (east shore only = 33.1)
Henderson Inlet	21.4	4.0	18.7
Budd Inlet	18.4	8.3	45.1
Dana Passage	8.4	3.1	36.9
Nisqually Reach	11.9	4.8	40.3
<b>Total</b>	<b>98.0</b>	<b>33.9</b>	<b>34.6 %</b>

### **Data Gaps**

Gathering an accurate portrait of WRIA 13 systems, including the upper reaches of fish distribution of known streams is a priority to ensure proper protection is allotted. Unnamed streams and tributaries that are unmapped and therefore unprotected from existing regulations are a significant portion of the existing data gap within the entire WRIA.

- In order to better evaluate habitat conditions in WRIA 13 a high priority will be given to address data gaps in both freshwater and marine shoreline areas.

### **Outreach Activities**

Despite the detrimental effects of urbanization in WRIA 13, the level of community outreach and involvement is quite high. The volunteer organization Stream Team is active within WRIA 13, with all three municipalities and Thurston County coordinating education and restoration activities in the area for public land. South Sound Green works with school teachers and children to monitor benthic invertebrates and water quality within local streams.

Local stormwater utilities also provide education and other resources to local landowners and general public. The South Puget Sound Salmon Enhancement Group and Thurston Conservation District provide direct services to help private landowners get involved with watershed restoration activities.

## **Individual Inlet Description**

### **Henderson Inlet**

Henderson Inlet is the eastern-most inlet of WRIA 13 and has a total area of about 32,000 acres. It includes the City of Lacey and as of 1988, had a population of 38,066, with an expected 2010 population of 61,018. With more than 11 shoreline miles and extensive tidal mud flats, this inlet is home to large commercial shellfish operations. The inlet has an average depth of 25 feet, and reaches its maximum depth of 60 feet near the mouth (Thurston County et al. 1995). Woodard and Woodland Creeks are the largest tributaries to Henderson Inlet and drain about 80% of the watershed.

Much of outer Henderson Inlet is rural with some suburban development. The City of Lacey's urban core is nested in the Woodland Creek watershed near its headwaters. As a result, stormwater impacts are notable in Woodland Creek, giving rise to high flows in the winter and low or sub-surface in the upper reaches during the summer months.

**Table 8.** Land cover in Henderson Inlet (TRPC, 2002)

<b>Land Cover</b>	<b>Area (ac)</b>	<b>% of Total</b>
Urban cover <sup>1</sup>	4,989	16
Forest cover <sup>2</sup>	11,766	37
Other <sup>3</sup>	15,077	47
<b>TOTAL</b>	<b>31,832</b>	<b>100</b>

<sup>1</sup>Urban cover refers to impervious surfaces such as roads, buildings and parking lots.

<sup>2</sup>Forest cover refers to coniferous and deciduous tree stands.

<sup>3</sup>Other refers to agricultural and shrub lands, and non-urban features in urban areas.

### **Significance to salmon**

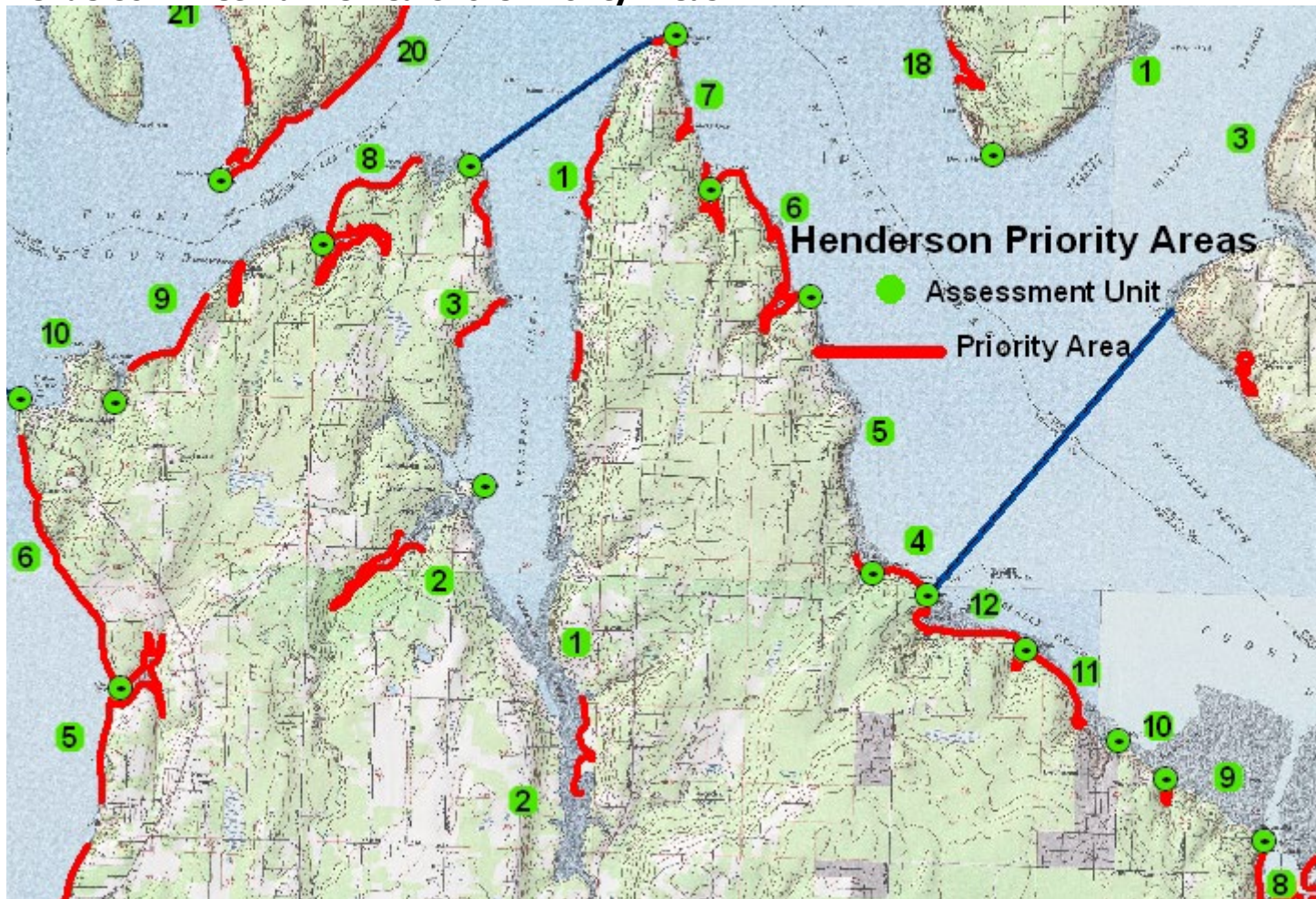
Henderson Inlet streams are habitat for Deep South Sound coho and a small run of chum. The status of Henderson Inlet chum is currently unknown, according to the 2002 SaSI report.

**Table 9.** Primary impacts to Henderson streams and shorelines.

<b>Henderson Inlet</b>	<b>WRIA#</b>	<b>Uppermost Distribution (RM)</b>	<b>Primary impacts</b>	<b>Priority Tier</b>
Marine shoreline	--	all	Bulkheads, beach erosion	See map below
Unnamed	13.0001	1	None	
Dobbs	13.0005	1.5	Urbanization?	

Woodland Fox Jorgenson Eagle	13.0006	5	Urbanization?	B
	13.0009	0.4	Fish passage	B
	13.0008	0.4	Fish passage	B
	13.0010	1.1	Fish passage	B
Woodard	13.0012	7	Urbanization?	B
Sleepy	13.0015	1	Water quality	

### Henderson Inlet Marine Nearshore Priority Areas



### Data Gaps

There exist numerous data gaps in the freshwater systems with regard to the condition of the habitat. Little also is known about the impacts of the stormwater on the hydrology and water quality of the freshwater systems.

## **Budd Inlet**

Budd Inlet is Puget Sound's southernmost marine water body. It is also the receiving waterbody for the Deschutes River. The inlet is approximately 7 mi long, 1 mi wide at its mouth, and 2 mi wide near its center. At its head lie two small bays, West Bay and East Bay, divided by a peninsula. The city of Olympia lies adjacent to these two bays. A narrow shipping channel and a dredged turning basin for the Port of Olympia is located in West Bay.

The outer portion of the inlet (commonly described as areas north of Ellis Cove) is different in character and habitat condition from the inner portion as a result of the intensity of land use. Rural residential development, including shoreline development is common along the outer portion of the inlet; several bulkheads exist in this area, however, good forest cover also exists. In the inner basin nearer the urban core of Olympia, several marinas line the shoreline on either side of the Port peninsula. Much of the inner West Bay was the site of former lumber and wood products industries that is now vacated and undergoing urban redevelopment.

Most of the stream in inner Budd Inlet flow through Olympia's urban and suburban areas. As a result, significant portions of these streams are impacted by altered hydrology and sedimentation from stormwater runoff. Restoring the health of these urban streams will require not only the repair of the degraded physical habitat conditions, but also reducing stormwater inputs, which is extremely challenging for existing development.

**Table 10.** Land cover in Budd Inlet (TRPC, 2002)

<b>Land Cover</b>	<b>Area (ac)</b>	<b>% of Total</b>
Urban cover <sup>1</sup>	6,496	14
Forest cover <sup>2</sup>	20,084	42
Other <sup>3</sup>	21,155	44
<b>TOTAL</b>	<b>47,735</b>	<b>100</b>

<sup>1</sup>Urban cover refers to impervious surfaces such as roads, buildings and parking lots.

<sup>2</sup>Forest cover refers to coniferous and deciduous tree stands.

<sup>3</sup>Other refers to agricultural and shrub lands, and non-urban features in urban areas.

### **Significance to salmon**

Budd Inlet hosts a diverse run of salmonids in its short streams. Deschutes hatchery chinook frequently stray into various Budd Inlet streams making up the largest numbers of returning fish. The mixed stock coho are, however, most widely distributed among these streams (excluding native cutthroat). Fish surveys by the Washington Dept of Fish and Wildlife (WDFW) unfortunately report low coho returns in past decades.

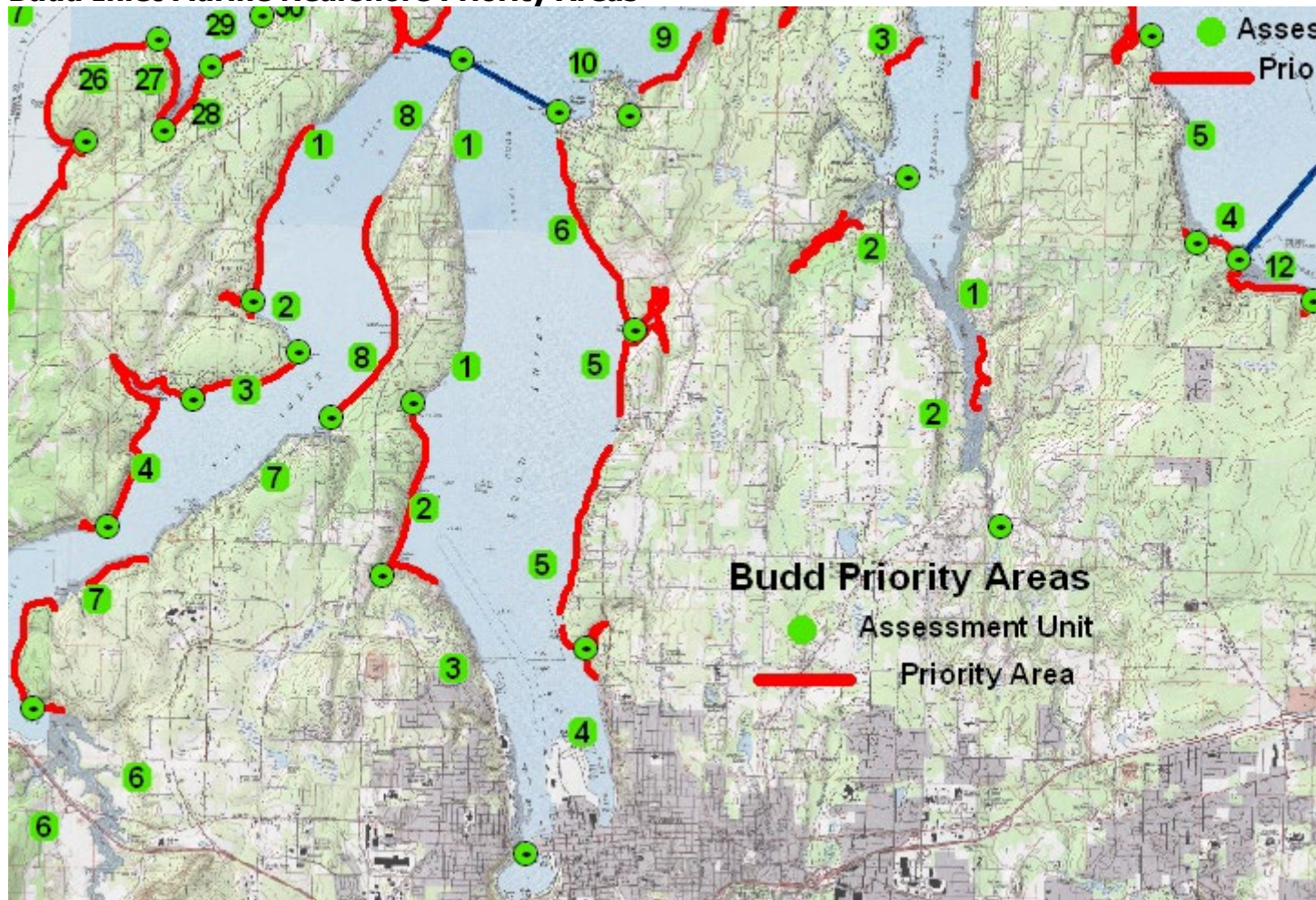
Deschutes coho are found in Percival Creek and Black Lake Ditch. WDFW also has observed a small chum presence in Budd Inlet streams, but recognizes that these streams are not historically significant spawning areas for chum.

The marine shorelines are significant habitat for juvenile salmonids according to a recent study by the Squaxin Island Tribe and Herrera.

**Table 11.** Primary impacts to Budd Inlet streams and shorelines.

<b>Budd Inlet</b>	<b>WRIA#</b>	<b>Uppermost Distribution (RM)</b>	<b>Primary impacts</b>	<b>Priority Tier</b>
Marine shoreline	--	all	Bulkheads, beach erosion	See map, below
Adams	13.0018	1.4	Passage, water quality	B
Unnamed	13.0021	0.3	????	
Ellis	13.0022	0.4	Fish passage	B
Mission	13.0025	0.4	Fish passage	C
Moxlie	13.0027	1.1	Water quality, natural substrate limitation	C
Indian	13.0026	1.2	Passage, urbanization	C
Percival	13.0029	3.3	Water quality, hydrology	B
Black Lake Ditch	13.0030	2.2	Artificial channel c.1920	B
Schneider	13.0131	0.3	Water quality, hydrology	C

## Budd Inlet Marine Nearshore Priority Areas



### Data Gaps

As a result of the community support and public ownership of stream corridors, the habitat conditions of most Budd Inlet streams have been quantified or quantitatively assessed by professional scientists. The cumulative impacts of urbanization in its respective influences (i.e. pollutant effects, hydrologic effects), however, are largely unknown.

Although WDFW conducts fish escapement surveys for chinook, coho, and chum on several Budd Inlet streams, the records are incomplete. More conclusive determinations of fish use are necessary, including survival of resident and juvenile anadromous fish in urban streams.

### Geographic/Project priorities

Deschutes Coho are thought to stray significantly into smaller streams in Budd Inlet as a result of their natural inclination and the geographic proximity to the river. Although most of these smaller streams are impacted by urbanization, they continue to hold

some numbers of resident and anadromous fish. Considering that the survival of the Deschutes run is dependent on a diversity of streams in which to stray, fish passage is a valid concern which needs to be balanced with urban water quality as a priority.

The City of Olympia has contributed a significant effort to enhance and restore urban stream habitat through the Storm and Surface Utility. During the past fifteen years, several large projects such as fish ladder installation, culvert replacement, stream corridor acquisition and regional stormwater facility construction, have supported the continued use of Olympia streams by returning and resident fish. Stormwater management, improved land use regulations, and riparian vegetation restoration continue to be the primary actions for urban portions of this inlet.

In the outer inlet, shoreline restoration and some fish passage issues remain the priorities for restoration work.

**Outreach activities**

The City of Olympia and the regional Stream Team have been strong advocates for community participation in salmon habitat projects. Through volunteer participation, both organizations have contributed thousands of hours to riparian revegetation, stream monitoring, and public outreach. These activities take place primarily on public land, however, some work is done collaboratively with private land owners on private land.

**Eld Inlet**

Eld Inlet is the least developed and consequently most intact watershed in WRIA 13. Although the western shore of the inlet is actually in WRIA 14, all of the eastern shore and the two main sub-basins, McLane and Green Cove, are within the WRIA 13 boundary. There are 30 miles of shoreline in the inlet and a total stream length of 47 miles.

This narrow inlet features several small coves along its shorelines with rural residential development along much of its length. The high bluffs at its outlet are in contrast to the low flat estuarine area of Mud Bay at its head. Residential and agricultural land uses are most common in the upper watershed, and the streams running through them are in private ownership.

**Table 12.** Land cover in Eld Inlet (TRPC, 2002)

Land Cover	Area (ac)	% of Total
Urban cover <sup>1</sup>	932	4
Forest cover <sup>2</sup>	14,721	63

Other <sup>3</sup>	7,881	33
<b>TOTAL</b>	<b>23,534</b>	<b>100</b>

<sup>1</sup>Urban cover refers to impervious surfaces such as roads, buildings and parking lots.

<sup>2</sup>Forest cover refers to coniferous and deciduous tree stands.

<sup>3</sup>Other refers to agricultural and shrub lands, and non-urban features in urban areas.

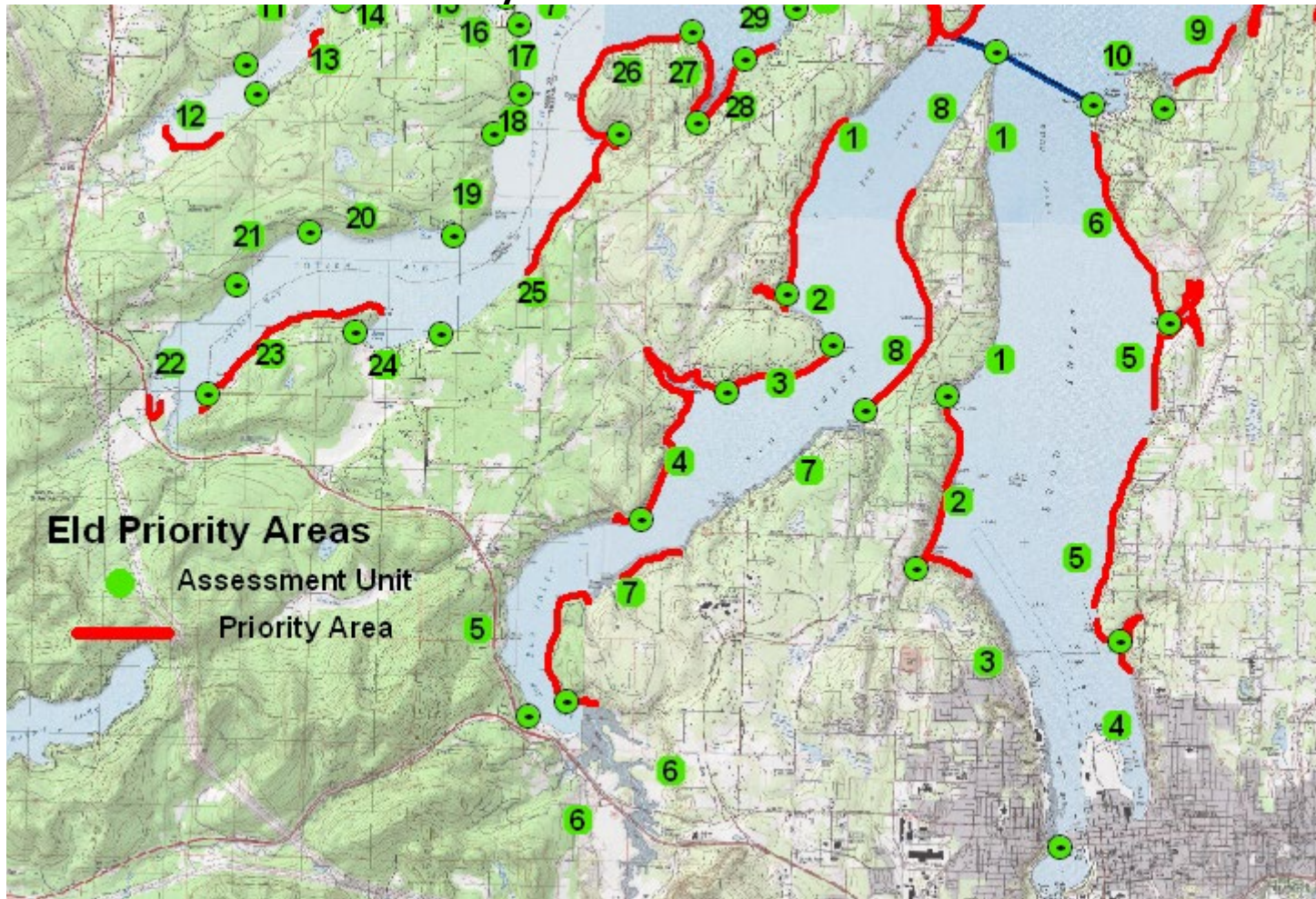
### Significance to salmon

Eld Inlet hosts a strong chum run, a weak coho run, and limited numbers of chinook.

**Table 13.** Primary impacts Eld Inlet shorelines and streams.

Eld Inlet	WRIA#	Uppermost Distribution (RM)	Primary impacts	Priority Tier
Marine shoreline	--	all	Bulkheads, beach erosion	See map, below
Green Cove	13.0133	3.4	Fish passage	A
Unnamed	13.0135	0.7		
Houston	13.0137	0.2		B
McLane Swift Perkins Cedar Flats Unnamed Beatty	13.0138	2.0		A
	13.0139	1.0		A
	13.0140	1.1		A
	13.0141	2.0		A
	13.0142	0.8		A
	13.0143	1.0		A

## Eld Inlet Marine Nearshore Priority Areas



### Project priorities

Green Cove Creek has been designated as Olympia's priority stream because of its good habitat condition and productivity. In 2002, Olympia created special "low impact development" regulations for the portion of the basin in Olympia in order to limit the density of development and discharge of stormwater. Conservation efforts by the City and Capitol Land Trust also have been important to protect the health of the basins wetlands and riparian areas. Continued work in conservation and restoring fish passage are central to the health of this basin.

