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

Thurston Conservation District Lead Entity

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Executive Summary

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

This approach leads to seven chapters for the plan:

1. The WRIA 13 Vision for Salmon Habitat Protection and Restoration, which speaks to the long-term vision of preserving or enhancing biologically diverse runs of salmon capable of self-sustaining natural reproduction through habitat protection and restoration.

2. WRIA 13 Salmonid Profile and Strategies contains: 1) a broad overview of the salmon species present in WRIA 13 and their status, and 2) a habitat protection and restoration approach that
   - In the upper stream reaches will primarily benefit migration, spawning and rearing habitat for coho, cutthroat, and steelhead
   - In the lower reaches will benefit migration habitat for all species, spawning habitat for chum, and rearing habitat for coho, cutthroat, and steelhead
   - In the nearshore will benefit the migration, feeding, and rearing of salmonids and he spawning and rearing of forage fish.

3. Annual High Priority Approach a prioritization of projects and programs that emphasizes the highest needs for salmon habitat protection and restoration from a WRIA-wide perspective. In 2004, the focus is on ensuring that the Habitat Project List submitted to the Salmon Recovery Funding Board is consistent with this plan.

4. Subbasin/Nearshore Assessment & High Priority Projects & Programs contain data and analysis of the limiting factors and intact habitats for each freshwater subbasin and its associated Puget Sound marine waters. It also includes an intra-subbasin prioritized habitat work schedule for protection and/or restoration actions.

5. Community Issues & Concerns discusses and outlines a WRIA-wide approach for integrating community attitudes and values in line with the Vision Salmon Habitat Protection and Recovery. Focus areas include:
   - Providing more effective educational needs
   - Promoting stewardship and strong partnerships
   - Addressing perceived threat to private property rights
   - Spending money wisely
   - Communicating effectiveness
   - Pointing out the public cost from private benefit
   - Sharing the cost
   - Overcoming a cumbersome bureaucracy

6. Guiding Principles for Program Development, Evaluation, and Ranking Criteria serves two purposes. First, it communicates to project sponsors the elements of good project design consistent with this plan. Second, it gives the WRIA 13 Lead Entity a tool for evaluating and selecting habitat project lists destined to the Salmon Recovery Funding Board or to other potential funding resources. The principles ensure that projects and programs:
   - Must be scientifically sound
   - Addresses habitat needs in sequential order
   - Achieves optimum cost benefit
   - Protects or restores natural stream functions
   - Considers all stocks and life stages
   - Increases the potential for natural productivity
   - Has the potential for long-term success
   - Addresses priority data gaps
   - Capitalizes on site-specific opportunities

7. The Salmon Recovery Funding Board Evaluation and Ranking Process covers the procedures as to how the Lead Entity will work with project sponsors to develop a WRIA 13 Habitat Project List for submittal to the Salmon Recovery Funding Board during the 2004 funding round.

- Chapter One -

The WRIA 13 Vision for Salmon Habitat Protection and Restoration

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 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
- Predictability of success when applying for funding
- Linkage of co-managers
- Renewed funding
- Building a positive reputation and strong relationships
- 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

- Chapter Two -

WRIA 13 Salmonid Profiles and Strategies

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 *(Onchorhynchus 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 genius *Oncorhynchus*. Late chum stocks often select spawning sites near springs above 4ºC (~ 39ºF), 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 25ºC (77ºF) 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 (60ºF and 40ºF 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^3/s and 0.3 m^3/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 m3/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 m3/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 Tribs 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 WRIAs (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 (8º 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.

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.

- Chapter Three -

Annual High Priority Approach

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

Conceptual Approach

The WRIA 13 Lead Entity (LE) has taken the approach not to prioritize the subbasins within its small geographic boundary. The LE adopted this approach because there are numerous natural resource groups that are geographically restricted to specific areas for project implementation. Since community involvement is essential to the salmon habitat restoration and preservation process, the LE identified their participation to be important. The LE acknowledges that although projects implemented in less productive subbasins do not necessarily have a high direct benefit for salmon the indirect impacts through such things as outreach and education will have long-term affects throughout numerous subbasins.

