WATER RESOURCES INVENTORY AREA 6
(WHIDBEY & CAMANO ISLANDS)

MULTI-SPECIES SALMON RECOVERY PLAN

Adopted by the Island County
Water Resources Advisory Committee
May 5, 2005

Adopted by the
Board of Island County Commissioners
May 9, 2005

WRIA 6 (Whidbey & Camano Islands)
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LIST OF ACRONYMS

ESA – Endangered Species Act

ESU – Evolutionarily Significant Unit

FOG – Friends of Glendale

ICHD – Island County Health Department

IC-MRC – Island County Marine Resources Committee

ICPW – Island County Public Works

MSA – Maxwelton Salmon Adventure

NOAA – National Oceanic and Atmospheric Administration

ppt – part per thousand

PSRUT – Puget Sound Bull Trout Recovery Unit Team

PSSMP – Puget Sound Salmon Management Plan

SRFB – Salmon Recovery Funding Board

SRSC – Skagit River System Cooperative

TRT – Technical Recovery Team

VSP – Viable Salmonid Population

WCLT – Whidbey Camano Land Trust

WRAC – Island County Water Resources Advisory Committee

WRIA – Water Resource Inventory Area

ACKNOWLEDGEMENTS

The WRIA 6 Salmon Technical Advisory Group (TAG) prepared this plan during 2004 and 2005. During the preparation of this document, Salmon TAG members included representatives from the: Water Resources Advisory Committee (Larry Bach, Bob Friedman, Barbara Brock, and Sego Jackson), WA Department of Fish & Wildlife (Steve Seymour), Puget Sound Action Team (Robyn du Pre & Linda Lyshall), Skagit River System Cooperative (Darla Boyer), Stillaguamish Tribe (Jason Griffith), Snohomish Conservation District (Kim Levesque), Whidbey Conservation District (Karen Lennon), Stilly-Snohomish Fisheries Enhancement Task Force (Erin Meyer), and lead entity agency-Island County Public Works (Gwenn Maxfield). Additional Salmon TAG advisory members included: Maxwelton Salmon Adventure (Nancy Waddell and Scott Pascoe) and Orca Network (Susan Berta). The draft version of this document was made available for public review at the beginning of March 2005. The Salmon TAG considered all feedback and has attempted to address this feedback in this document. The Puget

Sound Technical Recovery Team, the Shared Strategy Policy Committee, and the Salmon Recovery Funding Board Review Panel reviewed drafts of this document. Their comments and recommendations were greatly appreciated.

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PREFACE

The **Salmon Recovery Act** (RCW 77.85/ESHB 2496) was passed by the Washington State Legislature in 1998 to respond to the decline in salmon stocks. This act established the **Salmon Recovery Funding Board (SRFB)** and the local salmon recovery "lead entity" process.

The **Water Resources Advisory Committee** (**WRAC)** was formed by the Board of Island County Commissioners in 1999 to develop and oversee the implementation of a comprehensive water resource program for Island County. The WRAC is the planning unit that facilitates consensus decision-making concerning water resource management and salmon recovery projects in Water Resource Inventory Area (WRIA) 6.

The **Salmon Recovery Lead Entity** program provides a framework for developing local and regional salmon recovery plans and pursuing salmon habitat protection and recovery activities. This program is administered by the Island County Public Works department and overseen by the WRAC and the Watershed Coordinator.

The **Salmon Technical Advisory Group (Salmon TAG)** was established in 1999 to assist the Washington State Conservation Commission in the development of WRIA 6 Limiting Factors Analysis Report. With the completion of the report, the Salmon TAG became a working sub-committee of the WRAC whose principal tasks included the development and updating the WRIA 6 Salmon Recovery Strategy/Plan, overseeing its implementation, and providing technical review of projects seeking funding from sources such as the Salmon Recovery Funding Board. The Salmon TAG membership includes representatives from the WRAC, state agencies, Whidbey and Snohomish conservation Districts, tribes, and local non-profit agencies.