In the McLane Creek basin, LWD is lacking throughout the system. Additionally, landowners have historically been difficult to reach in this area, making this watershed a candidate for an assessment of locations for LWD that combines with it extensive landowner outreach.

### Outreach activities

Thurston Conservation District (TCD) and the South Sound Salmon Enhancement Group (SSSEG) has worked with several private landowners in the McLane basin in recent

years. TCD’s role in assisting small farm owners develop farm plans for best management practices are central to restoring stream banks and riparian areas and limiting animal waste runoff from these tracts. The SSSEG has helped coordinate many instream projects, such as culvert replacement, channel restoration, and riparian planting.

**Deschutes River**

The Budd Inlet/Deschutes Watershed is comprised of 143 identified streams that provide over 256 linear miles of drainage. Total area of the watershed is 118,773 acres. The Deschutes River with its associated tributaries is the largest drainage system within the watershed. The 52 mile-long river drains approximately 166 square miles or about 84% of the total watershed.

Much of the upper watershed (RM 41 to 52) lies in the transient snow zone of 1,100 to 3,600 feet elevation. This upper extent is owned by commercial timber company. The lower 41 miles of drainage consists of a broad prairie valley floor that flows through mostly open farmland interspersed with dense stands of mixed deciduous and coniferous growth. The river drains to Capitol Lake, a man-made impoundment of the river mouth managed by the Washington General Administration.

**Table 14.** Land cover in Deschutes River watershed (TRPC, 2002)

Land Cover	Area (ac)	% of Total
Urban cover <sup>1</sup>	2,368	4
Forest cover <sup>2</sup>	33,229	59
Other <sup>3</sup>	20,687	37
<b>TOTAL</b>	56,284	100

<sup>1</sup>Urban cover refers to impervious surfaces such as roads, buildings and parking lots.

<sup>2</sup>Forest cover refers to coniferous and deciduous tree stands.

<sup>3</sup>Other refers to agricultural and shrub lands, and non-urban features in urban areas.

**Significance to salmon**

The Deschutes falls located upstream of Capitol Lake was a natural barrier to fish migration until the 1950’s, when a fish ladder was constructed and hatchery stocks of chinook and coho were planted in the river. A hatchery operation managed jointly by the Squaxin Tribe and WDFW captures chinook adults and also passes some chinook and all returning coho into the upper river for wild production.

**Table 15.** Primary impacts to Deschutes River and tributaries

Deschutes River	WRIA#	Uppermost Distribution (RM)	Primary impacts	Priority Tier
Capitol Lake	--	--		A
Deschutes mainstem	13.0028	41		A

Unnamed	13.0032	0.5		
Chambers	13.0033	3.8		
Unnamed	13.0034	0.5		
Spurgeon	13.0037	5.2		
Offut Lake outlet	13.0040	0.3		
Silver Springs	13.0041	1.0		
Unnamed	13.0042	0.6		
Unnamed	13.0045	1.6		
Reichel	13.0046	2.8		
Unnamed	13.0047	1.1		
Pipeline	13.0051	1.5		
Unnamed	13.0052	1		
Hull	13.0053	1.8		
Fall	13.0057	0.3		
Unnamed	13.0066	0.3		
Mitchell	13.0069	1.3		
Huckleberry	13.0086	1.2		
Johnson	13.0089	0.7		
Thurston	13.0095	5.0		
Unnamed	13.0097	1.0		
Unnamed	13.0102	2.0		

## - Appendix A -

# WRIA 13 Salmonid Profiles and Strategies

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## Salmonid Profiles

Salmonids spawning within the freshwater sub-basins of WRIA 13 include chum, coho, winter steelhead trout, and coastal cutthroat trout. Fall Chinook, pink, sockeye, and bull trout rely on the WRIA 13 nearshore for rearing, feeding, and migration.

### **Chum (*Oncorhynchus keta*)**

#### **Chum Life History**

South Puget Sound chum typically spawn over a four to five month period from September to March. Chum enter rivers at the slightest increase in stream flow, but late in the spawning season high flows are not essential. Chum are strong swimmers, but not leapers, often reluctant to enter long span fish ladders, and are typically found below the first significant barrier on a stream. They prefer to spawn immediately above turbulent areas or in areas of groundwater upwelling. Eggs are generally buried 20 to 50 cm (~ 8 to 20 inches) deep in the substrate. Premature emergence occurs when eggs are buried less than 20 cm deep. Chum have adapted to spawn in lesser water depths and velocities than pink salmon and some of the other members of the genus *Oncorhynchus*. Late chum stocks often select spawning sites near springs above 4°C (~ 39°F), protecting the eggs from freezing and resulting in relatively consistent emergence timing from year to year. Intertidal spawning provides a similar benefit because the redd is warmed by marine waters during each tidal cycle. After hatching the chum alevins move downward in the gravel. The fish have an elongated body that allows them to move through the substrate better than coho, Chinook, and steelhead alevins. They remain in the gravel from 6 to 25 days (Salo 1998).

Fry emerge from the gravel after about 5 months (generally from March through May), typically at night and immediately head downstream to the estuary, feeding along the way. They linger in the estuary while making the transition from fresh to salt water. The fry do not school strongly and are typically found in a scattered distribution. They typically feed on chironomids, mayfly larvae, caddisfly larvae, and other benthic invertebrates (Salo 1998).

Chum are second only to Chinook in their dependence upon estuaries. The timing of entry to seawater is often correlated with warming of nearshore waters and the associated plankton blooms. The juveniles feed primarily on zooplankton including copepods and amphipods. The fry feed extensively over submerged tide flats. This allows them to exploit both freshwater and marine food webs. Juveniles move offshore

when they reach 45 to 55 mm (~ 1.8 to 2.2 inches) fork length, enabling them to feed on larger prey and avoid predators. Their prey consists of a variety of zooplankton, krill, and fish larvae. Chum mature in the Gulf of Alaska and Bering Sea before returning to spawn as three to five-year-olds. Three and four-year-olds make up the bulk of runs in South Puget Sound streams (Salo 1998).

### **Henderson Inlet Fall Chum Profile**

There are no abundance trend data for Henderson Inlet fall chum, so their status is still unknown in 2002. Chum salmon are observed in Woodland Creek during surveys conducted for coho salmon. Larger numbers of chum salmon spawn downstream of the coho index area, so the numbers of chum do not necessarily reflect stock status.

#### Stock Definition

Henderson Inlet fall chum were identified as a stock based on their distinct spawning distribution.

#### Spawning Distribution

Most spawning takes place in Woodland and Woodard creeks.

#### Spawning Timing

Spawning generally occurs from late November through December.

#### Genetic Analysis

No genetic analysis has been done on Henderson Inlet fall chum.

#### Stock Origin

This is a mixed stock with wild production. Elson Creek Hatchery and Minter Creek Hatchery chum stocks have been planted in both Woodard and Woodland creeks in the past; however, Woodard Creek may still have a remnant native run.

### **Eld Inlet Fall Chum Profile**

SaSI rated the status for this stock as "healthy" in 2002. Escapements have been strong since the mid-1980s with very large escapements (in excess of 45,000 spawners) between 1994 and 1998 and in 2001. This stock is robustly healthy. Total escapement estimates are based on index counts of live spawners made annually in McLane, Perkins, Swift and Perry creeks.

#### Stock Definition

Eld Inlet fall chum were identified as a stock based on their distinct spawning distribution and genetic composition.

#### Spawning Distribution

Most spawning takes place in McLane, Swift, and Perry creeks.

#### Spawning Timing

Spawning generally occurs from late November through early January.

#### Genetic Analysis

Allozyme analysis has shown Eld Inlet Fall chum salmon to be genetically distinct from all other Washington chum stocks examined (Phelps et al. 1995).

#### Stock Origin

This is a native stock with wild production.

### **Coho (*Onchorhynchus kisutch*)**

#### **Life History**

Adult coho begin to enter streams when water temperatures decrease and flows increase, often making short explorations into the stream and then returning to saltwater. Upstream migration typically takes place during the day and is triggered by a large increase in flow, especially when combined with a high tide. Most coho return to spawn at three years of age. They typically spend four to six months incubating, up to fifteen months rearing in freshwater, then sixteen months feeding in the ocean. Coho spawn in a variety of stream types, including small coastal streams, large rivers, and remote tributaries. They will spawn just about anywhere that suitable gravel (15 cm or smaller in diameter) is present. Sites with groundwater seepage are preferred. The redd is typically located at the head of a riffle to promote good oxygen circulation. The eggs generally hatch in 40 to 60 days depending upon temperature. The alevins initially move downward in the gravel, likely an adaptation to prevent premature emergence of individuals that hatch close to the surface of the streambed (Sandercock 1998).

Fry about 30 mm in length emerge from the gravel about two to three weeks after hatching. Emergence occurs primarily at night. Fry that emerge first are typically larger than later emerging fry. These individuals tend to make up a large proportion of the fingerling population because they are able to out-compete smaller individuals for territories and prey. Following emergence, the fry hide in the substrate during daylight hours. After a few days they begin to swim along the banks and use whatever cover is available. Backwaters, side channels, and small streams are preferred areas, particularly in shaded areas with overhead cover. The fry may move upstream or downstream and occupy areas inaccessible to adult coho. Some coho rear in lakes, but the majority rear in streams where they establish and aggressively defend territories. They may be found in both pools and riffles, but are best adapted to pool habitat. Trout out-compete coho in riffles. The fry are active during daylight hours, defending their territories and making frequent dashes to capture prey (and foreign objects

perceived as prey). They settle to the bottom during the night to rest (Sandercock 1998).

Small individuals are often harassed, chased, and nipped by the larger individuals. Complex instream habitat composed of large rocks, large woody debris, and vegetation is important to rearing coho because production is limited by the number of suitable territories present. Displaced fry often end up in less favorable habitat where they are vulnerable to predation. They may also be driven downstream clear to the estuary. Fish that enter the estuary during the first spring or summer of life do not generally survive to adulthood. Coho are visual feeders and prefer food moving in suspension or on the surface. They rarely feed on non-moving food or along the stream bottom. The juveniles usually rear in slower sections of the stream that allow them to capture prey with a minimum of effort. Small streams are the most productive coho areas because they provide more marginal slack water habitat than large streams. The midstream portion of large streams is generally unsuitable for juvenile coho; therefore, any food drifting through this area is unavailable (Sandercock 1998).

Fingerlings move into off-channel habitat when fall freshets begin. Instream cover, side channels, small intermittent streams, and ponds provide shelter from winter storms that could sweep the fish out of the system. They also provide refuge from predators at a time when the fingerlings' swimming ability is limited by cold water temperatures. Beaver ponds provide shelter to avoid high flows during winter and low flows in the summer. However, small coho in ponds are more susceptible to predation from cutthroat trout. When juvenile coho rear in conditions with moderate water temperatures and abundant prey, they grow rapidly. The fry are about 30 mm long at emergence in March. They grow to 60 to 70 mm by September. By March of the second year, the fingerlings are 80 to 95 mm long. The juveniles are about 100 to 130 mm in length by May when they smolt. Exposure to water temperatures of 25°C (77°F) or greater is fatal to juvenile coho (Sandercock 1998).

In freshwater, juveniles are subject to predation by numerous animals including: cutthroat and rainbow trout, char, whitefish, sculpins, fish ducks, herons, mink, and otter. Garter snakes, dippers (water ouzel), robins, and crows are also significant consumers of juvenile coho. Coho smolts begin to migrate downstream in the spring. Fish size, stream flows, water temperature, dissolved oxygen levels, photoperiod, and forage availability have all been identified as factors that trigger migration (Shapovalov and Taft 1954). The outmigration generally peaks in May, with most movement occurring at night. The fish grow rapidly in the nearshore waters of the estuary feeding on invertebrates. After attaining a larger size, they shift to feeding on fish, krill, and crab larvae (Sandercock 1998).

## **Deschutes River Coho Profile**

SaSI rated this stock "critical" in 2002 due to a severe short-term decline in escapements between 1998 and 2001, a long-term negative trend in escapements and chronically low escapements. Not only has this stock been subject to the precipitous plunge in marine survival rates seen in all South Sound coho stocks, it has also been affected by severe perturbations in the upper Deschutes watershed. Data are collected from smolt counts at the Tumwater Falls smolt trap (RM 0.1) and total escapements based on adult counts at the Tumwater Falls adult trap (RM 0.1).

### Stock Definition

Deschutes coho were identified as stock due to their distinct spawning distribution.

### Spawning Distribution

Spawning takes place throughout the Deschutes River and in independent tributaries to Capitol Lake including Percival Creek and Black Lake Ditch.

### Spawning Timing

Most spawning occurs from late October to early January.

### Genetic Analysis

No genetic analysis has been done on Deschutes coho.

### Stock Origin

This is a non-native stock with wild production. No coho spawned in the Deschutes River prior to construction of a fish ladder at Tumwater Falls (RM 0.1) in 1954. The introduced coho are largely Soos Creek Hatchery (Green River) in origin.

## **Deep South Sound Tributaries Coho Profile**

A short-term decline in escapements and run sizes occurred in this and all other South Sound coho stocks in the mid- to late 1990s, largely the outcome of a precipitous plunge in marine survival rates. Escapements are still above historical lows, so SaSI rated this stock "healthy" in 2002. A Depressed rating may be warranted if an upward trend is not observed in the near future. Total escapement estimates are expanded from serial live fish counts in index areas throughout deep South Sound.

### Stock Definition

Deep South Sound Tribs coho were identified as a stock based on the geographic proximity and common estuary of the numerous small to medium-sized coho-producing tributaries in deep South Sound and on the common origin (Soos Creek (Green River) and Minter Creek hatcheries) of the hatchery coho that were stocked extensively into streams in this region. These hatchery introductions are expected

to have resulted in at least some genetic modification and/or homogenization of the original natural coho stock(s) in deep South Sound.

#### Spawning Distribution

Spawning takes place in all suitable and accessible streams in WRIA 13 in Eld, Budd, and Henderson Inlets.

#### Spawning Timing

Most spawning occurs from late October to mid-December.

#### Genetic Analysis

No genetic analysis has been done on Deep South Sound Tributaries coho.

#### Stock Origin

This is a mixed stock with composite production. Non-native coho are not regularly stocked into Deep South Sound tributaries any longer, but many hatchery strays are observed during natural spawning surveys (Chuck Baranski, WDFW, personal communication.).

### **Winter Steelhead Trout (*Onchorhynchus mykiss*)**

#### **Life History**

Adult winter steelhead generally enter freshwater from November through March. Spawning usually takes place within four months of freshwater entry. The majority of returning adult steelhead are three to four years of age. These fish typically display three distinct life histories: (1) two years in freshwater and one year at sea (about 50%), (2) two years in freshwater and two years in saltwater (about 30%), and (3) three years in freshwater and one year at sea (about 10%). Survival of steelhead to first spawning improves with increased juvenile size at outmigration, hence the prevalence of two or three years of freshwater rearing in the three major life histories. Small groups of adult steelhead enter the stream as water levels rise following storms. The fish generally migrate upstream during daylight hours. Spawning sites are typically located near the head of a riffle (pool tailout). The redd is constructed in medium to small size gravel and is composed of several egg pockets or "pits." Each pit is typically four inches to one foot deep and about 15 inches in diameter. After egg deposition and fertilization the female covers the pit by moving upstream a few feet and excavating another pit. In the process, the disturbed gravel is washed downstream, covering the prior excavation. The completed redd is about 60 square feet in size (Shapovalov and Taft 1954).

Resident rainbow trout (and cutthroat trout, see below) often congregate near spawning steelhead. These fish are commonly thought to be feeding on dislodged eggs, but the majority are sexually mature males that are likely attempting to

participate in the spawning act similar to immature (jack) Pacific salmon. Resident rainbow trout males have been observed spawning with female steelhead in the absence of a male steelhead (Shapovalov and Taft 1954). This behavior may be an important life history strategy that is likely less common today than it was historically (McMillan 2001). Cutthroat trout also readily interbreed with steelhead (e.g. Anon 1921, Hawkins 1997, Johnson et al. 1999).

Unlike Pacific salmon, not all steelhead die following spawning. Some spawned-out steelhead called "kelts" migrate downstream and return to the ocean. These fish are able to mature and spawn again. Steelhead eggs incubate for 19 to 80 days depending upon water temperature (60°F and 40°F respectively) and in the absence of high substrate embeddedness are believed to have a hatching success of 80 to 90%. The alevins are about 18 mm in length. Fry 23 to 26 mm in length typically emerge from the gravel two to three weeks after hatching. The fry initially congregate in schools, but eventually disperse up and down the stream, with each individual staking out a territory (similar to coho). By late summer, juvenile steelhead have moved to the swifter portions of the stream. During the fall and winter months, they take shelter in backwaters and eddies to prevent being swept downstream in floodwaters. Larval insects are the principal forage of fry and fingerling steelhead. As the juveniles grow, they consume larger prey including fish. Dislodged salmonid eggs are also important food items during the late fall and winter months (Shapovalov and Taft 1954).

Juvenile steelhead have a diverse suite of life histories, with fish migrating downstream from young-of-the-year (YOY) to four years of age. The bulk of downstream migration takes place in the spring and summer. Young-of-the-year through age two juveniles make up the bulk of downstream migrants with age three and four fish only a small proportion of the outmigration. The typical life history involves migration to the ocean at two years of age, but environmental conditions and sexual development can cause changes in the behavior pattern. Age one and YOY juveniles often remain in the lower portion of the stream or estuary for an additional year prior to migrating to the ocean. Age two and older fish typically migrate to the ocean immediately. The saltwater feeding habits of steelhead are likely similar to coho, with small fish feeding on invertebrates and larger fish feeding on fish (Shapovalov and Taft 1954).

### **Deschutes Winter Steelhead Profile**

There are no adequate abundance trend data with which to rate stock status, so SaSI rated this stock as "unknown" in 2002. Escapement is not monitored. Sport harvest data are now of no value in rating status since wild fish release was implemented in sport fisheries in 1993.

#### **Stock Definition**

Deschutes winter steelhead were identified as a stock based on their distinct spawning distribution.

### Spawning Distribution

Spawning occurs throughout the Deschutes basin and in Percival Creek.

### Spawning Timing

Spawning occurs from early March through mid-June.

### Genetic Analysis

No genetic analysis has been done on Deschutes winter steelhead.

### Stock Origin

This is a non-native stock with wild production. Steelhead did not have access to the Deschutes basin until a fish ladder was installed at Tumwater Falls in 1954. Chambers Creek Hatchery winter steelhead were introduced into the Deschutes.

## **Eld Inlet Winter Steelhead Profile**

There are no adequate abundance trend data with which to rate stock status, so SaSI rated this stock as "unknown" in 2002.

### Stock Definition

Eld Inlet winter steelhead were identified as a stock based on their distinct spawning distribution.

### Spawning Distribution

Spawning takes place in Eld Inlet tributaries including McLane and Perry creeks.

### Spawning Timing

Spawning timing is unknown but is thought to run from early February through mid-April.

### Genetic Analysis

No genetic analysis has been done on Eld Inlet winter steelhead.

### Stock Origin

This stock is thought to be native with wild production.

## **Coastal Cutthroat Trout (*Onchorhynchus clarki clarki*)**

### **Life History**

Coastal cutthroat spawn from late winter through late spring in low gradient reaches of small tributary streams or the lower reaches of larger streams. These streams are typically small with summer low flows often between 0.1 m<sup>3</sup>/s and 0.3 m<sup>3</sup>/s (~ 3.5 to

10.6 cfs) (Johnston 1982, cited in Trotter 1997). Pea to walnut size gravel is the preferred spawning substrate. Redds are typically constructed in pool tailouts 15 to 45 cm (~ 6 to 18 inches) deep. The deep water of the pool may be used as escape cover. If larger salmonids such as coho are present, cutthroat will migrate upstream above the reaches used by salmon. Repeat spawning female coastal cutthroat produce more eggs of a larger size than first-spawning females. The larger eggs develop into larger alevins that have higher survival than small alevins. Emergence from the gravel typically peaks in mid-April, but may extend from March through June. Newly emerged fry are about 25 mm (~ 1 inch) long. The juveniles spend their first few weeks in lateral habitats including low-velocity backwaters, side channels, and other areas of cover along the channel margin (Trotter 1997).

During the summer months, young-of-the-year (Age-0) cutthroat prefer to rear in pools and other slow-water habitats. However, if coho juveniles are present, cutthroat are often displaced into riffles. Coho emerge earlier and at a larger size than cutthroat. They are able to out-compete cutthroat because of their larger size, aggressive behavior, and body morphology better adapted to pool habitat. Juvenile steelhead may displace juvenile cutthroat from riffles in a similar fashion. Steelhead are more aggressive with a body better adapted to riffle habitat than cutthroat. Interactions between young-of-the-year coho, steelhead, and cutthroat during the summer rearing period may set a natural limit on cutthroat production in streams where all three species are present. Stream-rearing juvenile coastal cutthroat may be feeding generalists, consuming whatever prey is available. Age-0 cutthroat consume both benthic (bottom dwelling) and drift organisms. Age-1 and older cutthroat often eat coho fry up to 50 to 60 mm (~ 2 inches). Cutthroat parr, smolts, and kelts (spawned adults) eat a variety of items including: insect larvae, sand shrimp, and small fish. Territoriality and agonistic behavior between juvenile salmonids decreases with the approach of winter. The juveniles overwinter in deep pools associated with large woody debris and undercut banks, as well as boulders and cobbles that provide interstitial cover. Off-channel pools, side channels, and lakes are also used where available (Trotter 1997).

Puget Sound coastal cutthroat typically smolt at age 2 with an average length of 160 mm (~ 6 inches). Seaward migration begins as early as March and continues through mid-July, with a peak in late May to early June. Anadromy is not well developed in coastal cutthroat trout. They spend little time in saltwater and often remain in the tidewater and estuarine reaches of their home streams. While in saltwater, cutthroat generally travel along the shoreline within 50 km (~ 31 miles) of the home stream and are reluctant to cross deep open water. They grow about 25 mm (~ 1 inch) per month while foraging in salt water. Marine survival of coastal cutthroat is as much as 40% higher than other Pacific salmonids. Predation by Pacific hake, spiny dogfish, harbor seals, and adult salmon likely accounts for the majority of mortality (Trotter 1997).