To avoid a random, ineffective, and reactive approach to salmon habitat protection and restoration in the watershed, the WRIA has adopted a proactive approach by annually identifying general actions that emphasize the highest needs for the WRIA as a whole. Simply stated, this entails determining which general habitat projects or programs will yield the highest benefit to salmonids in a logical, sequential manner consistent with the WRIA 13 Vision. Setting such priorities is especially important for project and program sponsors to focus their efforts on actions that will deliver the greatest impact towards achieving the Vision.

The WRIA sets these priorities annually for a number of reasons:

1. To account for the progress it makes through projects underway or completed.

2. To recognize that as data gaps close, new issues in the freshwater and nearshore environments will surface that may affect priorities.

3. To acknowledge that the community concerns and issues identified in Chapter Four are dynamic and will change frequently.

With the Annual Top Tier Approach, the Salmon Habitat Protection and Restoration Plan remains a flexible, realistic document.

2004 Top Tier Approach

Since the WRIA 13 Lead Entity was in the process of developing their strategy while applicants proposed projects for submittal to the SRF Board, the 2004 "Top Tier Approach" was not available to project sponsors before project development. However, recognizing this guidance would not be available, the project sponsors worked closely with members from the TAG and CAC to verify their projects were a priority action.

- Chapter Four -

Subbasin/Nearshore Assessments and High Priority Habitat Projects & Programs

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 B.

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.

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:

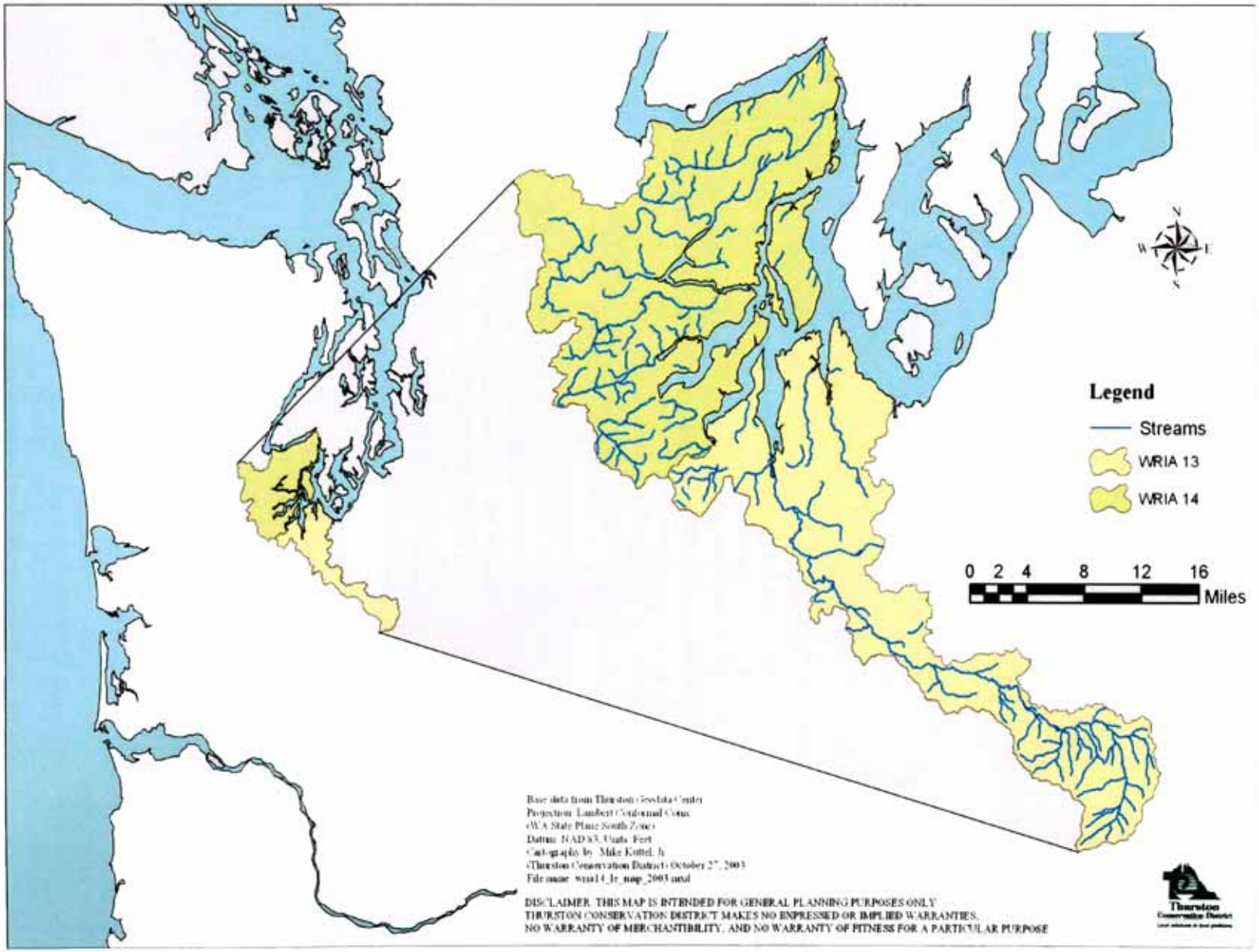
Inlet	Total Acreage	Percent of Total Impervious Area*
Budd Inlet	104,000 acres	6.5 %
Eld Inlet	24,000 acres	2.9 %
Henderson Inlet	32,000 acres	12.0 %