In accordance with SRFB requirements the Salmon TAG helped prepare a salmon recovery strategy for the WRIA in 2001. The WRAC reviewed and approved the plan. The following year a procedural manual to facilitate the project proposal process was written, reviewed, and approved by the WRAC.

After receiving no funding in the first round of SRFB funding grants, as the nearshore was not given priority, WRIA 6 has benefited from numerous grants in the subsequent rounds. To date, WRIA 6 has received a total of over $1,900,000 in salmon recovery grants and project sponsors have committed over $1,400,000 in matching funds (see Appendix A). Despite these funding successes, the Salmon TAG, WRAC, and its other salmon recovery partners feel that the current plan should be broadened and a more comprehensive approach to salmon recovery should be adopted. It has been noted that challenges that have led to habitat degradation and depletion of salmon stocks have occurred over many years and are due to multiple factors. It seems reasonable that the solutions sought to address salmon recovery issues should therefore be long-term, systems based, and multi-faceted. It is in this context that the Salmon TAG has helped prepare this updated WRIA 6 Salmon Recovery Plan.

The WRIA 6 Salmon Recovery Plan should be viewed as a framework in which salmon recovery activities can be undertaken in an integrated and comprehensive manner. While a comprehensive approach is encouraged for maximum impact, selective or sequential components (e.g., starting with promotion of improved practices) can be effective entry points. The proposed salmon recovery framework employs three core elements. These include:

- *providing access to technologies and the best science combined with,*
- *the promotion of improved salmon recovery practices and facilities, and*
- *support for long-term sustainability through the creation of an enabling environment in which salmon recovery activities can be supported and take place.*

While the framework will help provide planners with a road map for salmon recovery activities in WRIA 6, the ability and exact timing for the implementation of the proposed activities will depend to a large extent on the level of effort and availability of resources to volunteers and staff.

Island County has taken many steps already to increase the understanding of the role of our nearshore in the salmon recovery effort and to protect nearshore processes and habitats (Appendix B). These efforts include:

- Down-zoning vast acreage to the point that 93% of the land has a low density rural zoning. This includes approximately 90% of Island County's shoreline to a density of 1 dwelling unit per 5 acres.
- Protection of wetlands, streams, kelp and eelgrass beds, surf smelt and pacific herring spawning grounds, eagles, osprey, and habitats of local importance through the County's Critical Areas Ordinance.
- Identification of eight areas as habitats of local importance for their significance to migratory bird and waterfowl habitat. These areas total over 6,000 acres and are protected through the County's Critical Areas Ordinance.
- Protection of tidelands, wetlands, and estuaries through acquisition and public ownership.
- Adopted Agricultural Best Management Practices that are aimed at improving water quality of streams, wetlands, and nearshore areas that are located upon or adjacent to agricultural lands.
- Sponsored assessments of nearshore habitat resources (forage fish spawning beaches, eelgrass beds, and feeder bluffs) through the Island County Marine Resources Committee.
- Integrated these data sets into the development review process to promote better protection of these resources.
- Sponsored an assessment of shoreline hardening features through the Island County Marine Resources Committee.
- Initiated a Shore Stewards program through the Island County Marine Resources Committee, to encourage volunteer participation in protection of shoreline processes and habitats.
- Updated the Shoreline Master Program in 2001,which places severe limitations on the ability to construct new bulkheads, over water structures and waterfront subdivisions. A primary theme of the new SMP is to require bioengineering solutions wherever it is feasible.
- Adopted a shoreline designation of Aquatic Conservancy along a one-mile stretch of shoreline in the Utsalady area of North Camano. This designation precludes overwater structures and significantly increases the requirements for bulkheads on this highly productive forage fish beach.
- Eliminated the practice of roadside spray along all County roads as a method of controlling vegetation. Vegetation is controlled via mowing only.
- At the request of the Island County Marine Resources Committee, established two Marine Stewardship Areas covering all of Island County's marine waters, in December 2003. These stewardship areas are at the core of an outreach program sponsored by the Island County Marine Resources Committee to encourage citizens and visitors to adopt an attitude of personal responsibility for these waters, because of their importance to our heritage and way of life.
- Continued support of efforts to remove Spartina from those areas where a problem has been documented.