Coastal cutthroat seldom over winter in salt water. They often return to freshwater the same year they migrated to sea, but not all of these fish are spawners. Few female coastal cutthroat mature sexually before age 4. The immature fish over winter in freshwater then return to saltwater a second time to forage. These fish spawn following their second return to freshwater (Trotter 1997). In Puget Sound only 20 to 27% of first-return females spawned, while nearly all of the first-return males spawned (Johnston 1982, cited in Trotter 1997). In large streams (summer low flows > 1.4 m<sup>3</sup>/s, ~ 49 cfs) fish enter freshwater from July through November with a peak in September and October. In small streams (summer low flows < 0.6 m<sup>3</sup>/s, ~ 21 cfs) that flow directly to saltwater, cutthroat enter freshwater from December through March with a peak in December and January. Coastal cutthroat survive spawning quite well (Trotter 1997). Kelts return to saltwater from late March through early April, about one month earlier than cutthroat smolt outmigration. This timing places the adults in a position to feed on outmigrating juvenile salmonids, particularly pink and chum salmon (Trotter 1997).

### **Western South Sound Coastal Cutthroat**

Coastal cutthroat are distributed throughout WRIA 13. SaSI rated the status of the Western South Sound stock "unknown" in 2002. We have no current quantitative data on abundance or survival with which to assess status. Smolt counts collected by the Washington Department of Fisheries for Mill Creek (Hammersley Inlet) date back to the 1980s and are not useful in determining their current status. Hunter (1980) rated anadromous cutthroat status in many of the tributaries in this region, based on habitat quality. The following systems were ranked as good: Deschutes River and Woodland Creeks.

#### **Stock Definition**

The Western South Sound coastal cutthroat stock complex is thought to be distinct from other South Sound stocks based upon the later timing of freshwater entry exhibited by its anadromous component and its distribution in the small to medium-sized independent streams of south and western Puget Sound. For characteristics such as spawning time, smolt age, age at first spawning and morphology, the differences among stocks are not well defined.

#### **Distribution:**

The anadromous life history form is likely to be found in most of the above listed systems, but presence and distribution in freshwater may be quite seasonal because of summer and fall low flows. The resident form of this stock complex is present in virtually all perennial independent streams in western South Puget Sound.

#### **Spawning Timing**

It is expected that these fish are late-entry. The fluvial form probably inhabits all of the medium-sized streams, and the adfluvial form may be present in as many as 12

lakes within the range of this stock complex. Anadromous spawnings are unknown but are thought to be similar to the North Puget Sound Tribs. Complex which is January through March.

### Genetic Analysis

Genetic collections from this region include Kennedy and John's Creeks, which are both significantly different from one another as well as from other South Sound collections.

### Stock Origin

Hatchery-origin cutthroat were released in the Deschutes River and McAllister Creek for several years. Interbreeding between hatchery and wild cutthroat is thought to have been unlikely because of high catch rates on hatchery fish and poor survival of hatchery-origin fish in the wild. Consequently, Western South Sound coastal cutthroat are considered native. The stock is maintained by wild production.

## **Fall Chinook (*Oncorhynchus tshawytscha*)**

### **Life History**

Fall Chinook rely on the WRIA 13 nearshore environment for rearing, feeding, and migration. The Chinook found in WRIA 13 streams are of hatchery origin and are not considered self-sustaining stocks.

Ocean type (fall) Chinook typically migrate to sea during the first year of life, normally within three months of emergence. They spend the majority of their life in coastal waters and return to the natal stream in the fall a few days or weeks prior to spawning. In contrast, stream type (spring) Chinook rear for one or more years in fresh water prior to migrating to sea where they undertake extensive ocean migrations. They return to the natal stream in the spring or summer, several months prior to spawning (Healey 1998).

Although Chinook are generally considered to prefer deeper and faster spawning areas than other species in the genus *Oncorhynchus*, measurements recorded in the literature do not suggest that Chinook avoid shallow water and low flows. Their large body size may allow them to hold position in faster currents and displace larger spawning substrates than other Pacific salmon, hence the perceived preference for deeper and faster water. Chinook have been observed spawning in water ranging from ~ 2 inches (5 centimeters) to 15 feet (~ 4.6 meters) deep. They appear to select spawning sites with high subgravel flows. This preference may be related to the increased sensitivity of Chinook eggs to fluctuations in dissolved oxygen levels when compared to other species of Pacific salmon (Chinook produce the largest eggs, yielding a small surface-to-volume ratio) (Healey 1998).

Chinook fry appear to have more difficulty emerging from small substrate than large substrate. Most fry emergence occurs at night. Following emergence the fry move downstream, also principally at night. The fry may continue the downstream migration to the estuary, or take up residence in the stream for a few weeks to a year or more depending upon the life history strategy. Fry migrants typically range in size from 30 to 45 mm fork length. Fingerling migrants are larger, with a range of 50 to 120 mm fork length. While rearing in fresh water, Chinook feed primarily on larval and adult insects and zooplankton (Healey 1998).

Chinook fry feed in estuarine nearshore areas until they reach about 70 mm fork length, at which time they disperse to marine areas. Chinook rearing in estuarine areas are opportunistic feeders and will consume a variety of prey ranging from chironomid larvae and zooplankton to mysids (opossum shrimps) and juvenile fish. Most fall Chinook do not migrate more than 1,000 km (about 620 miles) from their home stream during their ocean residence. Fish, particularly herring and sand lance, are the primary prey of Chinook during their ocean growth phase. However, invertebrates including euphausiids (krill), squid, and crab larvae are also important at times (Healey 1998).

### **South Sound Tributaries Chinook Stock Profile**

The evaluation of the South Sound Tributaries Chinook stock in the 1992 SASSI regarded all naturally spawning fish, including hatchery returns released or escaping above hatchery racks. These hatchery-origin adults, spawning in their basins of origin, were responsible for the large escapement numbers and the healthy rating for this stock in 1992.

In SaSI 2002, the fall Chinook spawning aggregations observed in south Puget Sound independent tributaries are not rated. The Co-managers support this action with the following rationale: (1) The independent tributaries in south Puget Sound are not typical Chinook habitat because of relatively small stream size and low flows during the late summer/early fall spawning season. (2) The current low escapements (outside of streams that support on-station Chinook production programs) are likely the result of past hatchery plants or straying from either current South Sound hatchery production or viable South Sound natural populations. (3) Fall Chinook likely were not historically self-sustaining in these habitats and have little chance of perpetuating themselves through natural production.

We do not regard fall Chinook spawning in generally small independent South Sound streams as being a distinct stock in the same sense that the term is used elsewhere in this inventory.

### Spawning Distribution

Most spawning takes place in McAllister Creek, Deschutes River, Percival Creek and other independent tributaries such as Woodland Creek, Mill Creek, Goldsborough Creek, Case Inlet streams, Carr Inlet streams, and East Kitsap streams.

### Spawning Timing

Spawning generally occurs from late September through October.

### Genetic Analysis

No genetic analysis has been done on South Sound Tribes Chinook.

### Stock Origin

South Sound tributaries are streams that we consider probably did not possess sustainable populations of Chinook historically. Present-day Chinook returns are due to the large releases from a number of South Sound hatcheries. Although locally returning Chinook are now used for broodstock at these hatcheries, their ancestry is largely Soos Creek Hatchery (Green River) Chinook.

## ***Pink (*Oncorhynchus gorbuscha*)***

### **Life History**

Pink salmon are not known to occur in the freshwater systems of WRIA 13. However, since neighboring WRIsAs (e.g., Nisqually) have natural stocks of pink salmon present. It is acknowledged that they may possibly use the WRIA 13 nearshore environment.

Spawning - Pinks use the mainstems of large rivers and some tributaries, often very close to saltwater. Because their fry move directly to sea after emerging, the closer they spawn to saltwater the better. The shorter journey reduces predation and increases survival. Sometimes pink salmon spawn right in saltwater, avoiding freshwater altogether.

Pinks have a very regular life history, living for two years before returning to spawn the next generation. This is why pink runs in Washington occur only every other year; there are no one-year-old or three-year-old fish to establish runs in the other years.

Rearing - As mentioned, pink fry do not rear in freshwater. Immediately after emerging they move downstream to the estuary and rear there for several months before heading out to the open ocean. Because of this, pink fry have no spots, which provide camouflage in streams, but are bright chrome for open water.

## **Bull Trout (*Oncorhynchus salvelinus*)**

### **Life History**

No freshwater systems in WRIA 13 are known to support bull trout. There is likely use of nearshore marine habitat by bull trout.

Bull trout reach sexual maturity at between four and seven years of age and are known to live as long as 12 years. They spawn in the fall after temperatures drop below 48 degrees Fahrenheit (8° C), in streams with cold, unpolluted water, clean gravel and cobble substrate, and gentle stream slopes. Many spawning areas are associated with cold water springs or areas where stream flow is influenced by groundwater. Bull trout eggs require a long incubation period compared to other salmon and trout (4-5 months), hatching in late winter or early spring. Fry remain in the stream bed for up to three weeks before emerging. Juvenile fish retain their fondness for the stream bottom and are often found at or near it.

Some bull trout may live near areas where they were hatched. Others migrate from streams to lakes, reservoirs, or saltwater a few weeks after emerging from the gravel.

# Salmonid Strategies

## Overall Approach

In WRIA 13, the freshwater systems primarily support chum as well as coho, cutthroat, steelhead, and Chinook hatchery strays. Salmonid habitat restoration and protection efforts in the freshwater systems will focus on improving natural processes that benefit self-sustaining species in the area. In the freshwater environment, those species are chum, coho, steelhead, and cutthroat. In the nearshore environment, the focus will be on chum, coho, cutthroat, steelhead, Chinook, and bull trout.

WRIA 13 will focus its efforts on restoring or protecting the natural processes for self-sustaining species. Achieving this goal involves pursuing a series of more specific smaller scale actions on a reach-scale basis.

The overall species priority within WRIA 13 is Coho. Their declining returns are of great concern and without aggressive action, will warrant listing through ESA. Following Coho, preserving the strong runs of chum is a focus of the efforts with the LE area.

## Freshwater Strategies

For freshwater environments, WRIA restoration and protection activities will focus on:

- ▶ In the upper stream reaches → migration, spawning and rearing habitat for coho, cutthroat, and steelhead
- ▶ In the lower reaches → migration habitat for all species, spawning habitat for chum, and rearing habitat for coho, cutthroat, and steelhead

## Nearshore Strategies

Since the marine nearshore and estuarine habitats are critical to the survival of salmonids in WRIA 13, the Lead Entity has placed a priority emphasis for projects that restore and protect the natural processes in these areas. Nearshore surveys for south Puget Sound show that the nearshore and marine environment support local juvenile salmonids as well as Chinook juveniles from north Puget Sound watersheds (unpublished Squaxin Island Juvenile Seining Study, 2003-2004). These environments are also essential for the migration, spawning and rearing of forage fish, which are essential prey species for salmon.

## **- Appendix B -**

### **Stream Prioritization**

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Appendix A focused on how WRIA 13 attains its Vision for Salmon Habitat Protection and Restoration within individual subbasins. This appendix examines how WRIA 13 achieves the Vision from a watershed perspective.

#### **Conceptual Approach**

The salmonid stream assessment model is designed to provide a means for ranking streams for conservation and restoration consideration using readily available information along with the professional opinion of qualified habitat biologists. The model can be run for an entire stream or independent reaches within a stream. Two equally weighted resource factors are provided for consideration; Biological and Habitat.

The ranking procedure produces two outputs; "Biological Potential" and "Restoration Potential". Biological potential is a combination of the existing and potential salmonid production; defined as the number of stocks present and available habitat. This information is combined with the percentage of the watershed that is covered by impervious surfaces. The available literature has shown that increasing impervious surfaces in a watershed directly correlates with decreased production of salmonids and high amounts of impervious surfaces will preclude any attempts to restore stocks.

The second model output is a "Restoration Potential" score. This score is a combination of the biological potential described above and the current condition of the habitat. The impetus behind this score is that degraded system that has high biological potential would be a better candidate for restoration than a degraded system with little biological potential for improvement. For example, in a system with all else being equal, a stream where impervious surfaces are less than 10% of the system has more potential than the same stream if 30% of the land base were covered by impervious surfaces. A high restoration potential score indicates that the habitat is highly degraded but the system has the biological capacity to repopulate the stream if conditions are improved. Caution must be used with the Restoration Potential score as it only reflects Sassi rated stocks, 303D listed waters, and in-stream flows.

A component for Restoration Potential that was not included but may be considered is an attribute measuring landowner willingness, access, and funding sources. The purpose of this would be to prevent a stream or reach from obtaining a high score when there is no possibility for restoration activity. However a "Biological Potential" score is still generated independently for this reach or stream that can be used to show

the need for restoration activity. This would also boost projects that have strong local support.

The LE Committee adopted the ranking structure created by the co-managers, based upon biological potential, restoration potential, and integrated in community issues. Below are the streams, ranked as information was inserted into the model developed for this purpose.

**Table 16: Freshwater Priorities**

<b>GENERAL STREAM PRIORITY</b>	<b>Tier</b>		
	<b>A</b>	<b>B</b>	<b>C</b>
	Deschutes	Adams	Indian – Moxlie
	Green Cove	Ellis	Mission
	McLane	Percival	Other Puget Sound Tribs
		Woodard	
		Woodland	

## - Appendix C -

# Subbasin/Nearshore Assessments and High Priority Habitat Projects & Programs

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## Overview

This chapter lays out the analytical approach used by the WRIA 13 Lead Entity to evaluate the habitat protection and restoration needs within each subbasin and to determine high priority actions. Using a stepwise approach, this chapter

- ▶ Summarizes general data about individual subbasins and its associated nearshore within WRIA 13;
- ▶ Analyzes the natural processes that create salmon habitat in each one;
- ▶ Outlines the limiting habitat features that disrupt those natural processes;
- ▶ Establishes a “prioritized work schedule” for each subbasin and the nearshore that will ultimately produce habitat capable of sustaining healthy populations of salmon

The primary resource for this chapter is the publication, Salmonid Habitat Limiting Factors Final Report, Water Resource Inventory Area 13, published in July 1999.

A second resource for developing high priority projects and programs for the nearshore was the draft Chinook and Bull Trout Recovery Approach for the South Puget Sound Nearshore prepared by the South Puget Sound Salmon Recovery Group (2004). Appendix A contains excerpted material from this draft document that is pertinent to WRIA 13 and is useful in understanding nearshore conditions and potential restoration actions. This draft report is in a preliminary review stage and the reader should note that changes are likely.

Augmenting this primary resource are published and anecdotal observations by field biologists, culvert inventories, and past project data. Complete citations are included in Appendix H.

A technical committee comprised of field biologists prepared the tables entitled “Assessment Overview of Watershed Natural Processes” for each subbasin by using data from the WRIA 13 LFA, more recent data, and occasional anecdotal evidence (noted with an “\*”) to establish a new rating table. The assessment ratings used in the tables for each limiting factor and their meaning are as follows:

- ▶ For freshwater limiting factors:
  - Poor .....Average habitat condition considered not properly functioning
  - Fair.....Average habitat condition considered at risk
  - Good .....Average habitat condition considered properly functioning
  
- ▶ For the nearshore, limiting factor of estuary connectivity (“Is there a good physical connection between the freshwater and saltwater systems?”):
  - Poor .....Impacted functions (dikes, migration barriers)
  - Fair.....Slightly impacted/modified (culvert allows for tidal exchange)
  - Good .....Not impacted

The selection of High Priority Habitat Projects & Programs for each subbasin and its associated nearshore is the product of technical committee analysis. Technical committee members are qualified field biologists who are knowledgeable about the attributes and limitations of each subbasin and its associated nearshore.

The rationale for selecting High Priority Habitat Projects & Programs within a subbasin reflects:

- ▶ Opportunities for protecting intact habitats that contribute to maintaining properly functioning conditions
- ▶ Restoration actions that address “poor” ratings within the “Assessment Overview of Watershed Natural Processes” and that provides the highest benefit to fish in a logical, sequential approach
- ▶ Projects that contribute to achieving the WRIA Vision for community support
- ▶ Address data gaps through studies or assessments that lead to habitat projects or results in broader understanding of the WRIA to support High Priority Projects and Programs

The list of High Priority Projects & Programs does not reflect a priority of one project over another. Furthermore, a “High Priority Project or Program” in one subbasin is on equal footing to a “high priority project or program” in another.

Across the watersheds of WRIA 13, the freshwater systems are void of LWD and disconnected from their floodplains, making many of them incised in many places. This inhibits natural gravel sorting, limiting spawning habitat for salmon. Pools and riffles are limited as well due to the lack of LWD, with many of the streams having more runs. Urbanization has affected the riparian corridors, encroaching on the natural green spaces that surround the streams, thereby creating the absence of LWD in the systems. These problems are cyclical. Opening up intact habitat for Coho usage, creating LWD jams, planting riparian corridors and protecting habitat are priority actions within the area.

## Watershed Summary

This WRIA is unique in that it has such a vast amount of marine shoreline within Budd, Eld, and Henderson Inlets (85.17 miles) with one large watershed (Deschutes River) and numerous small streams draining directly into the Puget Sound. The area includes both rural and urban land uses. However, the urban areas continue to expand as they accommodate population growth demands in compliance with the State Growth Management Act. In WRIA 13, the impervious cover increased from 7% to 10% during 1985-2000 due to development.

The land use character of the three watersheds is different: Urban land use for the three watersheds is as follows:

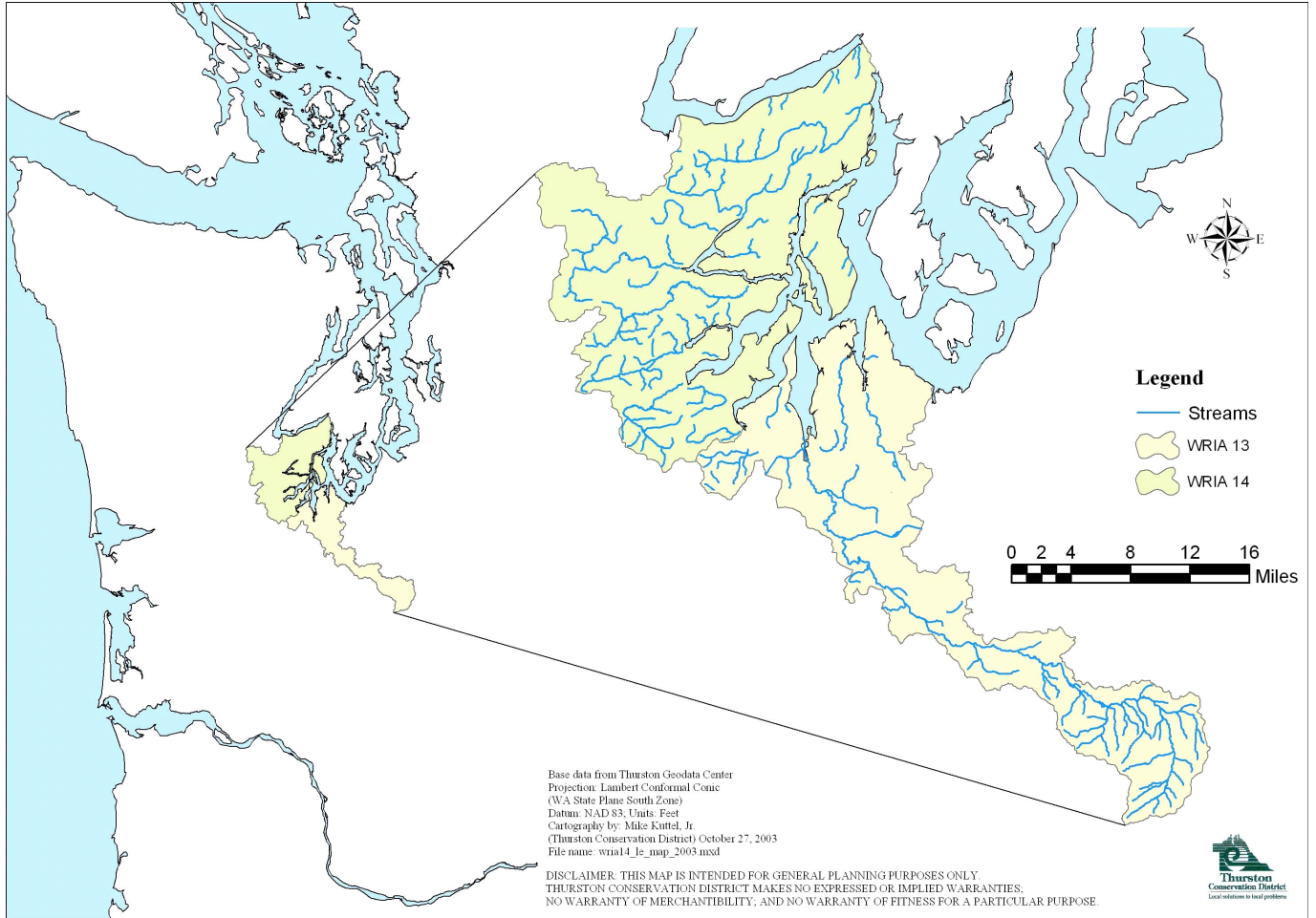
Inlet	Total Acreage	Percent of Total Impervious Area*
Budd Inlet	104,000 acres	6.5 %
Eld Inlet	24,000 acres	2.9 %
Henderson Inlet	32,000 acres	12.0 %

Budd and Henderson watersheds contain the urban centers of Olympia, Lacey, and Tumwater with some outlying rural residential development. Eld watershed has primarily rural residential development with large areas owned by the State of Washington and The Evergreen State College.

The condition of WRIA 13 streams range from highly urban streams (e.g. Indian Creek) to healthy systems (e.g. McLane Creek). For many streams, the lack of survey work leaves significant quantitative data gaps. In many WRIA 13 watersheds, this lack of habitat condition information creates a challenge to effectively addressing salmon habitat restoration or protection efforts in WRIA 13.

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\* The Relationship of Land Cover to Total and Effective Impervious area. 2003. Thurston Regional Planning Council.