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.

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

WRIA 13 and 14



Potential Restoration Projects for Addressing Limiting Factors

Limiting Factor	Recommendations
Fish passage	Install fish passage structures Replace failed culverts Replace grade control structures
Riparian canopy closure	Improve land use regulation & enforcement Fence livestock out of riparian zones Replant native riparian vegetation, particularly conifers
Streambank condition	Remove or setback dikes, remove riprap Remove meandering channel geometry Replant native riparian vegetation, particularly conifers
Floodplain connectivity	Improve land use regulations & enforcement Prevent development on floodplains & along channel banks Remove or setback dikes, remove riprap Restore meandering channel geometry
Substrate embeddedness	Replant native riparian vegetation Follow guidelines in "Forest & Fish Report" Build fewer roads & maintain existing roads Prevent development on floodplains & along channel banks
Large woody debris total/ *Large woody debris key pieces*	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
Pool frequency	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
Pool quality	Place LWD in spawning & rearing reaches Restore meandering channel geometry Leave LWD in channels & replant riparian vegetation
Off-channel habitat	Improve land use regulations & enforcement Prohibit dikes/levees and filling of wetlands Remove or setback dikes, remove rip rap Replant native riparian vegetation
Temperature *Dissolved oxygen*	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
Water quality/dewatering	Increase summer instream flows Limit development Restore floodplain connectivity Reduce surface water losses on losing reaches Maintain forest cover Enforce water quantity regulations
Change in flow regime	Increase summer instream flows Limit development Restore meandering channel geometry Enforce water quantity regulations
Biological processes	Eradicate exotic fish and riparian plant species Seed upper watersheds with pathogen-free hatchery carcasses Allow beaver populations to rebuild

Woodland Creek

Basin	Henderson Inlet
Watershed Acreage	18,873 acres
Anadromous Salmonid Use	► Nearshore: coho, Chinook, bull trout, chum, steelhead, and cutthroat ► Freshwater: coho, chum, steelhead, and cutthroat (Chinook = hatchery origin, not self-sustaining).
Land Use	Mixed rural and urban development
Total Stream Miles	15.7 miles
Anadromous Stream Miles	10.4 miles
Stream Typing	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
303(d) Listings	Dissolved oxygen, fecal coliform, temperature
Community Involvement	Community and city council offer strong support for salmon and habitat restoration.

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[a] - Poor[b]	Fair[a] - Poor[b]	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[a] Poor[b]	Good[a] Data Gap[b]	Fair[a] Poor[b]	Poor	Fair[a] Poor[b]

[a]Below RM 3.7, [b]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.