Island County's role in habitat restoration is to promote projects that respect the rights of property owners and create a sustainable environment for people and fish. The county is committed to protecting the property rights of citizens from uncompensated "take" as well as protecting against the "take" of habitat. Restoration projects will gain the support of the Island County Commissioners under the following conditions:

- Neighboring private and public uses and surrounding environment are protected,
- There are willing landowners,

- There is no adverse impact to Naval operations, and
- There is a significant benefit for salmon.

Whidbey Naval Air Station is a "keystone" element in WRIA 6, vital to the community and economic viability of Island County. Projects, such as the restoration of Dugualla Bay, which have the real or perceived potential to impact naval operations, will not be supported by the Island County Commissioners because of the potential negative economic impact to Island County. In other cases, salmon recovery efforts may be compatible with naval operations and existing property uses.

WRIA 6 (Whidbey & Camano Islands)
Multi-Species Salmon Recovery Plan

May 2005

I. INTRODUCTION

Salmon species utilizing WRIA 6 habitats include the three species listed as threatened under the Endangered Species Act (ESA) – Chinook, bull trout and Hood Canal summer-run chum salmon – plus coho, chum, pink, sea-run cutthroat, sockeye, steelhead, and char. In March 1999, the National Marine Fisheries Service (NMFS; now NOAA Fisheries) listed Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*) and Hood Canal summer chum (*Oncorhynchus keta*) as threatened. Within just a few months, in November 1999, the U.S. Fish and Wildlife Service listed the Coastal-Puget Sound population segment of bull trout (*Salvelinus confluentus*) as threatened.

The central location of WRIA 6 in the Salish Sea, at the junction of Puget Sound, the Strait of Juan de Fuca and Georgia Strait, places it on the migration corridors used by most Puget Sound juvenile and adult salmon and trout populations. As these fish move to and from their respective natal streams and rivers, nearshore and coastal estuaries in WRIA 6 provide critical shelter, feeding and physiological refugia. Many spawning beaches and eelgrass beds are used by the forage fish on which salmonids feed – surf smelt, sand lance and herring – as well as extensive eelgrass beds in which juvenile salmon find shelter from both predators and high-energy marine environments. Sheltered beaches, bays, and lagoons also provide resting areas for adults.

Killer whales are one of many species that rely on salmon as a primary food source. The Southern Resident community, pods J, K, and L whose range extends from Puget Sound up to the middle of Vancouver Island, spends a good part of the spring, summer and fall feeding on salmon in Puget Sound. Their diet is predominantly made up of salmon, especially Chinook. Transient orcas, a separate life history group from the Southern Residents, prey on marine mammals, particularly seals and sea lions. The Southern Resident numbers are currently so depleted the Washington Department of Fish and Wildlife has recently listed the Southern Resident population as endangered on the state endangered species list (Wiles 2004). Canadian officials have also listed the Southern Resident community as endangered. In December 2004, NOAA Fisheries proposed listing all Northern Pacific orcas as threatened under the ESA.

A. Salmon Recovery Act

In 1998, the Washington legislature adopted substitute House Bill 2496. This legislation, as modified by substitute Senate Bill 5595 in 1999, established a method of state-funded salmon habitat recovery. The legislation states that a state-wide salmon recovery plan must be developed and implemented through an active public involvement process in order to ensure public participation in, and support for, salmon recovery. The Revised Code of Washington - Chapter 77.85 states that habitat restoration is a vital component of salmon recovery efforts and established the Salmon Recovery Funding Board and local recovery programs to pursue protection and restoration activities.

B. WRIA 6 Salmon Recovery Program

Water Resource Inventory Area 6 (WRIA 6) was designated as a Salmon Recovery Lead Entity area, by the Washington State Department of Fish and Wildlife (WDFW), in 1999. Cities, conservation districts, and tribes with interests in WRIA 6 salmon recovery issues designated Island County as the Lead Entity Organization in 1999. The Island County Public Works Department sponsors the program by providing grant administration, staff, and overhead. The Salmon Recovery Lead Entity Coordinator is a member of the Surface Water Management Program. This position provides technical assistance & guidance for the WRIA 6 Salmon Recovery Funding Board (SRFB) grant application process and the WRIA 6 Salmon

Recovery Program. This program is supported by an annual WDFW grant to the Lead Entity Organization, with matching funds supplied by the Island County Public Works Department.