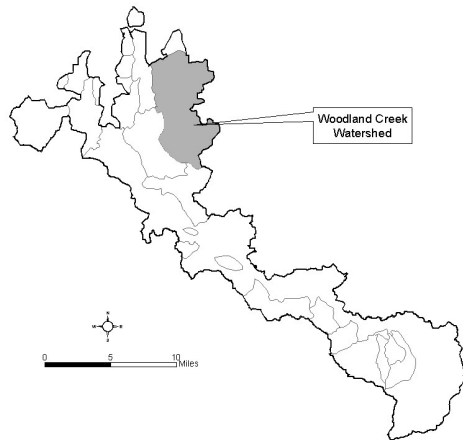


## Potential Restoration Projects for Addressing Limiting Factors

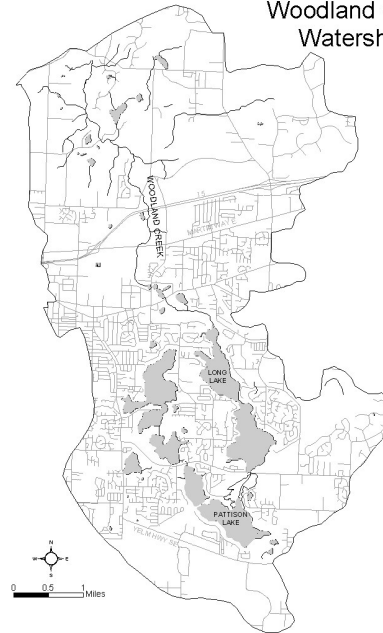
Limiting Factor	Recommendations
<i>Fish passage</i>	Install fish passage structures Replace failed culverts Replace grade control structures
<i>Riparian canopy closure</i>	Improve land use regulation & enforcement Fence livestock out of riparian zones Replant native riparian vegetation, particularly conifers
<i>Streambank condition</i>	Remove or setback dikes, remove riprap Remove meandering channel geometry Replant native riparian vegetation, particularly conifers
<i>Floodplain connectivity</i>	Improve land use regulations & enforcement Prevent development on floodplains & along channel banks Remove or setback dikes, remove riprap Restore meandering channel geometry
<i>Substrate embeddedness</i>	Replant native riparian vegetation Follow guidelines in "Forest & Fish Report" Build fewer roads & maintain existing roads Prevent development on floodplains & along channel banks
<i>Large woody debris total/ Large woody debris key pieces</i>	Preserve large coniferous trees in riparian zones Place LWD in spawning & rearing areas Restore meandering channels Leave LWD in channels & replant native riparian vegetation, particularly conifers
<i>Pool frequency</i>	Preserve large coniferous trees in riparian zones Place LWD in spawning & rearing reaches Restore meandering channel geometry Leave LWD in channels & replant native riparian vegetation, particularly conifers
<i>Pool quality</i>	Place LWD in spawning & rearing reaches Restore meandering channel geometry Leave LWD in channels & replant riparian vegetation
<i>Off-channel habitat</i>	Improve land use regulations & enforcement Prohibit dikes/levees and filling of wetlands Remove or setback dikes, remove rip rap Replant native riparian vegetation
<i>Temperature Dissolved oxygen</i>	Increase summer instream flows Replant native riparian vegetation, particularly coniferous trees/ protect riparian buffers Maintain natural wetland function (i.e. do not create lakes) Enforce water quality regulations
<i>Water quality/dewatering</i>	Increase summer instream flows Limit development Restore floodplain connectivity Reduce surface water losses on losing reaches Maintain forest cover Enforce water quantity regulations
<i>Change in flow regime</i>	Increase summer instream flows Limit development Restore meandering channel geometry Enforce water quantity regulations
<i>Biological processes</i>	Eradicate exotic fish and riparian plant species Seed upper watersheds with pathogen-free hatchery carcasses Allow beaver populations to rebuild

# Woodland Creek

WRIA #13 Deschutes



Woodland Creek Watershed



<b>Basin</b>	Henderson Inlet
<b>Watershed Acreage</b>	18,873 acres
<b>Anadromous Salmonid Use</b>	<ul style="list-style-type: none"> <li>▶ Nearshore: coho, Chinook, bull trout, chum, steelhead, and cutthroat</li> <li>▶ Freshwater: coho, chum, steelhead, and cutthroat (Chinook = hatchery origin, not self-sustaining).</li> </ul>
<b>Land Use</b>	Mixed rural and urban development
<b>Total Stream Miles</b>	15.7 miles
<b>Anadromous Stream Miles</b>	10.4 miles
<b>Stream Typing</b>	20.7 miles type 1 waters; 2.6 miles type 2; 15.1 miles type 3; 1.1 miles type 4; 3.5 miles type 5; 13.8 miles type 9. Note that stream lengths include pond and lake shorelines that are typed in the DNR hydro layer
<b>303(d) Listings</b>	Dissolved oxygen, fecal coliform, temperature
<b>Community Involvement</b>	Community and city council offer strong support for salmon and habitat restoration.
<b>Priority Tier</b>	B

## Ownership Pattern

Residential development dominates the headwaters at the lake/wetland complex. Urban land uses within the City of Lacey dominate the central basin. The lower watershed becomes semi-rural residential as it drains to its mouth at Henderson Inlet. The final reach of the creek above the Henderson Inlet estuary is a habitat preserve owned by Thurston County.

## Watershed Description

Development throughout the watershed basin impacts the natural function of Woodland Creek. These impacts include sudden and increased fluctuations of instream flows, excessive bank erosion, and sporadic riparian vegetation. The large wetland/lake complex at the headwaters of the mainstem Woodland drains to Lake Lois where the creek goes subsurface during low flow periods from the lake to Martin Way, a distance of approximately one mile. Juveniles are seen upstream of this point annually. Below Martin Way, large springs provide strong year-round base flows.

The system is naturally sand dominant with pockets of gravels, a condition amplified by stormwater issues. The City of Lacey has plans to construct a new stormwater facility to alleviate the erratic flow issues, particularly during the winter months. The residents, surrounding community, and city council offer strong support for salmon and habitat protection.

The basin contains numerous tributaries that are partially protected from the highflow events of the mainstem and represent underutilized habitat potential for salmonids. Fox and Palm Creeks offer 1.6 and 2.0 miles, respectively, of good rearing habitat with consistent flows and high quality wetlands. Jorgensen Creek provides 3.1 miles of rearing and spawning habitat for coho and cutthroat, while Eagle Creek serves as 2.6 miles of spawning habitat primarily for Henderson Inlet fall chum. Nearby Dobbs Creek, a tributary to Henderson Inlet, provides chum spawning and spawning and rearing for coho and cutthroat.

## Assessment Overview of Watershed Natural Processes

Fish Passage	Riparian Condition	Riparian Canopy Closure	Streambank Condition	Floodplain Connectivity	Substrate Embed.	LWD Total	LWD Key Pieces	Estuary Connectivity
Fair	Fair - Poor	Data Gap	Fair <sup>a</sup> - Poor <sup>b</sup>	Fair <sup>a</sup> - Poor <sup>b</sup>	Poor	Poor-Fair	Poor - Fair	*Good

Pool Frequency	Pool Quality	Off-Channel Habitat	Water Quality		Water Quantity/Dewatering	Change in Flow Regime	Biological Processes
			Temperature	Dissolved Oxygen			
Poor	Poor	Good	Good <sup>a</sup> Poor <sup>b</sup>	Good <sup>a</sup> Data Gap <sup>b</sup>	Fair <sup>a</sup> Poor <sup>b</sup>	Poor	Fair <sup>a</sup> Poor <sup>b</sup>

<sup>a</sup>Below RM 3.7, <sup>b</sup>Above RM 3.7

## **High Priority Habitat Projects & Programs**

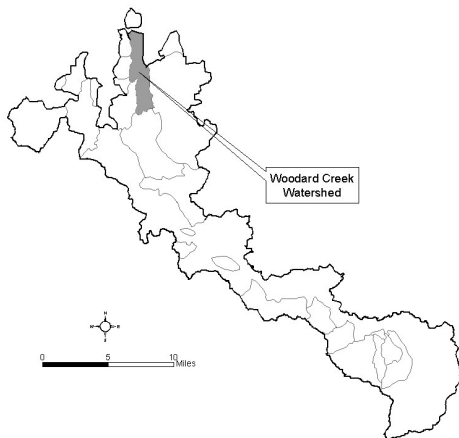
- ▶ Create a community showcase and education site. Create a community accessible viewing site for educational purposes to increase the appreciation for salmon, their issues, and their habitat. Increased education will help build on current knowledge to help perpetuate future projects.
- ▶ Protect land adjacent to Draham road up to RM 3.7. This site offers the upper limit of spawning in Woodland Creek.
- ▶ Provide adequate management to reduce/eliminate current stormwater impacts. Ensure that future development of the vacant Urban Growth area along Carpenter Road north of Draham Road does not have negative impact on flows or riparian habitat.
- ▶ Address instream flow issues.

## **Other Habitat Projects & Programs**

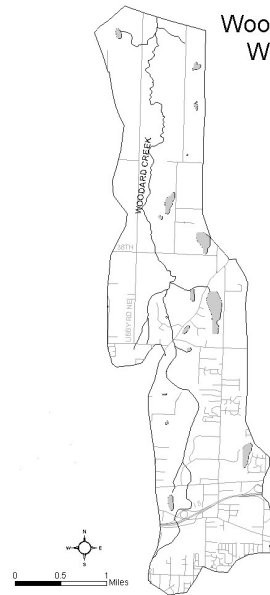
- ▶ Restore riparian corridor to provide shade, stabilize streambanks and recruit LWD. Plant appropriate species (incorporate additional conifer in the riparian corridor).
  - Utilize the City of Lacey's riparian assessment to identify appropriate locations for riparian restoration actions.
- ▶ Increase LWD key piece abundance to encourage pool formation and sorting of sediments. Develop a strategy to place instream LWD for immediate benefits until riparian conditions improve to allow natural recruitment.

# Woodard Creek

WRIA #13 Deschutes



Woodard Creek Watershed



<b>Basin</b>	Henderson Inlet
<b>Watershed Acreage</b>	4,479 acres
<b>Anadromous Salmonid Use</b>	<ul style="list-style-type: none"> <li>▶ Nearshore: Chinook, bull trout, coho, chum, steelhead, and cutthroat</li> <li>▶ Freshwater: coho, chum, steelhead, and cutthroat (Chinook = hatchery origin, not self-sustaining)</li> </ul>
<b>Land Use</b>	Rural / urban development, DNR Natural Areas Preserve in the estuary.
<b>Total Stream Miles</b>	8.2 miles
<b>Anadromous Stream Miles</b>	7.0 miles
<b>Stream Typing</b>	0.5 miles type 2 waters; 6.2 miles type 3; 2.5 miles type 4; 2.3 miles type 5; 4.2 miles type 9. Note that stream lengths include pond and lake shorelines that are typed in the DNR hydro layer
<b>303(d) Listings</b>	None
<b>Community Involvement</b>	DNR natural area preserve has high community activity.
<b>Priority Tier</b>	B

## Ownership Pattern

Woodard Creek empties into Woodard Bay, an intact saltmarsh owned and protected by a Department of Natural Resources (DNR) Natural Areas Preserve. The remainder of the stream is in private development.

## Watershed Description

A significant amount of effort is underway to restore the natural processes of Woodard Creek. Stormwater runoff from Lacey’s South Sound Center and Olympia’s commercial corridor along Pacific Avenue has impacted much of this stream’s natural functions. The construction of a stormwater treatment facility will aid in alleviating the detrimental aspects of runoff, including water quality issues and increased flows. Despite this limiting factor, Woodard Creek originates in a large wetland complex that offers rearing for coho and cutthroat. A recently completed 70-acre riparian planting south of 26<sup>th</sup> Avenue will enhance the wetland complex. The stream runs through mixed rural residential developments to the mouth, an intact saltmarsh estuary protected by a DNR Natural Areas Preserve. The availability of spawning gravels throughout the system has not been quantified, however, the area north of 46<sup>th</sup> Avenue has been identified as having good spawning habitat. In other areas, fine sediment dominates. There is a lack of large woody debris throughout the system. Thurston County plans to replace a partial barrier culvert under South Bay road in the next five years. One partial barrier exists under 36<sup>th</sup> Ave and several more severe (67% impassable) barriers exist on the tributaries.

## Assessment Overview of Watershed Natural Processes

Fish Passage	Riparian Condition	Riparian Canopy Closure	Streambank Condition	Floodplain Connectivity	Substrate Embed.	LWD Total	LWD Key Pieces	Estuary Connectivity
Fair	Fair	Fair	Fair	Data Gap	Data Gap	Data Gap	Data Gap	*Good

Pool Frequency	Pool Quality	Off-Channel Habitat	Water Quality		Water Quantity/Dewatering	Change in Flow Regime	Biological Processes
			Temperature	Dissolved Oxygen			
Data Gap	Data Gap	Data Gap	Good	Good	Good	Poor-Fair	Fair

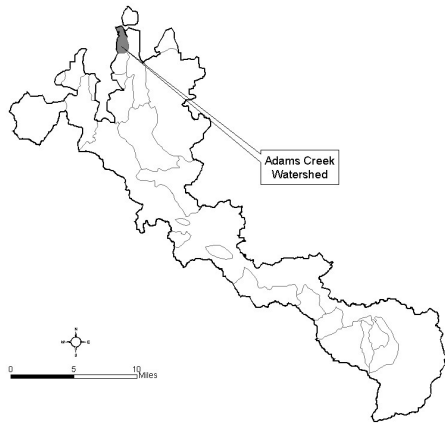
## High Priority Habitat Projects & Programs

- ▶ Prioritize and repair fish passage barriers.
- ▶ Improve riparian corridors, primarily in the lower basin, for increased shade and large woody debris (LWD) recruitment. Restore riparian corridor to provide shade, stabilize streambanks and recruit LWD. Plant appropriate species.

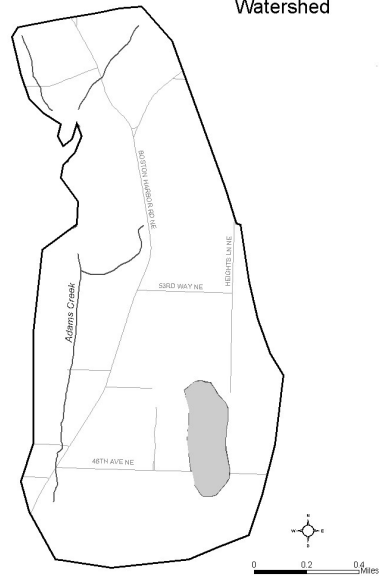
- Increase LWD key piece abundance to encourage pool formation and sorting of sediments. Develop a strategy to place instream LWD for immediate benefits until riparian conditions improve to allow natural recruitment.
  - Utilize the Thurston Conservation District's riparian assessment to identify appropriate locations for riparian restoration actions.
- 
- ▶ Provide adequate management to reduce/eliminate current stormwater impacts.
  - ▶ Identify and correct areas where livestock have direct access to Woodard Creek.
  - ▶ Educate landowners located in the Woodard Creek Basin to increase compliance with landuse regulations and voluntary implementation of best management practices.
  - ▶ Protect and restore stream associated and headwater wetlands.

# Adams Creek

WRIA #13 Deschutes



Adams Creek Watershed



<b>Basin</b>	Budd Inlet
<b>Watershed Acreage</b>	1,006 acres
<b>Anadromous Salmonid Use</b>	<ul style="list-style-type: none"> <li>▶ Nearshore: Chinook, bull trout, coho, chum, steelhead and cutthroat</li> <li>▶ Freshwater: coho, chum, and cutthroat</li> </ul>
<b>Land Use</b>	Residential
<b>Total Stream Miles</b>	1.5
<b>Anadromous Stream Miles</b>	Approx. 1.5
<b>Stream Typing</b>	0.1 miles of type 1 waters; 1.4 miles of type 3 waters; 0.2 miles of type 4 waters; 0.4 miles of type 5 waters; 1.1 miles of type 9 waters. Note that stream lengths include pond and lake shorelines that are typed in the DNR hydro layer
<b>303(d) Listings</b>	None
<b>Community Involvement</b>	Strong involvement with local landowners in protection and restoration projects (Capitol Land Trust).
<b>Priority Tier</b>	B

## Ownership Pattern

One private landowner owns the majority of the Gull Harbor Estuary with the remainder of the watershed divided into smaller residential lots.

## Watershed Description

Adams Creek and three other small, unnamed creeks drain into Gull Harbor, a substantial 30-acre protected estuary habitat on Budd Inlet. The intact estuary represents one of the only remaining contiguous unarmored shoreline reaches in all of Budd Inlet. Adams Creek has two partial (33% passable) barriers at the road crossings on Boston Harbor Rd. The stream lacks key pieces of LWD, though the riparian corridor is functioning with regards to stream bank conditions. Adams Creek runs through a wetland complex, providing rearing habitat for juvenile coho. Tributary 13.0019 has a complete blockage at river mile 0.2 as it runs through agricultural pasturelands, with little to no riparian buffer. Tributary 13.0020 has a full and a partial (33% passable) barrier towards the mouth, severely limiting access to one mile of intact habitat. The riparian cover consists of a mixture of conifers and deciduous vegetation, with off-channel habitat for rearing. Current sampling of the benthic invertebrates is on going, documenting the health of this tributary. Tributary 13.0021 has a full and a partial (33% passable) blockage at RM 0.5. The riparian corridor is functioning, with mixed riparian buffers and instream LWD. Adams Creek and the other tributaries to Gull Harbor face serious development pressures as one of Olympia’s most highly desired residential areas. Several conservation easements are in place to protect this vulnerable nearshore habitat.

## Assessment Overview of Watershed Natural Processes

Fish Passage	Riparian Condition	Riparian Canopy Closure	Streambank Condition	Floodplain Connectivity	Substrate Embed.	LWD Total	LWD Key Pieces	Estuary Connectivity
*Fair-Poor	*Fair	Data Gap	*Fair	*Good - Fair	Data Gap	*Fair Lower Reach *Poor – Upper Reach	Data Gap	*Good Poor = stream 13.0020

Pool Frequency	Pool Quality	Off-Channel Habitat	Water Quality		Water Quantity/ Dewatering	Change in Flow Regime	Biological Processes
			Temperature	Dissolved Oxygen			
Data Gap	*Fair - Poor	Data Gap	*Good	*Good	Data Gap	Data Gap	*Fair

## High Priority Habitat Projects & Programs

- Protect Adams Creek wetland and provide contiguous protected corridor with the existing easements on the estuary.

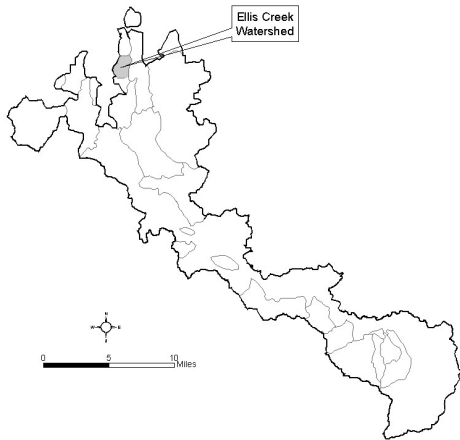
- ▶ Remove blocking culverts in Adams Creek subbasin (streams 13.0020, 13.0021, and 13.0018)
- ▶ Ensure that land use regulations protect wetland, estuary, and nearshore habitat functions.
- ▶ Preserve nearshore habitat functions from development pressures (fee simple purchase, easements).
- ▶ Restore riparian corridor to provide shade, stabilize streambanks and recruit LWD. Utilize Thurston Conservation District riparian assessments to locate potential restoration sites and plant appropriate species.

### **Other Habitat Projects & Programs**

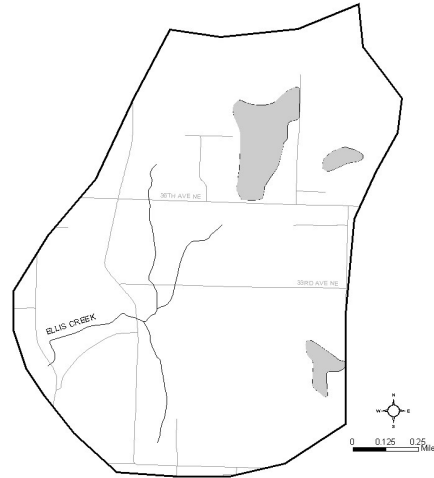
- ▶ Educate landowners located in the Adams Creek Basin to increase compliance with land use regulations and voluntary implementation of best management practices (i.e., livestock exclusion fencing).
- ▶ Assess habitat potential on 13.0019.

# Ellis Creek

WRIA #13 Deschutes



Ellis Creek Watershed



<b>Basin</b>	Budd Inlet
<b>Watershed Acreage</b>	1,472 acres
<b>Anadromous Salmonid Use</b>	<ul style="list-style-type: none"> <li>▶ Nearshore: Chinook, bull trout, coho, chum, steelhead, and cutthroat</li> <li>▶ Freshwater: coho, cutthroat</li> </ul>
<b>Land Use</b>	Rural light development
<b>Total Stream Miles</b>	4.3 miles
<b>Anadromous Stream Miles</b>	2 miles
<b>Stream Typing</b>	1.2 miles type 2 waters; 0.5 miles type 3; 1.4 miles type 4; 0.1 type 5; 1.0 miles type 9. Note that stream lengths include pond and lake shorelines that are typed in the DNR hydro layer
<b>303(d) Listings</b>	None
<b>Community Involvement</b>	Fish habitat reach is within a popular public park.
<b>Priority Tier</b>	B

## Ownership Pattern

The mouth of Ellis Creek is within Priest Point Park, a facility owned by the City of Olympia. The remainder of the creek is in rural residential ownership.

## Watershed Description

Ellis Creek is a rural stream with three headwater tributaries. The southernmost tributary has headwaters at Setchfield Lake. The lower reach (0.4 mi) used by salmonids is largely within Priest Point Park. Nearly all the natural processes in this rural stream are intact. The low impervious area and few road crossings have maintained the streams natural hydrology and biotic integrity (as measured by macroinvertebrate diversity). The intact riparian corridor in the lower reaches provides ample shade, though LWD recruitment is unknown. While the estuary is functional, a partial barrier culvert at the mouth constricts the stream and impedes adult and juvenile fish passage. Juvenile fish passage is restricted in the upper tributaries by four additional culverts.

## Assessment Overview of Watershed Natural Processes

Fish Passage	Riparian Condition	Riparian Canopy Closure	Streambank Condition	Floodplain Connectivity	Substrate Embed.	LWD Total	LWD Key Pieces	Estuary Connectivity
*Poor	Data Gap	Data Gap	Data Gap	Data Gap	Data Gap	Data Gap	Data Gap	*Poor

Pool Frequency	Pool Quality	Off-Channel Habitat	Water Quality		Water Quantity/Dewatering	Change in Flow Regime	Biological Processes
			Temperature	Dissolved Oxygen			
Data Gap	Data Gap	Data Gap	Good	Good	Data Gap	Data Gap	Data Gap

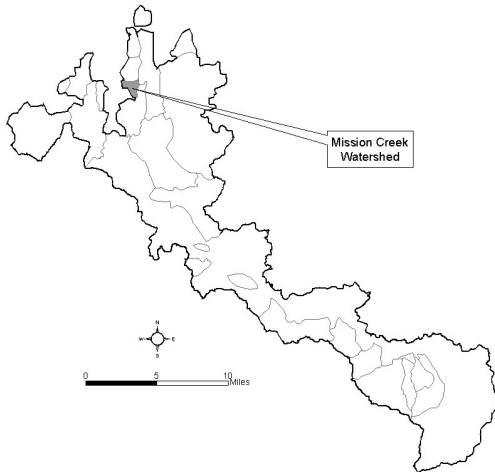
## High Priority Habitat Projects & Programs

- ▶ Replace culverts at East Bay Drive, 33<sup>rd</sup> Ave and Gull Harbor Rd. These three culverts represent two complete and one partial (67%) barrier on the system. Thurston County conducted a feasibility study on the blockage on Gull Harbor Rd. Since there is extensive fill, the cost of correction is high and partnerships and diversification of funding is encouraged. (Habitat to be opened: Gull Harbor Road= approximately 2 miles, 1694 square meters of spawning habitat, 7800 square meters of rearing habitat; 33<sup>rd</sup> Ave = 197 square meters of spawning habitat and 6391 square meters of rearing habitat).
- ▶ Actions should be taken to ensure the protection of the headwaters (wetland) and the riparian corridor. Continue to keep land use conversion minimized (last 15 years there was a 2% conversion from forest to urban).