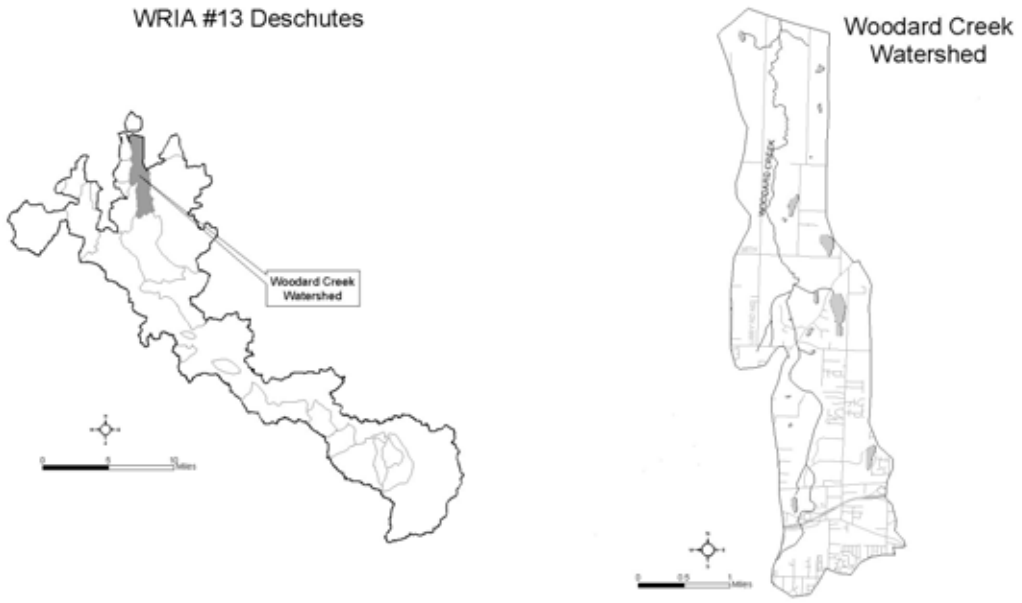
Other Habitat Projects & Programs

- 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



Basin	Henderson Inlet
Watershed Acreage	4,479 acres
Anadromous Salmonid Use	► Nearshore: Chinook, bull trout, coho, chum, steelhead, and cutthroat ► Freshwater: coho, chum, steelhead, and cutthroat (Chinook = hatchery origin, not self-sustaining)
Land Use	Rural / urban development, DNR Natural Areas Preserve in the estuary.
Total Stream Miles	8.2 miles
Anadromous Stream Miles	7.0 miles
Stream Typing	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
303(d) Listings	None
Community Involvement	DNR natural area preserve has high community activity.

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 26th 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 46th 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 36th 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

Basin	Budd Inlet
Watershed Acreage	1,006 acres
Anadromous Salmonid Use	► Nearshore: Chinook, bull trout, coho, chum, steelhead and cutthroat ► Freshwater: coho, chum, and cutthroat
Land Use	Residential
Total Stream Miles	1.5
Anadromous Stream Miles	Approx. 1.5
Stream Typing	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
303(d) Listings	None
Community Involvement	Strong involvement with local landowners in protection and restoration projects (Capitol Land Trust).

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

Basin	Budd Inlet
Watershed Acreage	1,472 acres
Anadromous Salmonid Use	► Nearshore: Chinook, bull trout, coho, chum, steelhead, and cutthroat ► Freshwater: coho, cutthroat
Land Use	Rural light development
Total Stream Miles	4.3 miles
Anadromous Stream Miles	2 miles
Stream Typing	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
303(d) Listings	None
Community Involvement	Fish habitat reach is within a popular public park.

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, 33rd 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; 33rd 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

Basin	Budd Inlet
Watershed Acreage	359 acres
Anadromous Salmonid Use	► Nearshore: Chinook, bull trout, coho, chum, steelhead, and cutthroat ► Freshwater: coho and cutthroat
Land Use	Urban residential
Total Stream Miles	1.5 miles
Anadromous Stream Miles	0.4 miles
Stream Typing	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
303(d) Listings	None
Community Involvement	There has been minimal outreach to property owners to date. Lower reach is in public ownership but access is limited.