The Board of Island County Commissioners designated the Water Resources Advisory Committee (WRAC) as the citizen committee responsible for overseeing the WRIA 6 Salmon Recovery Program and approving SRFB grants in WRIA 6, in accordance with RCW 77.85.050 in 1999. The committee's purpose, for salmon recovery, is to provide a citizen-based evaluation of the projects proposed to promote salmon habitat. The WRAC receives technical assistance, advice, and recommendations on SRFB project prioritization from the WRIA 6 Salmon Technical Advisory Group (TAG). The Salmon TAG provides scientific and technical assistance for salmon recovery program development, assists with salmon recovery project development and provides assistance in the SRFB grant ranking process.

The Washington Salmon Recovery Funding Board (SRFB) is one of the primary funding mechanisms for habitat protection and restoration activities. The SRFB was created by the Salmon Recovery Act and consists of ten members, five of whom are appointed by the governor. The SRFB is administered through the Washington Interagency Committee for Outdoor Recreation. This board is tasked with developing procedures and criteria for allocation of salmon habitat project funds statewide. These projects must address the highest priorities for salmon habitat protection and restoration. This board reviews local project lists from each WRIA and awards funds through a competitive ranking process developed by the board.

The WRIA 6 salmon recovery lead entity is participating in the Puget Sound Regional Chinook and Hood Canal Summer Chum Recovery Planning effort, which is being led by Shared Strategy for Puget Sound. The Shared Strategy for Puget Sound is a voluntary collaborative effort that seeks to protect and restore salmon runs across Puget Sound by engaging local citizens, tribes, technical experts, and policy makers in recovery planning. The Shared Strategy mission enjoys widespread support and involvement across the Puget Sound region. The organization consists of a Board of Directors, Development Committee, and Work Group, in addition to the broad-based and inclusive membership of the Shared Strategy Council. Numerous federal and state agencies, tribes, and local governments provide policy guidance through membership on the Board and Development Committee, including NOAA Fisheries, USFWS, the Governor's Office, Washington Department of Fish and Wildlife (WDFW), Washington Department of Ecology (WDOE), the Salmon Recovery Funding Board (SRFB), Northwest Indian Fisheries Commission (NWIFC), Western Washington tribes county and city governments and forestry, agricultural, and environmental interest groups. The goal of the Shared Strategy is to "build a practical, cost-effective recovery plan endorsed by the people living and working in the watersheds of Puget Sound".

As lead entity for salmon recovery, Island County chooses to participate in the regional planning process for the benefit of knowing first hand what is happening in the region and having the opportunity to influence actions impacting WRIA 6 projects and property, as stipulated by ESA recovery requirements.

C. WRIA 6 Salmon Recovery Plan

1. Purpose

The purposes of this plan are to identify the local actions necessary to recover the salmonid populations which use the nearshore areas of WRIA 6, especially listed species, and to outline the framework for implementation of recommended actions that have been agreed to by community stakeholders and local, state, tribal, and federal governments in WRIA 6.

The WRIA 6 Salmonid Recovery Plan has been developed locally but will be incorporated as a chapter into the Shared Strategy's "Plan for Recovery of Puget Sound Salmon". NOAA Fisheries will evaluate the Plan for Recovery of Puget Sound Salmon (which will include chapters from each watershed) for the probability of success in recovering and delisting of the Puget Sound Chinook Evolutionarily Significant Unit (ESU) and, if deemed acceptable, will adopt it as the formal Puget Sound Chinook Recovery Plan. US Fish and Wildlife Service (USFWS), on track to completing their own recovery plan for Puget Sound Bull Trout, is hopeful that local watershed salmon recovery plans will provide the means for implementation of their recommended actions for recovery. This document will also be used as the WRIA 6 Salmon Recovery Strategy required under the WDFW Lead Entity Grant agreement and used by the Salmon Recovery Funding Board for evaluation of proposed projects.