- ▶ Educate landowners located in the Ellis Creek Basin to increase compliance with landuse regulations and voluntary implementation of best management practices.
- ▶ Implement restoration efforts consistent with the findings of the Thurston Conservation District's riparian assessment.
- ▶ Conduct habitat assessment to fill data gaps for natural process needs.

# Mission Creek

WRIA #13 Deschutes



Mission Creek Watershed



<b>Basin</b>	Budd Inlet
<b>Watershed Acreage</b>	359 acres
<b>Anadromous Salmonid Use</b>	<ul style="list-style-type: none"> <li>▶ Nearshore: Chinook, bull trout, coho, chum, steelhead, and cutthroat</li> <li>▶ Freshwater: coho and cutthroat</li> </ul>
<b>Land Use</b>	Urban residential
<b>Total Stream Miles</b>	1.5 miles
<b>Anadromous Stream Miles</b>	0.4 miles
<b>Stream Typing</b>	0.4 miles type 2 waters; 0.5 miles type 4; 1.1miles type 5; 0.6 miles type 9. Note that stream lengths include pond and lake shorelines that are typed in the DNR hydro layer
<b>303(d) Listings</b>	None
<b>Community Involvement</b>	There has been minimal outreach to property owners to date. Lower reach is in public ownership but access is limited.
<b>Priority Tier</b>	C

## Ownership Pattern

Much of the creek is private, urban residential development, while the City of Olympia owns both the headwater wetland and the downstream reach used by fish.

## Watershed Description

Mission Creek flows from the northeast part of Olympia into Budd Inlet along the southern border of Priest Point Park. Several natural processes in Mission Creek remain intact despite the high percentage of impervious area that may be associated with impairment. Gauging from the high biotic integrity as measured by macroinvertebrate diversity, urbanization has not significantly impaired the biotic processes in the stream. The headwater wetlands are under protection through the ownership of the City of Olympia. Stormwater impacts from residential development are unknown and needs assessment. The riparian areas in the lower reaches of the stream provide good shade, although the small number of pools indicates a lack of LWD recruitment. The mouth of the creek contains a fish passage barrier culvert. An abandoned roadbed across the mouth constricts tidal exchange and may limit salmonid rearing functions within the estuary.

WDFW historic fish spawning surveys have not observed fish in Mission Creek. Despite the apparent biotic health of the lower basin, the stream is relatively small and the potential fish use in this stream is unknown. The level of existing development in the Mission warrants primarily enhancement and protection actions rather than restoration and protection<sup>1</sup>.

## Assessment Overview of Watershed Natural Processes

Fish Passage	Riparian Condition	Riparian Canopy Closure	Streambank Condition	Floodplain Connectivity	Substrate Embed.	LWD Total	LWD Key Pieces	Estuary Connectivity
Poor	Fair-Good	Fair	Fair	Data Gap	Fair	Data Gap	Data Gap	*Poor

Pool Frequency	Pool Quality	Off-Channel Habitat	Water Quality		Water Quantity/Dewatering	Change in Flow Regime	Biological Processes
			Temperature	Dissolved Oxygen			
Poor	Poor	Data Gap	Data Gap	Data Gap	Data Gap	Data Gap	Data Gap

## High Priority Habitat Projects & Programs

- Provide adequate management to reduce/eliminate current stormwater impacts.

<sup>1</sup> Storm and Surface Water Plan, November, 2003, City of Olympia

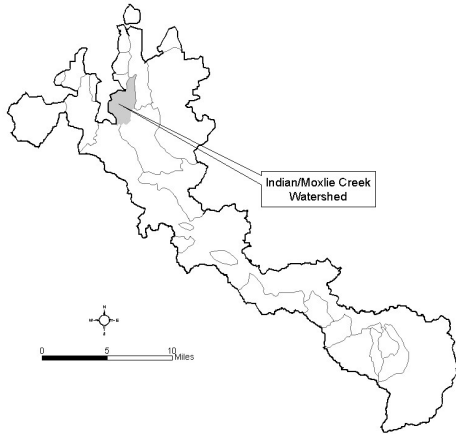
- ▶ Restore estuarine functions through removal of abandoned road and blocking culvert.
- ▶ Enforce existing setbacks along creek and wetlands.

### **Other Habitat Projects & Programs**

- ▶ Restore riparian corridor to provide shade, stabilize streambanks and recruit LWD. Plant appropriate species (incorporate additional conifer in the riparian corridor).
  - Conduct a riparian assessment to identify appropriate locations for riparian restoration actions.
  - Increase LWD key piece abundance to encourage pool formation and sorting of sediments. Develop a strategy to place instream LWD for immediate benefits until riparian conditions improve to allow natural recruitment.
  - Eliminate noxious weeds (e.g. ivy)

# Indian/Moxlie Creeks

WRIA #13 Deschutes



Indian/Moxlie Creek Watershed



<b>Basin</b>	Budd Inlet
<b>Watershed Acreage</b>	2,963 acres
<b>Anadromous Salmonid Use</b>	<ul style="list-style-type: none"> <li>▶ Nearshore: Chinook, bull trout, coho, chum, steelhead, and cutthroat</li> <li>▶ Freshwater: coho, cutthroat (?)</li> </ul>
<b>Land Use</b>	Residential, commercial, agriculture, City of Olympia
<b>Total Stream Miles</b>	4.8 miles
<b>Anadromous Stream Miles</b>	2.3 miles
<b>Stream Typing</b>	1.4 miles type 2; 0.9 miles type 3; 2.7 miles type 4; 1.0 miles type 5; 2.2 miles type 9. Note that stream lengths include pond and lake shorelines that are typed in the DNR hydro layer
<b>303(d) Listings</b>	Fecal coliform
<b>Citizen Involvement</b>	Indian Creek – minimal outreach to property owners to date. Moxlie Creek – Good access and visibility in a popular public park.
<b>Priority Tier</b>	C

## **Ownership Pattern**

The City of Olympia owns Watershed Park, the headwaters of Moxlie Creek. Residential development dominates the basin. The City of Olympia owns a portion of the lower reach of Indian Creek. The basin has multiple land uses including single family residential development, commercial development in a high density corridor, and agriculture.

## **Watershed Description**

Indian Creek, a tributary of Moxlie Creek, is an urban creek that has an extensively modified basin. A railroad grade in the lower section and channelization in the upper reaches has confined the channel. A shallow lake forms the headwaters of creek and several riparian wetland areas lie along its length. Indian Creek joins Moxlie Creek near Union Ave and Plum St.

Moxlie Creek has its headwaters and much of its length in the City of Olympia's Watershed Park. Single-family residential development surrounds riparian areas in the basin. The lower reach is almost entirely within a pipe, passing through a long culvert under Interstate Highway 5, surfacing for a short length to be joined by Indian Creek, and then piped under downtown for ½ mile to its outfall in east Budd Inlet. Residential and commercial development along the piped portion of the creek discharge stormwater directly into the pipe.

Urban development has impaired many of the natural processes in Indian and Moxlie Creeks. Impervious surfaces and resulting stormwater, compounded by channel modification and stream piping, have altered hydrologic functions. In most of the developed areas of the watershed, existing densities preclude retrofit to meet current stormwater standards to protect flow and water quality.

Although the riparian canopy is good, except in the upper reaches of Indian Creek, LWD recruitment is quite low. The intact riparian area of Moxlie Creek within Watershed Park provides very good cover. The trail system in this City of Olympia park provides good public access to observe salmon spawning. Natural sandy substrates and a lack of gravel in parts of Indian and most of Moxlie also contribute to low spawning habitat and food production for juveniles (benthic macroinvertebrates). Given high imperviousness, storm events impair water quality. Fish passage in Indian Creek is significantly impaired as there are a series of partial and impassable barriers along the entire length. Passage through the one-half mile piped section of the Moxlie Creek under downtown Olympia, though not technically a barrier, may act as a deterrent for adult fish. The estuary at the mouth has been significantly altered by filling and dredging.

Although the Indian/Moxlie system has been highly impacted and targeted for additional development growth, there is still the need to protect the existing habitats

and reduce the degree of impacts future development could impose on it's natural processes. A strong outreach/education element exists with the Watershed Park located on Moxlie Creek.

## Assessment Overview of Watershed Natural Processes

Fish Passage	Riparian Condition	Riparian Canopy Closure	Streambank Condition	Floodplain Connectivity	Substrate Embed.	LWD Total	LWD Key Pieces	Estuary Connectivity
Poor <sup>a</sup> Good <sup>b</sup>	Data Gap	Data Gap	Data Gap	Poor <sup>a</sup> Good <sup>b</sup>	Data Gap	Poor <sup>a</sup> Data Gap <sup>b</sup>	Data Gap	Poor

Pool Frequency	Pool Quality	Off-Channel Habitat	Water Quality		Water Quantity/ Dewatering	Change in Flow Regime	Biological Processes
			Temperature	Dissolved Oxygen			
Fair-Poor	Data Gap	Data Gap	Data Gap	Data Gap	Data Gap	Data Gap	Data Gap

<sup>a</sup> Indian Creek <sup>b</sup> Moxlie Creek

## High Priority Habitat Projects & Programs

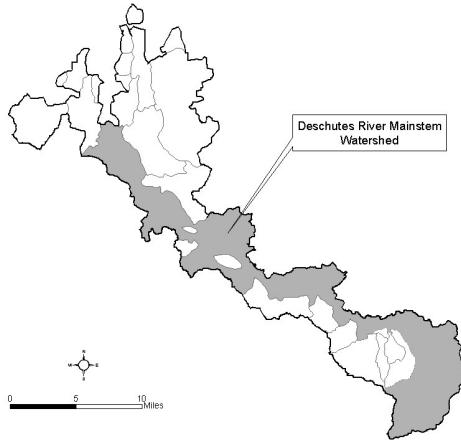
- ▶ Educate landowners located in the Indian/Moxlie Creek Basin to increase compliance with land use regulations (enforce existing setbacks along creek and wetlands) and voluntary implementation of best management practices.
- ▶ Manage stormwater runoff. In this urban creek, stormwater management is an important factor to improving water quality. Mistaken sanitary pipe hookups to stormwater pipes should continue to be investigated and corrected. Street sweeping and other measures should be pursued to reduce pollution loading to the creek. In most of the developed areas of the watershed, existing densities preclude retrofit to meet current stormwater standards to protect flow and water quality.

## Other Habitat Projects & Programs

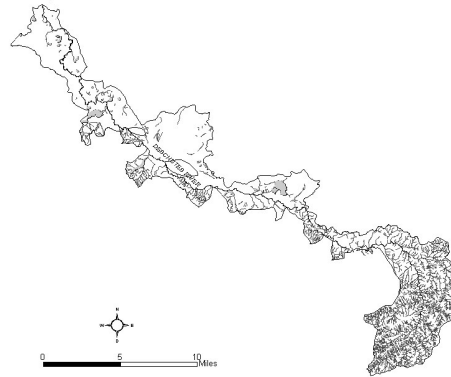
- ▶ Investigate opportunities to improve estuary conditions. Continue riparian revegetation efforts currently underway with City of Olympia.

# Deschutes River

WRIA #13 Deschutes



Deschutes River Mainstem Watershed



<b>Basin</b>	Budd Inlet
<b>Watershed Acreage</b>	118,773 acres
<b>Anadromous Salmonid Use</b>	<ul style="list-style-type: none"> <li>▶ Nearshore: Chinook, bull trout, coho, chum, cutthroat, and steelhead</li> <li>▶ Freshwater: coho, chum, cutthroat, and steelhead (Chinook = hatchery origin, not self-sustaining)</li> </ul>
<b>Land Use</b>	Commercial forestry, urban development
<b>Total Stream Miles</b>	256 miles
<b>Anadromous Stream Miles</b>	86 miles
<b>Stream Typing</b>	
<b>303(d) Listings</b>	Fecal coliform, fine sediment, temperature. Ongoing TMDL study
<b>Community Involvement</b>	Some good outreach and responses, still some differing opinions about what is needed for the Deschutes Basin.
<b>Priority Tier</b>	A

## **Ownership Pattern**

The State of Washington General Administration owns and manages Capitol Lake. The State of Washington and Squaxin Island Tribe co-manage the hatchery upstream of the fish ladder. The lower and middle reaches are predominantly in private residential holdings, while one commercial timber company owns the upper watershed.

## **Watershed Description**

The Deschutes River is the largest drainage in WRIA 13, providing over 256 linear miles of drainage before emptying into Budd Inlet through Capitol Lake. Primarily one commercial timber company owns the upper watershed of the river and its tributaries.

Urbanization has heavily impacted the lower reaches of the river. Capitol Lake was created as a reservoir at the mouth through damming the lower Budd Inlet estuary in the 1950's. A Chinook hatchery program includes adult capture, along with rearing pens above a fish ladder at the natural falls in Tumwater and in Percival Cove in Capitol Lake. This program releases 3.8 million sub-yearling and 200,000 yearling Chinook each year<sup>2</sup>. A new comprehensive Chinook hatchery complex is in conceptual design, which would add incubation and new rearing facilities. No natural anadromous fish passage exists past this point just above the mouth, although fish managers have introduced Chinook and coho above the falls since the 1950's.

The presence of Capitol Lake and the continued operation of the tide gate prohibit the system's ability to function naturally. During the winter months, the tide gate operation impedes juvenile access as lake levels are below what is necessary to allow access to the fish ladder. Out-migrating smolts must transition from fresh to salt water immediately due to the presence of the tide gate that prevents naturally occurring mixing that happens in a natural estuary. Sediment accumulation in the lake creates shallow areas that have increased water temperature. Additionally, attempts to manage the lake level for storm events have left the rearing area dry in some cases or lead to an early release of smolts in others. Currently, the State of Washington General Administration is heading an effort to study the management of Capitol Lake, evaluating the options of continuing to maintain the lake as a reservoir or to return it to an estuary.

Human efforts to limit erosion upstream from the falls has inhibited channel migration, thereby limiting off-channel areas for rearing in the lower reaches at the mouth. In the middle and upper reaches however, wetlands and off-channel areas exist in several locations. Much of the middle and upper reaches of the basin are rated as having fair to poor riparian conditions. A riparian assessment, currently underway by the Thurston

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<sup>2</sup> "The Value of the Deschutes/Capitol Lake and Percival Cove Chinook Programs to the Citizens of Washington State", February 2001, WDFW

Conservation District, will identify specific locations of degraded riparian areas so revegetation efforts can be implemented where needed.

Managed forestlands in the upper watershed and tributaries introduce fine sediment to the system; several significant forest road failures in recent years during abnormally high precipitation events accentuated this problem.

### Assessment Overview of Watershed Natural Processes

Fish Passage	Riparian Condition	Riparian Canopy Closure	Streambank Condition	Floodplain Connectivity	Substrate Embed.	LWD Total	LWD Key Pieces	Estuary Connectivity
Good	Fair-Poor	Poor	Fair	Fair	Poor	Fair-Good	Poor	*Poor

Pool Frequency	Pool Quality	Off-Channel Habitat	Water Quality		Water Quantity/Dewatering	Change in Flow Regime	Biological Processes
			Temperature	Dissolved Oxygen			
Fair-Good	Fair-Good	Fair	Poor	Good	Fair	Fair	Fair

### High Priority Habitat Projects & Programs

- ▶ Complete and implement Deschutes TMDL action plan to correct the impaired temperature and sediment parameters.
- ▶ Restore riparian corridor to provide shade, stabilize streambanks and recruit LWD. Utilize Thurston CD riparian assessment to locate riparian restoration sites (in process). Plant appropriate species.
  - Increase LWD key piece abundance to encourage pool formation and sorting of sediments. Develop a strategy to place instream LWD for immediate benefits until riparian conditions improve to allow natural recruitment.
  - Educate landowners on the importance of natural stream and floodplain functions (LWD, riparian, channel migration, etc.).
- ▶ Conduct an assessment in the upper watershed that focuses on slope stability, road impacts (density and sedimentation), and fish passage on lands not covered by Forest and Fish regulations.
- ▶ Protect channel migration zone from incompatible land uses through Thurston County Critical Areas Ordinances regulations.
- ▶ Protect and restore off-channel habitat priority sites identified in previous studies (Thurston Conservation District).

- ▶ Restore properly functioning estuary (see Capitol Lake section).
- ▶ Preserve headwaters from development pressures by evaluating the need for additional or more protective land use ordinances or through conservation easement and fee simple purchases.
- ▶ Educate landowners located in the Deschutes River Basin to increase compliance with land use regulations and voluntary implementation of best management practices.

### **Other Habitat Projects & Programs**

- Spurgeon Creek - prioritize and correct barriers identified in the WRIA 13 Fish Passage Inventory (South Puget Sound Salmon Enhancement Group (SPSSEG)).
- Ayer/Elwanger Creek – Restore riparian corridor.

## Capitol Lake

<b>Watershed Acreage</b>	829 acres
<b>Anadromous Salmonid Use</b>	<ul style="list-style-type: none"> <li>▶ Nearshore: Chinook, bull trout, coho, chum, steelhead, and cutthroat</li> <li>▶ Freshwater: Chinook, coho, steelhead and cutthroat</li> </ul>
<b>Land Use</b>	commercial, residential, recreation, and transportation
<b>Total Stream Miles</b>	6.5 miles of lake shoreline
<b>Anadromous Stream Miles</b>	6.5 miles
<b>Stream Typing</b>	6.5 miles type 1 water
<b>303(d) Listings</b>	fecal coliform, total phosphorous
<b>Priority Tier</b>	A

### Ownership Pattern

Capitol Lake is part of the Washington State Capitol Campus. The Washington State Department of General Administration (GA) and the state Department of Natural Resources (DNR) share ownership of the state owned portion of the lake. The state owns approximately 67% of the shoreline with the private owners located along the eastern shore of the middle and southern basin. The bottom of the lake is state owned by GA and DNR, with the South Basin being privately owned bedlands associated with adjacent uplands.

### Watershed Description

In 1951, Capitol Lake was created from the southern part of Budd Inlet. Since then, there have been a number of fills along the historic shoreline that has reduced the water surface by 124 acres. Today the lake surface is approximately 260 acres in size and has been divided into four basins, called: North, Middle, South, and Percival Cove. The Capitol Lake dam is located in the North Basin and Tumwater Falls is located in the South Basin, south of I-5. Deschutes Parkway bisects the Middle Basin and Percival Cove. The freshwater flow into the lake is provided by the Deschutes River flows into the South Basin and Percival Creek that provides about 10% of the flow discharging into Percival Cove.

The construction of Deschutes Parkway, the creation of the dam, and the creation of the various shoreline parks have significantly reduced the percent of properly functioning conditions, so that only 39% of the shoreline can be considered to be high quality. Tumwater Falls and a natural falls on Percival Creek limited the upstream migration until the installation of fish ladders in 1954. Since 1974, WDFW has been raising yearling Chinook salmon in Percival Cove, a practice they are planning to abandon when an alternative facility has been constructed.

Capitol Lake dam has a five-foot wide fish ladder. With recent restoration of the fish ladder and lake elevation maintained at its summer level of 6.5' NGVD, fish would have year round access to the lake. However, during the winter the lake has been lowered by a foot, is too low for the fish ladder to function properly. Delays in reaching the lake during the winter months may lead to increased predation in Budd Inlet. The lake has also been drained in advance of a flood event from the Deschutes River. This has led to the premature release of smolts or "zeros" being raised in the lake and yearlings from the Percival Cove net pen.

The Capitol Lake dam also prevents the natural mixing of fresh and saltwater that occurs in estuary, so out migrating smolts and yearlings are forced to immediately transition to by salt water on the other side of the dam. A recent study of dissolved oxygen levels in southern Budd Inlet noted that "a substantial water quality improvement (an increase of 1-5mg/l dissolved oxygen) is realized in south and central Budd Inlet as a result of returning Capitol Lake to a tidal estuary ... (with improvements) observed throughout the Budd Inlet, but particularly in the most water quality impaired areas in East Bay and West Bay" (Brown and Caldwell, 2000)

Sediment accumulation is a significant problem in the lake and has reduced its volume by 25% since 1951. This has resulted in many parts of the lake now being too shallow for boating, and an increase in water temperatures during the summer. Poor water quality has been a long term problem which is now being addressed by a TMDL study by the Washington State Department of Ecology. A recent study indicated that there are no less than 81 stormwater outfalls to Capitol Lake and the Deschutes River downstream of the "E" Stream bridge. TMDL Monitoring is on-going to determine which need to be addressed.

Since 1997, the Washington State Department of General Administration (GA) has headed an effort to adaptively manage the lake, with the assistance of nine government entities representing the state, an Indian Tribe, and local government. Called the Capitol Lake Adaptive Management Plan – Steering Committee, this advisory body helped GA adopt a 10-Year Management Plan for the lake. The Plan contains 14 Management Objectives that addresses a wide range of issues including sedimentation, fish ladder operation, flooding, fisheries management, improving shoreline habitat, and improving water quality. Continuing to managing the basin as a freshwater lake has come to such a point, that one of the management objectives is to undertake a feasibility study of the costs and benefits of returning the basin to an estuary. This estuary feasibility study is to be complete with a recommendation for the long-term aquatic condition of the basin by the end of the 10-Year Plan (2013).

The WRIA 13 Habitat Limiting Factors noted the loss of estuary habitat to the Deschutes River and Percival Cove, both of which are now a part of Capitol Lake. The restoration of Capitol Lake to a tidally influenced estuary would improve dissolved

oxygen levels in Budd Inlet (as noted above), add 260 acres of intertidal habitat, add 6.5 miles of marine shoreline (7.5% increase within WRIA 13), and may increase estuarine marsh habitat.