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[1].

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.

[1] 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

Basin	Budd Inlet
Watershed Acreage	2,963 acres
Anadromous Salmonid Use	► Nearshore: Chinook, bull trout, coho, chum, steelhead, and cutthroat ► Freshwater: coho, cutthroat (?)
Land Use	Residential, commercial, agriculture, City of Olympia
Total Stream Miles	4.8 miles
Anadromous Stream Miles	2.3 miles
Stream Typing	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
303(d) Listings	Fecal coliform
Citizen Involvement	Indian Creek – minimal outreach to property owners to date. Moxlie Creek – Good access and visibility in a popular public park.

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[a] Good[b]	Data Gap	Data Gap	Data Gap	Poor[a] Good[b]	Data Gap	Poor[a] Data Gap[b]	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

[a] Indian Creek [b] Moxlie Creek

High Priority Habitat Projects & Programs

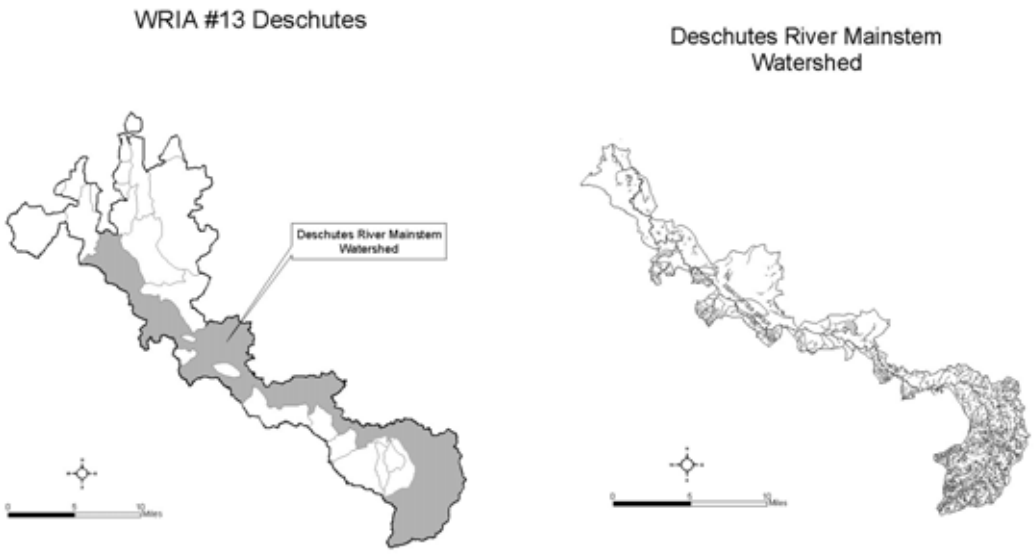
- Educate landowners located in the Indian/Moxlie Creek Basin to increase compliance with land use regulations (enforce existing setbacks along creek and wetlands) and voluntary implementation of best management practices.

- 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



Basin	Budd Inlet
Watershed Acreage	118,773 acres
Anadromous Salmonid Use	► Nearshore: Chinook, bull trout, coho, chum, cutthroat, and steelhead ► Freshwater: coho, chum, cutthroat, and steelhead (Chinook = hatchery origin, not self-sustaining)
Land Use	Commercial forestry, urban development
Total Stream Miles	256 miles
Anadromous Stream Miles	86 miles
Stream Typing	
303(d) Listings	Fecal coliform, fine sediment, temperature. Ongoing TMDL study
Community Involvement	Some good outreach and responses, still some differing opinions about what is needed for the Deschutes Basin.

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[2]. 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

[2] "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.