2. Scope

The WRIA 6 plan supports multi-species (salmon, trout, and forage fish species) recovery throughout Puget Sound. The geographic scope of the WRIA 6 Salmonid Recovery Plan focuses on nearshore processes and habitats in the Whidbey Basin and along protected areas of the west Whidbey coast. Large sections of the shoreline in WRIA 6 have been proposed as critical habitat for Puget Sound Chinook (revision November 2004) by NOAA Fisheries and for bull trout (June 2004) by USFWS. This plan focuses on local actions, activities that can be accomplished through the local salmon recovery lead entity process.

While the activities identified in this plan are intended to meet the needs of all salmon species and their associated forage fish species, there is a bias towards Chinook habitat needs in the analysis of habitats and development of actions. This bias is a result of several factors: 1) Chinook are recognized as the most prevalent ESA listed species using WRIA 6 habitats; 2) it is believed that Chinook use WRIA 6 habitats in all of their life history stages; 3) data collection has been biased towards Chinook; and 4) Chinook have a particularly high cultural, economic, and ecological value in Puget Sound. It is believed that activities intended to restore ecosystem processes and habitats for Chinook will have positive benefits for other salmon and trout stocks that use WRIA 6 habitats.

3. Plan Organization

This plan is organized into the following sections:

- Section I - Introduction
- Technical Background - Review and synthesis of the state of knowledge on local salmonid populations and current and historic habitat conditions and habitat-forming watershed processes.
  - Section II – Status of Salmon and Related Marine Species
  - Section III – Harvest, Hatcheries, and Hydropower
  - Section IV – Local Factors Influencing Salmon Viability
- Section V - Vision, Goals, and Strategy – Biological, community, and financial goals for salmon recovery in WRIA 6.
- Section VI - Implementation Plan – The pathway for implementation of necessary recovery actions, including plans for future research needs, monitoring and adaptive management,

education and outreach, and funding, as well as presentation of implementation schedule, responsibilities, and commitments.

4. Vision and Goals

Salmon are an icon of the Puget Sound lifestyle – symbolic of a healthy marine environment and of our cultural and historic heritage. They are an important nutritional resource for 147 other species (Cederholm 2000), including the Southern Resident orcas, which feed heavily on salmon, especially Chinook (Wiles 2004). Many WRIA 6 residents feel a strong connection to salmon emotionally and recreationally.

For thousands of years before Europeans arrived in Puget Sound, salmon were a staple of the Coast Salish peoples who harvested them in the nearby river systems and along the shore. Following European settlement, salmon continued to be a key component of the local economy and culture. As recently as a few decades ago, the WRIA 6 nearshore provided salmon in abundance. The steep decline of salmon populations in recent years (Myers et al. 1998), following centuries of abundance, is widely regarded as a sign of trouble in the once-healthy Northwest environment. Today harvest is tightly regulated.

Members of the WRIA 6 Salmon Technical Advisory Group crafted this document. Currently this committee has 12 voting members including four citizen representatives from the WRAC and eight technical representatives. In crafting this document, the WRIA 6 Salmon TAG uses the pronoun "we" to represent citizens and staff of the WRIA 6 lead entity currently participating in salmon recovery activities.

Vision Statement

We, *the citizen volunteers and staff of the WRIA 6 salmon recovery lead entity*, envision:

- Abundant, Pacific salmon using nearshore and coastal stream habitats in WRIA 6
- Diverse, viable populations of salmon coexisting with the human population and supporting human harvest
- Strong community participation in ecosystem protection and restoration

We envision restoring diverse salmon populations so that humans and fish may live in balance, side-by-side. We envision broad-based community support for the protection and restoration actions necessary to achieve this result. We anticipate this will come through a dialogue among all county stakeholders – citizens, tribal, business, and political leaders – and from ongoing education, outreach, and public participation, leading an attitude of increasing public stewardship. We envision a time when the WRIA 6 nearshore waters support abundant, naturally-spawning Pacific salmon and the many other species that rely on them, including orcas. We envision a time when WRIA 6 residents and visitors will enjoy a thriving small-boat recreational fishery.