## Assessment Overview of Watershed Natural Processes

Fish Passage	Riparian Condition	Riparian Canopy Closure	Streambank Condition	Floodplain Connectivity	Substrate Embed.	LWD Total	LWD Key Pieces	Estuary Connectivity
Fair to Poor	Poor	NA	Fair to Poor	NA	NA	Poor	Poor	Poor

Pool Frequency	Pool Quality	Off-Channel Habitat	Water Quality		Water Quantity/Dewatering	Change in Flow Regime	Biological Processes
			Temperature	Dissolved Oxygen			
NA	NA	NA	Poor	Fair to Good	NA	Data Gap	Poor to Fair

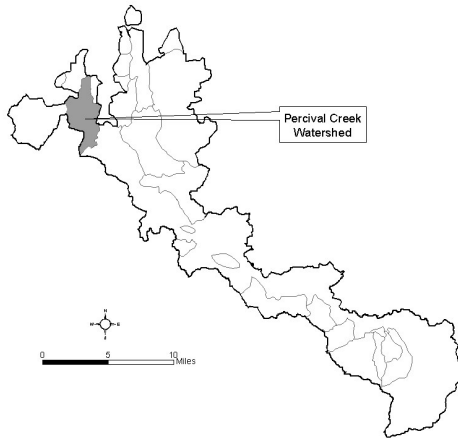
## High Priority Habitat Projects & Programs

- ▶ Restore estuarine conditions. Undertake an estuary feasibility study to determine the benefits and cost of restoring Capitol Lake to a tidally influenced estuary. This is one of the Management Objectives contained in the CLAMP 10-Year Management Plan.
- ▶ Restore riparian conditions. Replant riparian vegetation (predominantly conifers) and understory along those parts of the lake with less than high quality shoreline habitat. One of the Management Objectives in the CLAMP 10-Year Management Plan is to prepare a landscaping plan of where LWD, aquatic vegetation, and riparian vegetation (particular conifers) may be planted.
- ▶ Insure Year Round Fish Passage. While GA manages the water body as a lake, it shall maintain the elevation of Capitol Lake at 6.5' NVGD to provide for a fully functional fish ladder year round and increase upland flood protection measures so that winter pre-flood drawdowns that result in premature releases of smolts and yearlings are not needed.
- ▶ Remove the WDFW net pens from Percival Cove. This would eliminate a significant source of phosphorous into the lake. WDFW and the Squaxin Island Tribe are cooperating in the construction of a new fish rearing facility for the Deschutes River stocks. Once the new facility is available, the net pens will be removed and sediments of the cove will be remediated, if necessary. This is one of the Management Objectives contained in the CLAMP 10-Year Management Plan.
- ▶ Eradicate exotic plant species. While GA manages the water body as a lake, it shall implement actions to control Eurasian milfoil and purple loosestrife. This is one of the Management Objectives contained in the CLAMP 10-Year Management Plan.

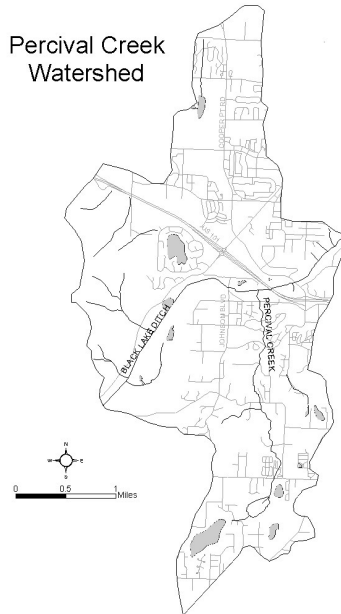


# Percival Creek

WRIA #13 Deschutes



Percival Creek Watershed



<b>Basin</b>	Budd Inlet
<b>Watershed Acreage</b>	4,712 acres
<b>Anadromous Salmonid Use</b>	<ul style="list-style-type: none"> <li>▶ Nearshore: Chinook, bull trout, coho, chum, steelhead, and cutthroat</li> <li>▶ Freshwater: coho, chum, and cutthroat (Chinook = hatchery origin, not self-sustaining).</li> </ul>
<b>Land Use</b>	Mixed industrial, commercial and residential development, open space
<b>Total Stream Miles</b>	5.6 miles
<b>Anadromous Stream Miles</b>	5.5 miles
<b>Stream Typing</b>	2.8 miles of type 1 waters; 1.1 miles type 2; 4.6 miles type 3; 1.7 miles type 5; 8.7 miles type 9. Note that stream lengths include pond and lake shorelines that are typed in the DNR hydro layer
<b>303(d) Listings</b>	None
<b>Community Support</b>	There are opportunities to engage citizens at Black Lake Meadows; lots of public access.
<b>Priority Tier</b>	B

## **Ownership Pattern**

The predominant land uses surrounding Black Lake Ditch is industrial and open space. Upstream of the confluence, Percival Creek has open space and residential development. Below the confluence, several land uses including commercial and mixed residential development are present. Development pressures have been significant during the past few decades. Thurston County, City of Olympia, and Tumwater own most of the riparian corridor of Black Lake Ditch and Percival Creek. The City of Olympia uses Black Lake Meadows, a large constructed wetland complex adjacent to the Ditch, to treat stormwater.

## **Watershed Description**

Percival Creek is an urban lake-fed creek discharging into Capitol Lake/Deschutes River. The headwaters are at Trosper Lake. At approximately 1 mile above its mouth, Percival Creek is joined by Black Lake Ditch, a man-made drainage channel built in 1922 originating at Black Lake. Black Lake Ditch accounts for nearly two-thirds of the total flow of Percival Creek below the confluence. A Burlington Northern railroad line parallels the creek in the lower reaches and a portion of Black Lake Ditch. Regional stormwater facilities treat significant amounts stormwater runoff from the heavily urbanized portions of the basin, but runoff remains a difficult challenge to mitigate, creating pockets of scour in the sand-dominant system. The City of Olympia rated Percival Creek as an "impacted" stream, where there is still some potential for properly functioning fish habitat that warrants a moderate level of protection and restoration activity.

Adult access is limited at the mouth by a WDFW managed fish gate, which directs hatchery Chinook to the hatchery facility at Deschutes River falls until sufficient eggs are collected. No species can utilize the creek until the WDFW-operated gates are opened. The City of Olympia is discussing options for gate management with WDFW, a proposal that will allow fish access to habitat in Percival Creek before the gate becomes open in the fall. The replacement of culverts at RW Johnson Road on Black Lake Ditch and Chaparral Road on Percival Creek corrected previous limitations for adult and juvenile passage. The installation of two fish ladders (at Mottman Road and below Highway 101) on Percival Creek corrected previous limitations for adult access.

## Assessment Overview of Watershed Natural Processes

Fish Passage	Riparian Condition	Riparian Canopy Closure	Streambank Condition	Floodplain Connectivity	Substrate Embed.	LWD Total	LWD Key Pieces	Estuary Connectivity
Fair	Fair	Fair	Poor-Fair	Data Gap	Poor	Poor	Data Gap	*Poor

Pool Frequency	Pool Quality	Off-Channel Habitat	Water Quality		Water Quantity/Dewatering	Change in Flow Regime	Biological Processes
			Temperature	Dissolved Oxygen			
Poor	Poor	Data Gap	Data Gap	Data Gap	Data Gap	Poor	Data Gap

### High Priority Habitat Projects & Programs

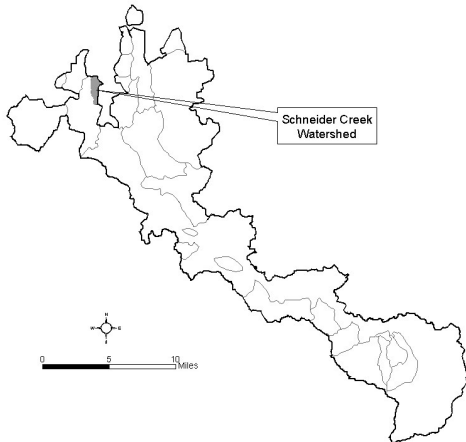
- ▶ Manage fish access at the mouth. Work with WDFW to solve the access limitations to the creek for adults and juveniles seeking refuge. Currently, a mesh screen is in place from April to mid May to keep reared Chinook in Percival Cove. Adult salmon passage into Percival Creek is restricted while the diversion pickets/gate is in place at the Deschutes Parkway crossing from August through September.
- ▶ Restore properly functioning estuary (see Capitol Lake section).
- ▶ Improve riparian corridors for increased shade and large woody debris (LWD) recruitment. Restore riparian corridor to provide shade and recruit LWD. Publicly owned lands should be targeted for this activity. Utilize Thurston CD riparian assessment to locate riparian restoration sites (in process). Plant appropriate species.

### Other Habitat Projects & Programs

- ▶ Evaluate water quality and quantity impacts from Black Lake and Black Lake Ditch (flow regimes, sediment budget, pollutants).  
Improve existing stormwater system.

# Schneider Creek

WRIA #13 Deschutes



Schneider Creek Watershed



<b>Basin</b>	Budd Inlet
<b>Watershed Acreage</b>	680 acres
<b>Anadromous Salmonid Use</b>	<ul style="list-style-type: none"> <li>▶ Nearshore: Chinook, coho, bull trout, chum, cutthroat</li> <li>▶ Freshwater: coho and cutthroat</li> </ul>
<b>Land Use</b>	Residential and commercial development
<b>Total Stream Miles</b>	1.2 miles
<b>Anadromous Stream Miles</b>	0.2
<b>Stream Typing</b>	0.4 miles type 4 waters; 0.5 miles type 5; 0.3 miles type 9. Note that stream lengths include pond and lake shorelines that are typed in the DNR hydro layer
<b>303(d) Listings</b>	None
<b>Community involvement</b>	Four owners in lower reach with fish use have at least some participation with Stream Team
<b>Priority Tier</b>	C

## Ownership Pattern

The predominant land use in the subbasin consists of multifamily residential development and commercial development.

## Watershed Description

Schneider Creek is an urban spring-fed creek discharging into Budd Inlet. The filling and development of the headwater wetlands of the mainstem and the estuary at the mouth happened in the early history of the City of Olympia. The entire upstream half of the stream and the mouth of the creek are now underground. The long history of development along this urban creek has impaired the natural processes that influence instream structure and overall stream health. Stormwater inputs increase the winter storm event flows causing excessive spawning gravel scour and fill. Good groundwater flow in the summer helps to maintain year-round flows, which help rearing conditions. Seasonally high instream flows also contribute to bank erosion and fine sediment input. Although the wide riparian areas provide good shade, low LWD recruitment has created low pool habitat for juvenile rearing. The moderate biotic health as measured by macroinvertebrate diversity is reflective of the stream hydrology and water quality conditions. Two culverts that restrict adult passage at the mouth and one under Bowman road is the only barrier in the creek system. The estuary at the mouth where the culvert discharges into Budd Inlet has been greatly degraded by filling and past industrial activities.

The level of existing development in Schneider Creek warrants enhancement and protection actions rather than restoration and protection<sup>3</sup>.

## Assessment Overview of Watershed Natural Processes

Fish Passage	Riparian Condition	Riparian Canopy Closure	Streambank Condition	Floodplain Connectivity	Substrate Embed.	LWD Total	LWD Key Pieces	Estuary connectivity
Poor	PoorFair	Poor	Poor	Data Gap	Fair	Poor	Fair	Poor

Pool Frequency	Pool Quality	Off-Channel Habitat	Water Quality		Water Quantity/Dewatering	Change in Flow Regime	Biological Processes
			Temperature	Dissolved Oxygen			
Poor	Poor	Data Gap	Data Gap	Data Gap	Data Gap	Poor	Data Gap

## High Priority Habitat Projects & Programs

- ▶ Provide adequate stormwater management to reduce/eliminate current stormwater impacts.

<sup>3</sup> Storm and Surface Water Plan, November, 2003, City of Olympia

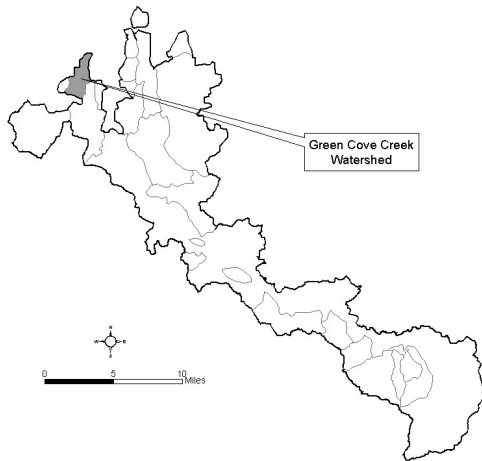
- ▶ Explore opportunities to re-establish an estuary at the mouth of the creek.

### **Other Habitat Projects & Programs**

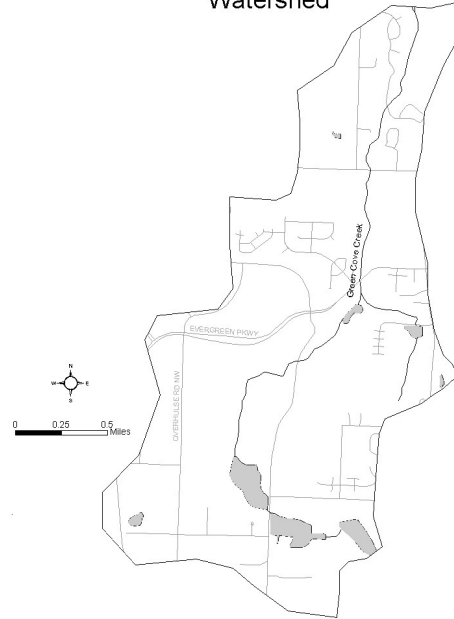
- ▶ Engage the local community in trash cleanup and other habitat maintenance activities.
- ▶ Replace culverts on West Bay Drive and Bowman Rd.
- ▶ Restore riparian corridor to provide shade, stabilize streambanks and recruit LWD. Plant appropriate species (incorporate additional conifer in the riparian corridor).
  - Utilize the Thurston Conservation District's riparian assessment to identify appropriate locations for riparian restoration actions.
  - Increase LWD key piece abundance to encourage pool formation and sorting of sediments. Develop a strategy to place instream LWD for immediate benefits until riparian conditions improve to allow natural recruitment.

# Green Cove Creek

WRIA #13 Deschutes



Green Cove Creek Watershed



<b>Basin</b>	Eld Inlet
<b>Watershed Acreage</b>	2,626 acres
<b>Anadromous Salmonid Use</b>	<ul style="list-style-type: none"> <li>▶ Nearshore: Chinook, bull trout, chum, coho, steelhead, and cutthroat</li> <li>▶ Freshwater: Chinook (rare), chum, coho, steelhead and cutthroat</li> </ul>
<b>Land Use</b>	Residential
<b>Total Stream Miles</b>	4.0 miles
<b>Anadromous Stream Miles</b>	3.4 miles
<b>Stream Typing</b>	3.7 miles type 1; 3.5 miles type 3; 0.3 miles type 4; 0.8 miles type 5; 0.4 miles type 9. Note that stream lengths include pond and lake shorelines that are typed in the DNR hydro layer
<b>303(d) Listings</b>	None
<b>Community Involvement</b>	Capitol Land Trust and local citizens involved in protection and restoration activities.
<b>Priority Tier</b>	A

## Ownership Pattern

The southern portion of the basin lies within the City of Olympia and the Urban Growth Area. The headwater wetlands lie within the city’s Grass Lake Park. The Capitol Land Trust has protected some additional wetlands and forested uplands in the upper basin. The majority of the basin lies within private ownership characterized by residential land uses.

## Watershed Description

The headwaters of Green Cove Creek emanate from a large intact wetland complex largely protected by conservation easements, acquisitions, and a City of Olympia . The riparian corridor is comprised of mixed conifer and deciduous forest with only a few sites warranting improvement. Because it is relatively intact, Green Cove Creek is Olympia’s priority for salmon habitat protection measures.<sup>4</sup>

The Green Cove Creek Comprehensive Drainage Basin Plan (1998) recommended minimum canopy cover of 60% within the watershed to prevent excessive stormwater impacts. The City of Olympia has downzoned the upper Basin and instituted more stringent development standards to maintain the forest cover and protect the creek. Although the City has instituted these standards, significant residential development pressures exist in this desirable area, especially new home construction. Tidal influence occurs in the estuary and at the mouth of the creek, allowing for a fresh and saltwater mixing despite the presence of some bulkheads. Green Cove has two fishways assessed by WDFW; one has retrofitted baffles which impact upstream adult and juvenile migration while the other is passing fish.

## Assessment Overview of Watershed Natural Processes

Fish Passage	Riparian Condition	Riparian Canopy Closure	Streambank Condition	Floodplain Connectivity	Substrate Embed.	LWD Total	LWD Key Pieces	Estuary Connectivity
*Poor	Fair-Good	Fair	Fair	Good	Poor-Good	Good-Fair	Good-Fair	*Good

Pool Frequency	Pool Quality	Off-Channel Habitat	Water Quality		Water Quantity/Dewatering	Change in Flow Regime	Biological Processes
			Temperature	Dissolved Oxygen			
Good-Poor	Poor	Good	Good	Good	Fair	Fair	Fair

## High Priority Habitat Projects & Programs

- ▶ Preserve upland forest and restore where necessary. As the Basin becomes more developed, peak flow stormwater impacts are expected to adversely affect the

<sup>4</sup> Aquatic Habitat Evaluation and Management Report, October, 1999, City of Olympia

watershed. To prevent this, at a minimum, implement the City of Olympia's Green Cove Creek Comprehensive Drainage Plan (1998) that recommends a 60% vegetated landscape has been recommended in the City of Olympia's sub-basin plan. Retaining the current forested riparian corridor as habitat is crucial and revegetating areas that have been impacted are very important steps for the creek.

- Place riparian and wetland areas into easements for long term conservation.
  - Monitor to assure prescriptions recommended in the Management Plan are adequate.
- ▶ Replace the culvert / fishway at Country Club Road. The culvert has been retrofitted with baffles to improve fish passage. However, the culvert still restricts upstream migration for adults and juveniles, limiting access to the wetlands vital to coho and cutthroat for rearing within the freshwater. The culvert also disrupts movement of sediment and wood downstream to lower creek and the marine estuary.

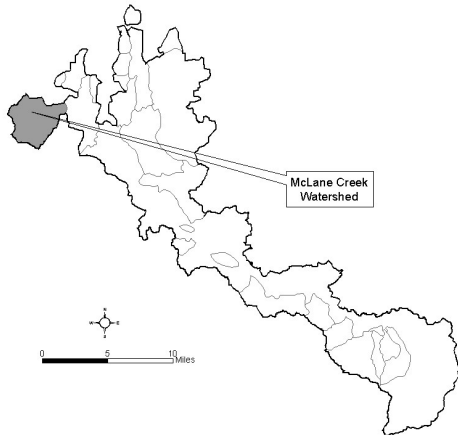
- ▶ Preserve estuary functions.

### **Other Habitat Projects & Programs**

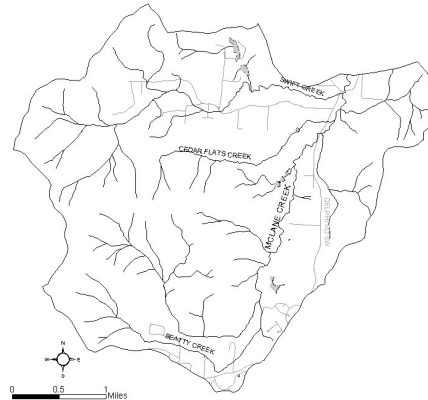
- ▶ Restore riparian corridor to provide shade, stabilize streambanks and recruit LWD. Plant appropriate species (incorporate additional conifer in the riparian corridor).
- Conduct a riparian assessment to identify appropriate locations for riparian restoration actions.
  - Increase LWD key piece abundance to encourage pool formation and sorting of sediments. Develop a strategy to place instream LWD for immediate benefits until riparian conditions improve to allow natural recruitment.
  - Implement restoration efforts consistent with the findings of the Thurston Conservation District's riparian assessment.

# McLane Creek

WRIA #13 Deschutes



McLane Creek Watershed



<b>Basin</b>	Eld Inlet
<b>Watershed Acreage</b>	7,360 acres
<b>Anadromous Salmonid Use</b>	<ul style="list-style-type: none"> <li>▶ Nearshore: Chinook, bull trout, coho, chum, steelhead, and cutthroat</li> <li>▶ Freshwater: coho, chum, steelhead, cutthroat, (Chinook = hatchery origin, not self-sustaining)</li> </ul>
<b>Land Use</b>	DNR ownership in the headwater reaches and the McLane Nature Trail, Upper portion of the middle basin is rural residential and some sub-divisions, Middle and Lower basin is agriculture, forestry, and rural residential
<b>Total Stream Miles</b>	43 miles
<b>Anadromous Stream Miles</b>	23 miles
<b>Stream Typing</b>	1.3 miles type 1 waters; 2.3 miles type 2; 19.8 miles type 3; 4.4 miles type 4; 6.3 miles type 5; 12.1 miles type 9. Note that stream lengths include pond and lake shorelines that are typed in the DNR hydro layer
<b>303(d) Listings</b>	Fecal coliform
<b>Community Involvement</b>	Difficult to engage
<b>Priority Tier</b>	A

## Ownership Pattern

The McLane Creek Basin headwaters originate in the Black Hills, a managed forestland landscape primarily owned by DNR. The middle reach consists of primarily rural residential with some subdivision type development. The lower reach is primarily agriculture, forestry, and rural residential.

## Watershed Description

The McLane Creek Basin consists of McLane Creek, Beatty Creek, Swift Creek, Perkins Creek, Cedar Flats Creek, and numerous unnamed tributaries. A portion of McLane Creek runs through an interpretive trail owned by WA Department of Natural Resources (DNR). This trail system provides an educational opportunity for visitors to understand the importance of the habitats within the basin. Man-made barriers are not a substantial problem within the basin yet a few still remain. Some of these barriers, if fixed, would open up to two miles of habitat.

The McLane Creek Basin has an abundance of chum spawning in the lower reaches of McLane Creek, Swift Creek, Perkins Creek, and somewhat in Cedar Flats Creek and Beatty Creek. Coho salmon utilize this basin but not in large numbers. The Deep South Sound coho stock has been considered to be listed as a “depressed” stock in SaSI, however it is still currently listed as “healthy”. There is no abundance trend data available for steelhead trout in this basin. There are some fall Chinook within the McLane basin but are not considered a native self-sustaining population.

Past development and landscape alterations within this basin have had some impact on the natural processes that create the instream habitat utilized by salmonids for spawning and rearing. According to recent assessments, the lower reach of the basin needs improved riparian corridors and increased amounts of LWD. Sediment amounts did not rate poor yet the levels are close to that threshold. The overall condition of the McLane Creek Basin and estuary at the mouth is relatively good.