- Address water use issues to protect and improve summer instream flow conditions (coordinate with efforts in the Watershed Planning Process)

- 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

Watershed Acreage	829 acres
Anadromous Salmonid Use	► Nearshore: Chinook, bull trout, coho, chum, steelhead, and cutthroat ► Freshwater: Chinook, coho, steelhead and cutthroat
Land Use	commercial, residential, recreation, and transportation
Total Stream Miles	6.5 miles of lake shoreline
Anadromous Stream Miles	6.5 miles
Stream Typing	6.5 miles type 1 water
303(d) Listings	fecal coliform, total phosphorous

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 lead 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 it 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 undertaking 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 influences 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 (particulary 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

Basin	Budd Inlet
Watershed Acreage	4,712 acres
Anadromous Salmonid Use	► Nearshore: Chinook, bull trout, coho, chum, steelhead, and cutthroat ► Freshwater: coho, chum, and cutthroat (Chinook = hatchery origin, not self-sustaining).
Land Use	Mixed industrial, commercial and residential development, open space
Total Stream Miles	5.6 miles
Anadromous Stream Miles	5.5 miles
Stream Typing	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
303(d) Listings	None
Community Support	Thee are opportunities to engage citizens at Black Lake Meadows; lots of public access.

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

Basin	Budd Inlet
Watershed Acreage	680 acres
Anadromous Salmonid Use	► Nearshore: Chinook, coho, bull trout, chum, cutthroat ► Freshwater: coho and cutthroat
Land Use	Residential and commercial development
Total Stream Miles	1.2 miles
Anadromous Stream Miles	0.2
Stream Typing	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
303(d) Listings	None
Community involvement	Four owners in lower reach with fish use have at least some participation with Stream Team

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[3].

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.

[3] 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

Basin	Eld Inlet
Watershed Acreage	2,626 acres
Anadromous Salmonid Use	► Nearshore: Chinook, bull trout, chum, coho, steelhead, and cutthroat ► Freshwater: Chinook (rare), chum, coho, steelhead and cutthroat
Land Use	Residential
Total Stream Miles	4.0 miles
Anadromous Stream Miles	3.4 miles
Stream Typing	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
303(d) Listings	None
Community Involvement	Capitol Land Trust and local citizens involved in protection and restoration activities.

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.[4]

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

[4] 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

Basin	Eld Inlet
Watershed Acreage	7,360 acres
Anadromous Salmonid Use	► Nearshore: Chinook, bull trout, coho, chum, steelhead, and cutthroat ► Freshwater: coho, chum, steelhead, cutthroat, (Chinook = hatchery origin, not self-sustaining)
Land Use	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
Total Stream Miles	43 miles
Anadromous Stream Miles	23 miles
Stream Typing	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
303(d) Listings	Fecal coliform
Community Involvement	Unknown

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.

- Chapter Five -

Community Issues and Concerns

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.

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

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.

- Chapter Six -

Guiding Principles for Project and Program 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.

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.

- Chapter Seven -

Salmon Recovery Funding Board Evaluation and Ranking Process

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 5th Round (All meetings are open to the public)

All applicants must submit their applications through the WRIA 13 Lead Entity. As a continuation from last year, all applicants will submit and modify their grant applications on-line through PRISM, a grant management tool provided by the SRFB. SRFB staff and the Lead Entity Coordinator will provide guidance for PRISM use. Further information on registering to use PRISM and to view the applications can be obtained by contacting the LE Coordinator.

2004 SRFB 5th Round Grant Cycle – WRIA 13 Timeline

Step 1:	April 2	Letter of Intent Due to LE (attached)
Step 2:	April 6	Application Workshop
Step 3:	May 14	First Rough Draft Application Due to LE
Step 4:	May 20	Sponsors Meet with TAG to Review Proposals
Step 5:	June 4	Second Rough Draft of Application Due to LE
Step 6:	June 8	SRFB Technical Advisors Meet with Sponsors and LE
Step 7:	June 8	Field Trip to Project Sites
Step 8:	June 17	Project Presentations to LE
Step 9:	June 17	Sponsors Meet with TAG to Review Proposals
Step 10:	June 18	Final Applications Due to LE
Step 11:	June 30	TAG Ranks Proposals
Step 12:	July 7	Citizen's Committee Ranks and Finalizes Project List
Step 13:	July 16	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: April 2, 2004

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: April 6, 2004, 1:00-4:00pm Olympia Community Center

Step 3: First Rough Draft Application Due to LE

Project sponsors are asked to input all relevant project information into the PRISM database for review and comment by the TAG by this date. Training for use of this computer program will be provided at the above referenced application workshop. The LE Coordinator will assist sponsors having difficulty with the database upon request.

Due Date: May 14, 2004

Step 4: Sponsors Meet with TAG to Review Proposals

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: May 20, 2004 Mason Conservation District Board Room

Step 5: Second Rough Draft of Application Due to LE

Project sponsors are asked to incorporate any suggested changes or additions to their proposed projects given at the first review meeting at this time. All changes will be made in the PRISM database. The LE Coordinator will assist sponsors having difficulty with the database upon request.

Due Date: June 4, 2004

Step 6: SRFB Technical Advisors Meet with Sponsors and LE

The SRFB Technical Advisors will be traveling to the LE to meet with the Committee and project sponsors. This is the opportunity for the LE and the project sponsors to conduct site visits and gather valuable insight and suggestions from those with expertise based upon the project types being visited. The Technical Advisors will also identify issues of concern regarding the technical soundness of the proposed projects early in the process to allow time to remedy them. The Technical Advisors will provide written comments following the visit.

Date: TBD by SRFB staff, LE and project sponsors

Step 7: 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 Technical Advisors 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. The exact date will be determined in mid-April to coordinate with LE committee members and availability of the Technical Advisors.

Date: June 7-11, 2004. Exact date TBD by LE, SRFB Technical Advisors and project sponsors.

Step 8: Project Presentations to LE

Project sponsors are asked to prepare a presentation for the LE outlining the details of their proposed project. A time limit for each presentation will be announced along with a schedule, both of which will depend upon the number of applications received. Applicants should include project details, cost estimate, maps depicting project area and orientation, and photos of the site. Time will be allotted to allow for a question and answer session for each project proposed.

The purpose of this presentation is to acquant the LE with the sponsor and the project's intent. All dialogue exchanges will strive for clarity and work towards strengthening the overall benefits of the project

Date: June 17, 2004

Step 9: Sponsors Meet with TAG to Review Proposals

This second meeting with the TAG allows project sponsors to further discuss their proposals and ensure all necessary changes and additions have been incorporated into their draft. Any additional questions will be answered at this time. This is the final opportunity for the project sponsor to make changes to their proposals before they are submitted and ranked. The sponsor will be made aware of any concerns the TAG has at this time. It is the purpose of this meeting to further the collegial exchange between sponsors and LE members and every effort will be made to help the sponsor improve their proposal.

Date: June 17, 2004

Step 10: 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: June 18, 2004

Step 11: TAG Ranks Proposals

The TAG will meet in a cooperative workshop style format to discuss and rate the overall merits of each project. The TAG will rate each project as high, medium or low for the following factors:

- Benefits to Salmon
- Certainty of Success
- Consistency with Strategic Plan
- Cost / Benefit

The goal of this discussion is to come to a consensus on the various merits of each project. This holistic approach will incorporate a full discussion of each project, the outcome of which will outline the ranking rational for each proposal. At the completion of this meeting, the TAG will recommend a ranked list of projects to the Citizens Committee based upon the technical merits of each project.

Date: June 30, 2004 Mason Conservation District Board Room

Step 12: Citizen's Committee Ranks and Finalizes Project List

This meeting will be a combined meeting of the Citizen and Technical Committees. It is the role of the Citizen's Committee to rank each proposal on the basis of:

- Education and Outreach
- Partnerships
- Consistency with Strategic Plan
- Cost / Benefit

The TAG will present their project rankings at this time. They will discuss their rationale and the linkage each project possesses with the strategy. An open dialogue will occur, with questions and discussion from all aspects. The Citizen Committee may choose to accept the rankings as presented from the TAG or re-rank the proposals based upon their elements of focus: education and outreach; partnerships; etc. A consensus of ranking between all members of the LE is the intent of this exchange. If a consensus cannot be reached, a vote will be taken in accordance with the WRIA 13 Salmon Habitat Recovery Committee Policy and Procedure manual. Any consenting votes will be noted and passed along with the final ranking to the SRFB. Sponsors will be notified of the outcome of this meeting within one business day.