## Assessment Overview of Watershed Natural Processes

Fish Passage	Riparian Condition	Riparian Canopy Closure	Streambank Condition	Floodplain Connectivity	Substrate Embed.	LWD Total	LWD Key Pieces	Estuary Connectivity
Good	Poor	Poor	Data Gap	Data Gap	Fair	Good	Poor	*Good

Pool Frequency	Pool Quality	Off-Channel Habitat	Water Quality		Water Quantity/Dewatering	Change in Flow Regime	Biological Processes
			Temperature	Dissolved Oxygen			
Fair	Fair	Data Gap	Fair-Poor	Data Gap	Data Gap	Data Gap	Good

## High Priority Habitat Projects & Programs

- ▶ Improve riparian corridors, primarily in the lower basin, for increased shade and large woody debris (LWD) recruitment. Restore riparian corridor to provide shade, stabilize streambanks and recruit LWD. Utilize Thurston CD riparian assessment to locate riparian restoration sites (in process). Plant appropriate species.
  - Increase LWD key piece abundance to encourage pool formation and sorting of sediments in the lower basin (Swift Creek and McLane Creek). Develop a strategy to place instream LWD for immediate benefits until riparian conditions improve to allow natural recruitment.
- ▶ Correct existing fish passage barriers (Beatty Creek, Perkins Creek, Cedar Flats Creek).
- ▶ Preserve intact habitat. Several key parcels within the McLane basin have initially been identified for acquisition or easements (e.g. DNR Nature Trail, Sundeen, Drutz). A comprehensive strategy is needed to identify, prioritize, and preserve (acquisition or easements) additional key salmonid habitat areas (off-channel habitats, beaver dam complexes, and wetlands that have open water connections to streams or that regulate the surface water runoff to stream channels).
- ▶ Maintain vegetative cover to reduce runoff and erosion that lead to fine sediment deposition. Assure timberland owners within the McLane Creek Basin are in compliance with current regulations.
  - Encourage low impact development.
  - Reforest high impact clearcut-developed areas.
- ▶ Educate landowners located in the McLane Creek Basin to increase compliance with land use regulations and voluntary implementation of best management practices.
- ▶ Fix road surface runoff from directly entering Beatty Creek on Andreson Road.
- ▶ Preserve estuary.
  - Restore/preserve estuary shoreline through riparian plantings, livestock exclusion, and long-term conservation easements. Explore opportunities to alleviate the threat of future development.
- ▶ Protect sensitive habitat features/processes from incompatible land uses (impacts) through implementation and enforcement of Thurston County Critical Areas Ordinances regulations.

- Protect hydrologic integrity within the basin. The impervious surface area within the McLane basin is estimated to be close to 5%. Over 5% is considered the threshold of impervious surface having an impact on instream flows and habitats.

## **- Appendix D -**

### **Community Issues and Concerns**

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Although a salmon habitat protection and restoration project or program must pass a review regarding its technical merits, simultaneously it must deal with community issues and concerns in an effective and appropriate manner. To this end, Chapter Five inventories these community issues and concerns as well as provides guidance as to developing and prioritizing project lists from this standpoint.

The following issues are listed in order of need, from greatest to least.

#### **More Effective Educational Needs**

The one community issue and concern that clearly leads the way above all others is the need for more effective education, especially of riparian property owners. There is a breadth of misinformation in the community about the needs of salmon, who benefits by habitat protection and recovery efforts, and how best to help. The community's lack of knowledge on these issues often surface as:

- ▶ No commitment in habitat protection and recovery efforts
- ▶ Avoidance in accepting that we can do something about habitat problems
- ▶ Looking for easy fixes (hatcheries)
- ▶ Hostility against specific groups of people

There are areas throughout the LE that present pockets of opportunity for outreach, places that have historically been difficult to perform restoration activities but could house the keystone landowner that is pivotal for recovery of a given system. The known areas are, but not limited to: McLane creek landowners; landowners along the upper Deschutes, downstream from the falls and from McIntosh Lake to Lake Lawrence; agricultural landowners adjacent the Deschutes River; and community associations that collectively own large pieces of land along the nearshore. Projects that address concerns and incorporate outreach in these areas will be given priority during the ranking process.

The LE encourages and supports projects that have the opportunity to incorporate an educational element to some extent, whether it be active or indirect. These opportunities are important to share information to the community about why salmon habitat protection and restoration is crucial.

Actions incorporated into projects that provide opportunities for more effective education are:

- ▶ Publicizing good stewardship practices and actions
- ▶ Getting the word out about salmon habitat recovery and restoration efforts through a website, educational signs, radio ads, written information distributed in high traffic areas, public access TV shows, and interpretive trails
- ▶ Giving presentations before community groups during and after completion of projects

### **Promoting stewardship and strong partnerships**

The most frequent positive question we receive from the community is “What can I do to help?” We need to be prepared to bring about this willingness to help into constructive action.

Projects can facilitate good stewardship and strong partnerships through educational efforts as well as by

- ▶ Engaging community volunteers in revegetation and salmon monitoring projects
- ▶ Soliciting corporate sponsorships – especially with large landowners
- ▶ Soliciting partnerships with private communities with critical habitat or open space
- ▶ Giving presentations before sportsmen’s clubs to promote collective or individual project ideas
- ▶ Briefing editorial boards on current projects
- ▶ Having native plant give-a-ways

### **Perceived threat to private property rights**

We cannot ignore the fact that salmon share their habitat with people on privately owned lands. Many landowners show great anxiety about getting involved in protection and restoration efforts due to their anxiety about losing private property rights, including their long-term financial investment.

That is why using approaches that convey the message that preserving or restoring salmon habitat is not synonymous with taking away private property rights. Project and programs can do this by

- ▶ Having clear agreements with landowners before entering property

- ▶ Educating communities about how salmon habitat protection and restoration can coexist with long-term protection of property
- ▶ Promoting landowner friendly methods, such as conservation
- ▶ Sharing information with landowners and the public about private property rights
- ▶ Ensuring funding outreach efforts with landowners

## **Project cost benefit**

The big, pointed question that the public often asks is whether we are spending public tax dollars wisely. Are we really making a difference? Our projects and programs need to prove and communicate to the public that we indeed are spending their money to good and effective purpose.

We can accomplish this by designing and implementing projects and programs that

- ▶ Have a high benefit to cost ratio
- ▶ Take the most cost efficient approach possible
- ▶ Ensure the completion of each project or program is within the established budget
- ▶ Has commitment for the necessary follow-through to bring about a successful completion
- ▶ Gives progress reports back to the community

## **Effectiveness Monitoring**

People demand that we prove that preserving and restoring salmon habitat will bring more fish.

We can do this over time through effectively monitoring of projects during and after their implementation. Projects will

- ▶ Adopt Salmon Recovery Funding Board guidance on monitoring
- ▶ Educate the public that fixing the habitat does not bring fish back by itself. Many other factors impact fish returns (e.g., hatcheries, harvest, ocean conditions)
- ▶ Communicate the results of monitoring efforts to project sponsors, the Lead Entity, and the citizens
- ▶ Incorporate past monitoring findings to improve proposed project approaches

## **Public cost for private benefit**

Continued development within critical areas and the continued fragmentation of lands into smaller private parcels may prove disastrous for long-term efforts aimed at salmonid habitat protection and restoration.

Public awareness needs to address the following:

- ▶ The public loss of salmon is a private loss – we lose a very special part of our Northwest quality of life
- ▶ We need to change public perceptions of private property rights versus the public good
- ▶ An increase in regulations on public lands can protect public resources
- ▶ There are incentives available for property owners to conserve, such as Open Space Tax program and land trusts
- ▶ We need to acquire key habitat to protect salmon resources into the future
- ▶ Environmentally-conscious development is possible

## **Sharing the cost**

The burden of “who pays” for salmon habitat protection and restoration is a matter of frequent debate. Increased taxes on property owners, loss of useable land via protection measures (i.e. buffers), and lost jobs are reasons frequently stated for not doing salmon projects and programs.

We can find new ways to distribute the load more evenly across the community. Here are some sample approaches

- ▶ Research alternative match requirements for projects requiring “match”
- ▶ Educate communities concerning cost effectiveness of protection versus restoring habitat functions
- ▶ Recognize outstanding stewardship
- ▶ Increase awareness about open space tax and easement programs
- ▶ Research compensation to landowners for preserving key habitat not protected by regulations
- ▶ Target conservation futures to fund priority projects

## **Overcome a cumbersome bureaucracy**

The lightning rod of salmon habitat protection and restoration is the bewildering realm of government processes, regulations, and permitting, even for projects that benefit salmon. Cumbersome bureaucracy sours everyone's attitude and makes the job of salmon recovery more difficult to bring about.

Projects that "ease" sponsor anxieties about bureaucracy are important.

An important facet of any good projects is to have the right people available to give assistance to landowners or sponsors during permitting processes.

But we need to examine and change how the system itself works – its complexities make it a challenge just to get people involved in the first place. Here is a list of some of the most needed systematic improvements:

- ▶ Most grants require match; it is expecting a lot to find sponsors who are willing to both share their land and come up with a match. Research alternate funding sources.
- ▶ Expand the amount of time allowed to complete a project with SRF Board funding.
- ▶ Consolidate or waive individual permits for salmon habitat restoration projects.
- ▶ Have consistent permit applications, timelines, and review requirements among local, state, and federal agencies.
- ▶ Permit agencies need to provide better upfront feedback to project sponsors about application times and requirements. Project planners need to work with sponsors to provide better direction towards success.

## - Appendix E -

# **Guiding Principles for Project and Program Development, Evaluation, and Ranking**

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The WRIA 13 Lead Entity Technical Committee adopted a series of guiding principles for evaluating and ranking projects and programs for inclusion on Habitat Project Lists, which it submits to the Salmon Recovery Funding (SRF) Board for potential funding. These guiding principles are also useful in evaluating applications to other grant funding programs that require the endorsement of the Lead Entity.

Potential project sponsors looking to design effective projects consistent with the Salmon Habitat Protection and Restoration Plan for WRIA 13 can also find this chapter helpful.

The guiding principles that follow below blend the integration of science-based protection and recovery priorities with community values. While it is not necessary for all projects to display every one of these principles, each will play a consideration within a formal ranking process.

### **The project or program must be scientifically sound.**

The single, overarching attribute of any project or program seeking endorsement from the WRIA 13 Lead Entity is that it must be scientifically sound. Projects and programs must use the best available science and incorporate accepted best management practices.

### **The project or program addresses habitat needs in sequential order.**

The project must be consistent with the High Priority Habitat Projects & Programs for the appropriate subbasin. Consistency with these lists ensures that projects or programs provide the highest benefit to fish in a logical, sequential manner. Projects or programs to be included on Habitat Project Lists must be consistent with the 2004 High Priority Actions.

### **The project or program achieves optimum cost benefit.**

Resources are limited and competition with other WRIAs for funding is high. Therefore, projects must demonstrate a reasonable cost/benefit ratio and be within scale with other projects proposed within the WRIA 13.

## **The project or program protects or restores natural stream functions.**

### **Protection**

Protection effort in WRIA 13 will focus on areas of functional habitat that have a high threat of development or land use changes that will deleteriously impact and/or have the potential to lead to aquatic habitat degradation. Protection projects will conserve critical aquatic habitats and/or landscape features that directly influence the natural processes within a watershed/marine shoreline. These efforts will also target key habitat that provides the most benefit to salmonids. Restoration of vital habitat functions may also be a component of a protection project.

### **Restoration**

Restoration efforts in WRIA 13 will focus to restore the natural watershed functions. These efforts will take place in the freshwater watersheds and marine shorelines where it is most attainable to successfully restore the natural processes to benefit salmonids.

Potential restoration areas within WRIA 13 will include those watersheds systems that have a greater potential to restore habitat functions. Subbasins and marine shorelines having restoration potential must incorporate habitat functions for all life history phases, which include spawning, rearing, and migration. Restoration efforts will address the problems impacting the natural processes rather than their symptoms. Logical project sequencing will also be implemented to maximize project benefit (resource/financial) and not negate previously implemented projects.

Although “imperviousness” is a poor indicator of “stream health”, there is some relationship between the function of natural ecosystem processes and urbanization. Stormwater treatment and surface water management are the two largest concerns within urban watersheds because of their harmful affects on freshwater and marine habitats.

Streams supporting urban development may have irreparably impaired natural processes. Altered stream hydrology from existing impervious areas, developed buffers, channel modification are a few of the conditions that are found impacting WRIA 13 urban streams. These streams, however, by virtue of their proximity to neighborhoods, offer good opportunities to involve and educate the public on the importance of salmon protection. While restoration actions may not fully restore natural processes, enhancement and protection of existing conditions is possible. Stormwater management is a priority action for these subbasins. However, the WRIA 13 Lead Entity usually does not consider urban streams an appropriate focus area for restoration projects.

### **The project or program considers all stocks and life stages.**

While WRIA 13 gives strong consideration to projects that benefit salmonids listed under the Endangered Species Act and those ranked as critical or depressed under SaSI, it remains committed to its vision of a multi-species approach.

WRIA preference extends to projects and programs that benefit all stocks within a subbasin or the nearshore rather than a single one. Likewise, all life stages remain equal in importance.

### **The project or program increases the potential for natural productivity.**

The long-term health of salmonids in WRIA 13 depends on self-sustaining salmon reproducing at sustainable levels. Ultimately, successful projects must provide a direct or indirect link to an increase in salmon numbers.

### **The project or program has the potential for long-term success.**

Projects and programs must demonstrate a certainty of success by relying on proven best available science and best management practices in their design and implementation.

There must also be a clear commitment towards monitoring and maintenance of a project or program to guarantee long-term duration of the benefit to salmonids.

Adaptive management entails relying on scientific methods to test the results of a project or program so that adjustments can happen appropriately to provide the greatest opportunity for project success. Good projects and programs employ a strong adaptive management approach within its design, along with the capacity to accommodate the need for change when necessary.

### **The project or program addresses priority data gaps.**

The limiting factors analysis clearly communicates the breadth of information still missing about existing conditions in WRIA 13 subbasins. This prevents biologists and communities alike from making the best decisions that adequately address the habitat needs in a logical, prescriptive, and efficient manner.

WRIA 13 encourages projects and programs that address information gaps identified as “High Priority Projects and Programs” within individual subbasins.

**The project or program capitalizes on site-specific opportunities.**

Habitat Project Lists submitted for SRF Board review and funding normally reflect the Top High Priority Projects and Program Strategy. However, there are times when the exception to this rule makes sense for the WRIA as a whole.

The WRIA will endorse high priority projects within a subbasin that does not make the High Priority Projects and Program Strategy when an “opportunistic” event arises. However, the opportunistic event must still be scientifically sound and approved by the Technical Advisory Group and Citizen Advisory Committee for submittal to the SRFB.

## **- Appendix F -**

# **Salmon Recovery Funding Board Evaluation and Ranking Process**

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### **Purpose**

Funding for a project is awarded on a competitive basis by the state Salmon Recovery Funding Board (SRFB). Thurston Conservation District is the Lead Entity (LE) for WRIA 13, Deschutes. The LE encompasses the southwest terminus of Puget Sound, including the saltwater inlets of Henderson and Budd Inlets, portions of Eld Inlet, and the freshwater streams that drain to them. WRIA 13 is contained entirely within Thurston County. Applicants submit project proposals by to the Lead Entity, which evaluates the proposals, offers suggestions to strengthen the projects, ranks them according to the local salmon habitat recovery strategic plan, and submits a list of proposals to submit to the SRFB for funding consideration.

A committee of citizens, with the assistance of a Technical Advisory Group (TAG), evaluates and ranks projects proposed to the Lead Entity. The TAG evaluates projects based on their technical merits, with an emphasis on the project's benefits to salmon and certainty of success as provided in this plan. The citizen's committee works with the TAG to determine the final ranking of the projects based upon their technical merits in addition to how well the project fits within the Salmon Habitat Restoration and Protection Plan for WRIA 13, public involvement, and cost appropriateness. The lead entity then compiles the entire list of proposals in ranked order and submits them with lead entity details as one package to the SRFB for funding consideration.

### **Process Steps for 2005, 6<sup>th</sup> Round (All meetings are open to the public) :**

All applicants must submit their applications through the WRIA 13 Lead Entity. Applicants will fill out an application in MS Word format (available through the LE) and turn it into the LE Coordinator for input into the PRISM database, a grant management tool provided by the SRFB. Sponsors are required to submit a CD-rom containing the following documents to the LE for funding consideration:

- Authorization Memorandum
- Maps (general vicinity and work site)
- Project Photo(s) (assessment projects optional)
- Long-term stewardship plan
- Project Partnership Contribution Form (required for state agencies)
- Barrier Evaluation Form (fish passage projects)
- Expanded Barrier Evaluation Form
- Other materials (optional)

- Evaluation proposal response
- Landowner willingness form

## **2005 SRFB 6<sup>th</sup> Round Grant Cycle – WRIA 13 Timeline**

Step 1:	June 13	Letter of Intent Due to LE (attached)
Step 2:	June 16	Application Workshop
Step 3:	June 22	Field Trip to Project Sites for Committee and Review Panel, with Five-Minute Project Synopsis by Sponsors at the Site
Step 4:	July 6	Rough Draft of Application Due to LE, CD-rom and Hardcopy
Step 5:	July 13	TAG Meets with Sponsors to Review Proposals, following monthly meeting – All LE Members Encouraged to Attend
Step 6:	August 31	FINAL Application Due to LE, CD-rom and Hardcopy
Step 7:	Sept. 14	Sponsors Present Proposals: TAG and Citizen Committee Rank Proposals at Monthly LE Meeting
Step 8:	Sept. 30	LE Application Packet Due to SRFB

### **Step 1: Letter of Intent**

This brief one-page synopsis allows the project sponsor to share details of a proposed project with the LE. It includes project title, location, a brief description of intended actions, salmonid species effected and an approximate cost estimate.

Due Date: June 13, 2005

### **Step 2: Application Workshop**

SRFB staff along with the LE Coordinator will provide application manuals, timelines for state and local processes, identify specific sources for technical assistance, and conduct a question and answer session. Also included will be a training on the grant management tool PRISM. This program will be used to submit applications to the LE and finally to the SRFB. Those interested in becoming project sponsors are highly encouraged to attend. Others in attendance include members of the citizen's and technical committees.

Workshop Location and Date: June 16, 2005,, 1:00-4:00pm Olympia Community Center

### **Step 3: Field Trip to Project Sites**

It is the intent of the LE to conduct site visits to every project proposed. Where scheduling permits, these site visits will be done in tandem with all representatives of the LE in addition to the Review Panel members working with the SRFB. Project specifics will be presented by the sponsors on site and suggestions will be given by all participants present. The dialogue created in this setting is aims to increase the benefit and certainty of the project. Site visits are being conducted early in the process to allow for suggestions given to be integrated into the projects prior to the rough draft submittal. Projects that require additional development will also be notified at this time.

Date: June 22, 2005, Thurston Conservation District offices, 2400 Bristol Ct., Olympia.

### **Step 4: Rough Draft Application Due to LE**

Project sponsors are asked to submit the application and all relevant documents to the LE Coordinator in CD-rom and / or hardcopy format. The Coordinator will input projects into the PRISM database for the applicant.

Due Date: July 6, 2005

### **Step 5: TAG Meets With Sponsors to Review Proposals, Following Monthly Meeting – All LE Members Encouraged to Attend**

This step allows for a dialogue to occur between the TAG and the project sponsor. The TAG will give suggestions for project improvements and modifications during this meeting. The approach is collegial, with all participants working towards the creation of the most beneficial project for salmon. Suggestions will be captured during the meeting on a feedback form that will be available to the sponsor within one working day. Projects that are determined to have a low benefit or low certainty as defined in attachment x, will be informed at the completion of the meeting and given suggestions for action. The goal of the meeting is to educate the TAG members as to the nature of the project and to provide project applicants with constructive verbal and written evaluations. Examples of feedback could be:

Example 1: Culvert design should be improved to pass all species of fish at all life stages.

Example 2: Additional community outreach and educational components could be improved by involving local elementary school students in the plantings.

Meeting Date and Location: July 13, 2005, 2404 Heritage Ct., Olympia

### **Step 6: FINAL Applications Due to LE**

Final versions of the project proposals are to be submitted into PRISM by this date. The LE Coordinator will assist sponsors having difficulty with the database upon request. Additional written materials such as maps or diagrams must be submitted to the LE Coordinator at this time. Project applications will be downloaded from the PRISM database on June 21, 2004 for distribution to the LE Committees.

Date: August 31, 2005

### **Step 7: Sponsors Present Proposals: TAG and Citizen Committee Rank Proposals at Monthly LE Mtg**

The entire committee works together to rank the projects. The TAG discusses elements of the project that relate to benefit to salmon and certainty of success while the CAC discusses elements of the project that relate to community outreach and involvement. This discussion begins following the presentation of each project by the project proponent and initiates with each member revealing their scores on the ranking sheet for each of the three categories for each project. The point total serves and initial ranking serves as the platform for discussion and potential changes to the ranking. Members strive for consensus, but if consensus cannot be reached, members will vote. Voting is restricted to one vote per entity, agency or group even if more than one representative is present. The decisions of the committee are final.

Date: September 14, 2005

### **Step 8: LE Application Packet Due to SRFB**

The LE Coordinator will incorporate the final prioritized list of projects into an application packet to submit to SRFB. The packet will include the Strategic Plan for WRIA's 13 & 14, the prioritized list of projects, the ranking criteria, and the LE summary questions as requested by the SRFB.

Date: September 30, 2005

A period of review will follow for the SRFB, which will include Lead Entity presentations, reports and public comment period. The SRFB will allocate funding at their open public meeting January 5 and 6, 2006.

## **COMMITTEE ROLES**

### **WRIA 13 Salmon Habitat Recovery Workgroup**

The WRIA 13 Salmon Habitat Recovery Workgroup (Workgroup) is comprised of 25 technical and citizen members representing the cities, counties, Tribes, environmental community, citizen groups, state agencies, agriculture, shellfish growers, realtors and other interested or affected people and groups within the area. The Workgroup is the combined Technical Advisory Group and the Citizen Advisory Committee. The Workgroup created a WRIA-wide strategy to provide a regional understanding of the reasons that salmonid habitat is impaired, what caused those impairments, how to restore those habitats and what the desired future conditions look like. The fundamental role of the Workgroup is to review, score and rank all projects submitted to the Lead Entity and submit them to the Salmon Recovery Funding Board, in accordance with RCW 77.85.

The WRIA 13 Technical Advisory Group (TAG) and Citizen Advisory Committee (CAC) perform important, unique and complementary roles. These roles are essential to ensure the best projects are proposed for salmon recovery and that the projects will increase the technical and community support for expanded and ever-increasing effectiveness of Lead Entities at both the local and regional levels.

### **WRIA 13 Technical Advisory Group**

The TAG is often the most knowledgeable about watershed, habitat and fish conditions. Their expertise is invaluable to ensure priorities and projects are based upon ecological conditions and processes. They are also the best judges of the technical merits and the certainty of a project's technical success.