Step 13: LE Application Packet Due to SRFB

The LE Coordinator 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: July 16, 2004

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 December 2-3, 2004.

- Appendix A -

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

Stressor	Recommendations
Shoreline Armoring	▶ 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. ▶ Identify and remove bulkheads not needed for protecting structures ▶ Avoid the necessity of shoreline armoring by requiring setbacks and buffers ▶ 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.
Overwater Structures	▶ 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. ▶ 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. ▶ Design overwater structures to let light through, to allow survival of subtidal/ intertidal vegetation. ▶ Remove old homes, floats, debris, old piling, anchors, and derelict vessels. ▶ Minimize the number of docks by encouraging community facilities.
Ramps	▶ Minimize the number of ramps by encouraging community facilities. ▶ Provide incentives to residential property owners to give up individual ramps and marine railways. ▶ Identify and remove boat ramps that cloak sediment transport.
Stormwater & Wastewater	▶ 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. ▶ 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.

Stressor	Recommendations
Stormwater & Wastewater (Continued)	▶ 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. ▶ 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. ▶ 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 http://www.ecy.wa.gov/pubs/0203021.pdf). 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. ▶ 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. ▶ 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. ▶ 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." ▶ 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.

Stressor	Recommendations
Stormwater & Wastewater (Continued)	▶ 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. ▶ 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
Landfill below the HHWL	▶ Prohibit any new fill for any use or structure ▶ Remove fill and structures below the high high water line
Riparian Loss	▶ 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. ▶ 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. ▶ 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. ▶ Increase public ownership along the shoreline to protect riparian habitat. ▶ Designate shorelines as open space areas.
Wetland & Estuarine Modification	▶ 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.

Stressor	Recommendations
Wetland & Estuarine Modification (Continued)	▶ 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. ▶ Remove shoreline armor and bulkheads around the mouths of tributaries. ▶ Remove blockages to small tributaries, such as culverts, fill, and structures
Input of Toxic Components	▶ 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. ▶ 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. ▶ Clean up Puget Sound toxic sediments, including South and Central Puget Sound. The removal of sediments is preferable to capping. ▶ Pesticides – Educate the public about the problems related to pesticide use and provide stream buffers to help filter water before it reaches streams. ▶ Prevent oil spills through local and regional planning and implementation efforts.
Predation	▶ Reduce or eliminate man-made predator buffets.
Boat Traffic	▶ 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. ▶ Require specific anchoring practices and docking design.
Invasive Species	▶ 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. ▶ Remove from riparian areas invasive terrestrial non-native vegetation, such as scotch broom.
Shellfish Aquaculture	▶ 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.

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

WRIA 13 - Nearshore Landscape Regions	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
Eld Inlet (*east shore*)													
McLane Creek to Mud Bay (north end)		●	●		●		●	●					●
Mud Bay (north end) to Green Cove (north end)	●	●			●		●	●					●
Green Cove (north end) to Cooper Point		●			●		●	●					●
Budd Inlet·													
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	●	●					●	●					
Hartstene Island Group *(Dana Passage)*													
Dofflemyer Point to Little Fishtrap (east end)	●	●	●				●						
Little Fishtrap (east end) to Henderson Inlet Line	●	●											
Henderson Inlet													
Henderson Inlet Line to Woodard Bay	●	●	●				●	●					
Woodard Bay to Woodland Creek	●		●		●			●					
Woodland Creek to Johnson Point	●	●	●				●	●					

WRIA 13 - Nearshore Landscape Regions	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
Hartstene Island Group *(Nisqually Reach)*													
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	●	●											●
McNeil Island Group *(Nisqually Reach)*													
Hartstene Island Group Line to Luhr Beach	●	●											●

- Appendix B -

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WRIA-Wide

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