The purpose of the TAG is to work together as a group to review proposals in WRIA 13 and to assist the sponsor to improve projects for habitat restoration and preservation. The TAG will evaluate the projects to assess their degree of integration with other previous or current projects in the same watershed, consistency with the strategy, benefit to salmonids, number of species affected, budget, etc. The primary goal of the TAG evaluation is to ensure that restoration / preservation projects are part of a holistic method to restore or preserve habitat function to the affected area. If reviewing an assessment project, the role of the TAG is to ensure the study is identified with the strategy or fills a previously unidentified data gap, will lead to habitat projects and benefits salmonids.

The TAG will assure that the proposed project addresses limiting factors, the strategy and clearly benefits salmon. To achieve that goal, the TAG will evaluate projects and conditions using objective criteria as outlined within the strategy document. TAG members will come to the technical ranking meeting with all projects scored and ranked according to the criteria. Members will then discuss their individual ranking with the entire group. This discussion will lead to a final TAG list. They will rank the projects according to the criteria and submit that ranked list to the Citizen's Advisory Committee. They will provide rationale for their ranking and representative members will be present to answer questions for the CAC.

TAG membership includes representatives from:

- Squaxin Island Tribe
- Washington Department of Fish and Wildlife
- South Puget Sound Salmon Enhancement Group
- Washington Department of Ecology
- Thurston Conservation District
- Clover Park Technical College
- Washington Trout
- Others as identified

### **WRIA 13 Citizen's Advisory Committee**

The WRIA 13 Citizen's Advisory Committee (CAC) members are critical to ensure that priorities and projects have the necessary community support for success. They are the best judges of current levels of community interests in salmon recovery and how to increase community support over time with the implementation of habitat projects.

The CAC is responsible for developing the final prioritized project list and submitting it to the Salmon Recovery Funding Board for funding consideration. As a group, the CAC may reject a project proposal from inclusion on the final ranked list if recommended by the TAG or if it is in conflict with established SRFB guidelines. They may also change the ranking recommended by the TAG based upon social, economic or public acceptance reasons.

When examining the projects, the CAC will evaluate each proposal based upon technical, budgetary, and community support criteria. It is the role of the CAC to integrate these issues and formulate a final ranked list to be submitted to the SRFB for funding consideration. Members of the CAC will come to the citizen-ranking meeting with all projects scored and ranked according to the criteria. Members will listen to the presentation by the TAG members and discuss amongst one another the rationale for ranking the entire list. The conclusion of this discussion is the final list; the CAC has the last word on the ranked habitat list.

WRIA 13 Citizen Advisory Committee membership includes:

- Thurston County
- City of Olympia
- City of Lacey
- City of Tumwater
- Capitol Land Trust
- Thurston Regional Planning Council
- Watershed Council Members
- Interested Citizens and Groups

This coordinated organizational structure ensures that the technical merit of each project is fully reviewed and commented on by local, state and tribal representatives, represents a blend of benefit to salmon and community interests and that the ranked list is supported by the entire Workgroup.

## **RANKING PROCEDURES**

### **Ground Rules**

The following rules shall govern the participation of project sponsors, TAG members, and CAC members during the habitat project list process.

### **Conflict of Interest**

Committee members are expected to recuse themselves from reviewing any applications with which they have a prior involvement or interest. Specifically, a conflict of interest occurs if the reviewer:

- Has financial ties to the applicant;
- Sits on the applicant's Board of Advisors;
- Stands to benefit directly from the proposed project's completion; or
- Has contributed directly to the development of the proposal.

Prior knowledge of the proposal or prior contact with the applicant does not constitute a conflict of interest, as long as none of the above criteria apply to the reviewer. If you have any concerns or questions about whether your relationship with an applicant or proposal warrants recusal, please explain your situation to the other members of the technical review committee at the meeting. They will decide jointly whether it constitutes a conflict of interest.

### **Project Sponsors**

- Project sponsors must submit a complete proposal in accordance with the schedule set forth by the WRIA 13 Workgroup.
- A complete proposal includes all required information requested by the SRFB within the application materials and by the WRIA 13 Workgroup, as requested by the Lead Entity Coordinator.

- Proposals are considered proprietary and will only be utilized by the TAG and CAC. They will not be given to a third party for any reason without the written approval of the sponsor.
- Projects submitted for consideration must address the strategic plan, limiting factors, watershed processes, or supporting data.
- Sponsors will be asked to make written and oral presentations to the Workgroup, in addition to leading one or more site visits for the benefit of the Workgroup and for evaluation purposes of the SRFB Technical Panel.
- The TAG will recommend modifications to a proposal to the project sponsor. It is for the benefit of the project that these suggestions are made. It is up to the discretion of the sponsor to heed this advice, knowing that project ranking may be affected by this decision. Once the CAC has finalized the ranked habitat list, the project sponsor cannot change the scope or budget of the project.
- Project sponsors are given one rough draft review with the TAG to incorporate beneficial changes, expand partnerships, etc. Project sponsors may not be present in the room when the TAG is ranking the projects. TAG members who are also project sponsors will be asked to submit their written comments on the projects being reviewed to the Lead Entity Coordinator prior to the ranking meeting. The Coordinator will be responsible for conveying the project sponsor's input to the TAG.
- During the CAC ranking meeting, project sponsors will be admitted to the room, but asked to remain quiet save for questions asked directly of them by a CAC member. Sponsors will not be allowed to advocate for their proposals during the ranking meeting. Those who do will be given one verbal warning. If the conduct continues, they will be asked to leave.

## WRIA 13 SRFB 6<sup>th</sup> Round 2005 Project Reviewer Scoresheet

Applicant	Project Title
Reviewer	Date

Category	Criteria for Evaluating Project's Benefit	Score
Action and Areas	Is the project in a high priority fresh or saltwater area? Does the project address a high priority need within the watershed? (Points 1-10)	
Scientific	Is the project identified within the strategy, recovery plan or habitat assessment, or other relevant document? (Points 1-10)	
Feasibility	Can the project accomplish the stated objectives? (Points 1-10)	
Species	Does project have a multi-species approach, with emphasis on protecting healthy stocks, ie chum, and restoring declining stocks, ie Coho? Is there documented fish use in the project area? (Points 1-10)	
Life History	Does the project address an important life history stage or habitat type that limits the productivity of the salmonid species in the area and/or the project addresses multiple life history requirements? (Points 1-5)	
Cost	In your experience, is the project cost relatively low when compared to the predicted gains? Is this project a good investment of grant dollars? (Points 1-5)	
<b>BENEFIT TOTAL:</b>		

Category	Criteria for Evaluating Project's Certainty	Score
Scope	Is the scope of work appropriate to meet the projects goals and objectives? (Points 1-5)	
Approach	Is the proposed method of implementation consistent with proven scientific methods? (Points 1-5)	
Sequence	Does the project address habitat features in the appropriate order? (i.e. Is there a blocking culvert downstream of the proposed culvert removal?) (Points 1-5)	
Threat	Is habitat threatened if project does not proceed?	

	(Points 1-5)	
Stewardship	Does the sponsor have an adequate monitoring plan? (Points 1-5)	
Landowner	Are the landowners aware and willing to have work performed on their property? (Points 1-5)	
Implementation	Does the sponsor have a track record of implementing beneficial project's? If funded, will project proceed to implementation with few or no known constraints? (Points 1-5)	
<b>CERTAINTY TOTAL:</b>		

<b>Category</b>	<b>Criteria for Evaluating Community Involvement</b>	<b>Score</b>
Partnerships	Does the project combine expertise from other groups and/or agencies? Do these partnerships pave the way for future projects? Does the proposal engage community groups, businesses and/or landowners as project partners? (Points 1-5)	
Location	Does the project take place in a difficult to reach area (landowners traditionally unwilling to perform projects) or with a partner that is under-represented in habitat efforts? (Points 1-5)	
Expertise	Is the project sponsor able to implement the intent of the project? (Points 1-5)	
Education	Does the project allow for education of the public regarding salmon issues, particularly riparian landowners? Will the sponsor highlight the results of the project with the surrounding community? (Points 1-5)	
<b>COMMUNITY TOTAL:</b>		

<b>PROJECT TOTAL SCORE:</b>	/105
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**- Appendix G -**

**Nearshore Excerpts from the draft Chinook and Bull Trout Recovery Approach for the South Puget Sound Nearshore**

**General Restoration Approaches for Restoring Properly Functioning Nearshore Conditions**

<b>Stressor</b>	<b>Recommendations</b>
Shoreline Armoring	<ul style="list-style-type: none"> <li>▶ Removing armoring from public access sites – City, County and State Parks often contain waterfront recreation areas with unnecessary armoring. Removal of these structures and restoring native vegetation can account for actual restoration of processes because of their relatively large size and provide perfect example sites for education purposes.</li> <li>▶ Identify and remove bulkheads not needed for protecting structures</li> <li>▶ Avoid the necessity of shoreline armoring by requiring setbacks and buffers</li> <li>▶ When feasible use soft shore protection measures to protect shorelines - Much of the bulkheading that has occurred in South Puget Sound is unnecessary, and in many cases has actually increased shoreline erosion. When bulkeading is required, soft shore alternatives that mimic natural processes, using gravel, sand, logs and root masses, should be used.</li> </ul>
Overwater Structures	<ul style="list-style-type: none"> <li>▶ Institute a No Net Gain in armoring per drift cell – Local governments updating shoreline master programs and GMA critical areas ordinances can adopt a standard to protect existing shoreline function by placing moratoria on new armoring or collecting a resource impact fee for each armoring permit to help defray the cost of bulkhead removal and other nearshore restoration projects.</li> <li>▶ Formalize design criteria in Overwater Structures white paper – The Aquatic Habitat Guidelines Project developed a white paper with useful design criteria to prevent and minimize damage to nearshore environments. These criteria should be formally adopted in a public rule-making process for WDFW’s Hydraulic Project Approval permit program, Corps of Engineers’ Section 10 permits and other appropriate permits.</li> <li>▶ Design overwater structures to let light through, to allow survival of subtidal/ intertidal vegetation.</li> <li>▶ Remove old homes, floats, debris, old piling, anchors, and derelict vessels.</li> <li>▶ Minimize the number of docks by encouraging community facilities.</li> </ul>
Ramps	<ul style="list-style-type: none"> <li>▶ Minimize the number of ramps by encouraging community facilities.</li> <li>▶ Provide incentives to residential property owners to give up individual ramps and marine railways.</li> <li>▶ Identify and remove boat ramps that cloak sediment transport.</li> </ul>
Stormwater & Wastewater	<ul style="list-style-type: none"> <li>▶ Retrofit stormwater systems using Low Impact Development practices – Many urban areas could be retrofitted using LID principles to improve water retention, treatment and infiltration to the water table, especially as part of ongoing redevelopment projects.</li> <li>▶ Retrofit wastewater treatment plants for reclaimed water re-use – Wastewater that is currently being discharged into south Puget Sound can be treated to higher standards and used for irrigation, fire suppression and wildlife habitat enhancement similar to Yelm’s State of the Art system.</li> </ul>

<b>Stressor</b>	<b>Recommendations</b>
<p>Stormwater &amp; Wastewater (Continued)</p>	<ul style="list-style-type: none"> <li>▶ Promote land use practices that prevent stormwater flows- Development reduces the natural storage and buffering capacity of watersheds, resulting in greater stormwater runoff and a range of negative impacts to aquatic habitats. Where feasible, stormwater runoff should be prevented by preserving native land cover and natural drainage systems (forests, soils, wetlands, shorelines, stream corridors) and limiting the area and connectivity of impervious surfaces.</li> <li>▶ Implement Comprehensive Stormwater Programs - Element SW 1.2 of the 2000 Puget Sound Water Quality Management Plan calls on all cities and counties to adopt comprehensive stormwater programs to manage stormwater runoff.</li> <li>▶ Include Nutrient Removal in On-Site Sewage System Design - Nutrient loadings to south Puget Sound are a significant water quality concern (see for example, WDOE 2002 at <a href="http://www.ecy.wa.gov/pubs/0203021.pdf">http://www.ecy.wa.gov/pubs/0203021.pdf</a>). Nutrient sources include discharges from sewage treatment systems. In the Puget Sound region, on-site sewage systems are designed to meet bacteria standards to protect public health, but do little to remove nutrients. Systems installed in shoreline and riparian areas of south Puget Sound should be designed to reduce nitrogen concentrations as well.</li> <li>▶ Improve Monitoring and Maintenance of On-Site Sewage Systems - In order for sewage systems to function effectively they must be properly sited, designed, installed, operated, monitored and maintained. Element OS-2 of the 2000 Puget Sound Water Quality Management Plan calls on local health jurisdictions to adopt programs that provide for regular monitoring/maintenance of on-site systems and follow-up action to ensure that malfunctioning and failing systems are repaired or replaced. The plan further calls on local health jurisdictions to identify areas of special concern and use risk-based approaches to provide enhanced oversight in marine shoreline areas and other sensitive environments.</li> <li>▶ Promote or Require Wastewater Reuse - Municipalities and other dischargers should explore opportunities to recycle and reuse treated wastewater to reduce nutrient loadings to marine waters and to supplement and replenish limited freshwater supplies.</li> <li>▶ Prohibit New Wastewater Discharges to Puget Sound - Water quality studies indicate that wastewater discharges are contributing to the eutrophication of marine waters in south Sound. Element P-2.1 of the 2000 Puget Sound Water Quality Management Plan calls on Ecology to pursue alternatives to marine wastewater discharges "whenever such alternatives are feasible, economically achievable and environmentally preferable. . . . Alternatives to be considered shall include, but not necessarily be limited to, the following: land application, reuse, additional treatment and the use of constructed wetlands."</li> <li>▶ Reduce Nutrient Loadings from Permitted Wastewater Facilities - State and federal law and the 2000 Puget Sound Water Quality Management Plan call on Ecology to set water quality and sediment standards, to implement anti-degradation requirements, to incorporate conditions from Total Maximum Daily Load studies, and to issue NPDES permits to meet and implement these requirements. Increased nitrogen loadings and related problems with dissolved oxygen have been identified in many areas of south Puget Sound.</li> </ul>

<b>Stressor</b>	<b>Recommendations</b>
Stormwater & Wastewater (Continued)	<ul style="list-style-type: none"> <li>▶ Systematically reduce human-caused nutrient sources. Ecology marine monitoring data and studies have found the South Sound waters are susceptible to low dissolved oxygen conditions that can be caused by increased nutrients. A focused effort, South Puget Sound wide is needed to prevent human-associated nutrients from entering the South Sound.</li> <li>▶ Implement a comprehensive street sweeping program to reduce the amount of pollution in water runoff - Roads, highways and bridges are sources of pollution such as sediment, heavy metals, oil, grease and debris. A significant amount of these pollutants are carried to Puget Sound by storm water when it rains. New technology in street sweeping equipment considerably reduces the amount of pollution found in runoff water</li> </ul>
Landfill below the HHWL	<ul style="list-style-type: none"> <li>▶ Prohibit any new fill for any use or structure</li> <li>▶ Remove fill and structures below the high high water line</li> </ul>
Riparian Loss	<ul style="list-style-type: none"> <li>▶ Require native plantings along shoreline as a permit condition – Most bulkheads, overwater structures and other appurtenances require a local building permit and several state or federal use permits. These permits should require the planting of native vegetation, even for renewal permits, so that a marine riparian area can eventually re-establish. There are a number of guidance materials available for maintaining views and access while retaining native vegetation along the shoreline.</li> <li>▶ Establish building setbacks that are protective of shoreline forests and other natural habitats, or allow the restoration of these habitats. Shoreline forests and other natural habitats provide important functions such as inputs of salmonid prey species and wood. Encroachment into these natural areas and forests leads to extensive physical/chemical, and habitat effects and impacts on salmonid populations.</li> <li>▶ Require riparian buffers along the nearshore as a permit condition - The importance of riparian buffers for salmon and trout in freshwater systems has long been recognized. Placing buffers along the marine nearshore would serve a similar purpose.</li> <li>▶ Increase public ownership along the shoreline to protect riparian habitat.</li> <li>▶ Designate shorelines as open space areas.</li> </ul>
Wetland & Estuarine Modification	<ul style="list-style-type: none"> <li>▶ Encourage dike and tide gate removal, and improve agricultural practices on marine and estuarine marshes. In the past, substantial loss of estuarine and tidally influenced wetlands was due to the diking and hydrologic isolation of the wetlands, primarily for agricultural purposes. Dike removal and restrictions on agricultural use of estuarine wetlands (fencing of cattle, etc.) would restore important estuarine functions. This can be accomplished through incentives and buy-back programs, some of which currently exist at the federal level, such as the Conservation Reserve Program and the Wetland Reserve Program through the Natural Resources Conservation Service. Similar state and local programs could also be created and targeted toward wetland/estuarine restoration.</li> </ul>

<b>Stressor</b>	<b>Recommendations</b>
Wetland & Estuarine Modification (Continued)	<ul style="list-style-type: none"> <li>▶ Increase funding for estuarine restoration and monitoring – Most funding sources for restoration are capped at \$5 million or less and require enormous resources on the part of local partnerships to find match. Restoring natural processes generally occurs at a larger geographic scale than structural restoration projects and may contain elements that are experimental until implemented and monitored. These funding sources also limit the amount of the grant that can be spent on monitoring and adaptive management, so little is known as to the success of these projects. Increasing state and federal appropriations for restoration at larger scales and actively investing in effectiveness monitoring would improve restoration effectiveness.</li> <li>▶ Remove shoreline armor and bulkheads around the mouths of tributaries.</li> <li>▶ Remove blockages to small tributaries, such as culverts, fill, and structures</li> </ul>
Input of Toxic Components	<ul style="list-style-type: none"> <li>▶ Public education re Best Management Practices (BMPs) for preventing entry of toxic contaminants into nearshore and marine waters. For many years the ocean and inland marine waters were generally considered safe from harm by human actions. This is no longer the case; South Puget Sound nearshore and marine waters now have extensive contamination that can cause a broad suite of negative effects to salmonid populations.</li> <li>▶ Ban the use of PBDEs - PBDEs (polybrominated diphenyl ethers) are persistent, bio-accumulating toxics used as flame-retardants in mattresses, carpets, etc. They have a structure similar to PCBs (polychlorinated biphenols), appear to behave similarly, and they are increasing in the environment in North America.</li> <li>▶ Clean up Puget Sound toxic sediments, including South and Central Puget Sound. The removal of sediments is preferable to capping.</li> <li>▶ Pesticides – Educate the public about the problems related to pesticide use and provide stream buffers to help filter water before it reaches streams.</li> <li>▶ Prevent oil spills through local and regional planning and implementation efforts.</li> </ul>
Predation	<ul style="list-style-type: none"> <li>▶ Reduce or eliminate man-made predator buffets.</li> </ul>
Boat Traffic	<ul style="list-style-type: none"> <li>▶ Restrict vessel speed and/or redirect vessel routes - Many inlets and passages in South Puget Sound offer narrow and shallow openings for marine traffic. The wake from passing boats and ships passing through these constrictions can cause shoreline erosion and damage to the near-shore marine environment. Much of this impact can be avoided by selectively controlling speeds and vessel routes located near sensitive areas.</li> <li>▶ Require specific anchoring practices and docking design.</li> </ul>
Invasive Species	<ul style="list-style-type: none"> <li>▶ Require that ballast water in commercial ships be exchanged or treated before release in South Puget Sound - Before a voyage commercial ships must take in water (ballast) for stability. Once a ship arrives at its destination port this water is released. A common method of non-native species introduction is by being carried in this ballast water. By requiring the dumping or treatment of ship ballast water exotic species would be prevented from introduction.</li> <li>▶ Remove from riparian areas invasive terrestrial non-native vegetation, such as scotch broom.</li> </ul>
Shellfish Aquaculture	<ul style="list-style-type: none"> <li>▶ Identify Shellfish Aquaculture Impacts and Improve Management Practices - The production and harvest of shellfish involves a variety of techniques that can negatively affect the nearshore environment. Practices should continue to be developed to avoid and mitigate potential negative impacts. One document that sets a solid framework for this work is the Pacific Coast Shellfish Growers Association’s Environmental Codes of Practice for the Pacific Coast Shellfish Industry, adopted in 2002 to minimize an array of impacts associated with the most common industry practices.</li> </ul>

## Assessment Overview of Nearshore (Excerpted from “Chinook & Bull Trout Recovery Approach for the South Puget Sound Nearshore, Draft July 2004)

	Intact Areas	Shoreline Armoring	Overwater Structures	Ramps	Stormwater/Wastewater	Landfill Below HHWL	Riparian Loss	Wetland & Estuarine Mod.	Input of Toxic Components	Predation	Boat Traffic	Invasive Species	Shellfish Aquaculture
<b>WRIA 13 - Nearshore Landscape Regions</b>													
<b>Eld Inlet (<i>east shore</i>)</b>													
McLane Creek to Mud Bay (north end)		●	●		●		●	●					●
Mud Bay (north end) to Green Cove (north end)	●	●			●		●	●					●
Green Cove (north end) to Cooper Point		●			●		●	●					●
<b>Budd Inlet</b>													
Cooper Point to Big Tykle Cove		●	●		●		●				●		
Big Tykle Cove to Butler Cove		●	●		●		●				●		
Butler Cove to Capitol Lake dam		●	●		●	●	●	●	●		●		
Capitol Lake dam to Ellis Cove (south end)	●	●	●	●	●	●	●	●	●		●		
Ellis Cove (south end) to Gull Harbor (north end)		●					●	●					
Gull Harbor (north end) to Dofflemyer Point	●	●					●	●					
<b>Hartstene Island Group (<i>Dana Passage</i>)</b>													
Dofflemyer Point to Little Fishtrap (east end)	●	●	●				●						
Little Fishtrap (east end) to Henderson Inlet Line	●	●											
<b>Henderson Inlet</b>													
Henderson Inlet Line to Woodard Bay	●	●	●				●	●					
Woodard Bay to Woodland Creek	●		●		●			●					
Woodland Creek to Johnson Point	●	●	●				●	●					

	Intact Areas	Shoreline Armoring	Overwater Structures	Ramps	Stormwater/Wastewater	Landfill Below HHWL	Riparian Loss	Wetland & Estuarine Mod.	Input of Toxic Components	Predation	Boat Traffic	Invasive Species	Shellfish Aquaculture
<b>WRIA 13 - Nearshore Landscape Regions</b>													
<b>Hartstene Island Group (<i>Nisqually Reach</i>)</b>													
Johnson Point to Baird Cove		●	●		●		●						
Baird Cove to Mill Bight	●	●	●		●		●						
Mill Bight to Dog Fish Bight		●					●						
Dog Fish Bight to Sandy Point		●				●		●					
Sandy Point to Butterball Cove	●	●			●			●					
Butterball Cove to DeWolf Bight	●	●											
DeWolf Bight to Hogum Bay	●	●					●						
Hogum Bay to McNeil Island Group Line	●	●											●
<b>McNeil Island Group (<i>Nisqually Reach</i>)</b>													
Hartstene Island Group Line to Luhr Beach	●	●											●

## **- Appendix H -**

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