On a regional scale, the ultimate goal of salmon recovery efforts in WRIA 6 and Puget Sound as a whole is healthy, self-sustaining runs of salmon which are robust enough to support sport and commercial harvest. A more proximate goal, and one that underlies much of the federal and state funding allocated to salmon recovery in recent years, is the recovery and de-listing of endangered and threatened salmonid species and the subsequent relief to local governments, businesses and citizens from the regulatory constraints of the ESA. Accomplishing both these goals will require the understanding and integration of all factors which have led to the decline of salmon and bull trout over the recent past including the effects of habitat loss, commercial and sport harvest, predation, hatchery interaction, and in some basins hydropower.

Some actions can be implemented relatively quickly (e.g. harvest changes). Other actions (e.g. repairing the habitat) will require a strategic approach to watershed restoration that entails voluntary participation by affected property owners, protection of functioning habitats, and restoration of the landscape processes

that form and maintain the habitats to which wild salmonid stocks are adapted. Successful recovery will also require explicit consideration of the economic viability and diversity of values of the community, as well as the cooperation and coordination of local, state, tribal, and federal governments and active engagement of stakeholders and citizens in planning and implementation. Given that watershed processes will take many decades to recover, a long-term commitment to implementing the actions necessary for recovery will also be necessary.

Our overriding goal over the next 100 years is to achieve a net increase in salmon habitat through voluntary protection, enhancement, and restoration of naturally-functioning ecosystems that support self-sustaining salmon populations and the many species that depend on them. During the first ten years, we plan to pursue this goal through education programs that encourage stewardship; partnerships with local and regional organizations; and coordination with regional, state and federal agencies. Numerical habitat protection and restoration goals have not been set for individual areas or habitats within WRIA 6. As the relationships between nearshore habitat function and salmon population dynamics are further developed, quantitative goals will be developed. Along the way to reaching this goal we expect to realize many economic and community benefits for the people of WRIA 6. This will bring additional rewards to the businesses that benefit from strong tourism, recreation, and housing development.

Goals

Our four strategy goals are:

1. Over the long term, achieve a net increase in salmon habitat through protection, enhancement, and restoration of naturally-functioning ecosystems that support self-sustaining salmon populations and the species that depend on salmon.
2. Develop understanding of habitat functions and the distribution of forage fish species, salmonids, and marine mammals in WRIA 6.
3. Engage an informed community in identifying, protecting, enhancing, and restoring salmon-supporting ecosystem processes and habitats.
4. Cultivate a supportive environment for salmon recovery by supporting policies that protect salmon habitats; advocating for adequate program staffing; encouraging cross-sector and public-private partnerships; pursuing adequate, reliable funding; and implementing effective project and program evaluations.

Our implementation plan (section 6) lists actions that are priorities for the next ten years. The full benefits of these and other actions may not be entirely realized for 50-100 years.

5. Guiding Principles

In order to produce a Salmon Recovery Plan that resonates with property owners, elected officials, scientists, and environmental interests, we knew that certain guiding principles were necessary. The following principles set the framework for WRIA 6's ESA response.

- **Salmon Recovery Requires a Long Term View and Commitment:** The goals of this plan will take decades, possibly centuries to achieve. The actions in this plan are initial steps. As we add to our knowledge about juvenile and adult salmon utilization of WRIA 6 habitats, we will revise and update our action plan to best support regional recovery efforts.
- **Best Available Science and Appropriate Technologies:** It is critical that salmon recovery activities be based on comprehensive and current fisheries science and habitat information. Filling key existing data gaps and integrating this new information into future versions of this recovery document are high priorities in WRIA 6.
- **Ecosystem Processes and Habitat Protection:** In comparison to many areas of Puget Sound, the salmon supporting habitats and ecosystem processes in WRIA 6 are generally in good to very good condition (Washington Department of Natural Resources 2001a). Our initial focus is on ensuring that the high quality habitats and functioning processes are protected, with a goal of no additional loss of habitat and function. In addition to protecting ecosystem processes and habitats it will be necessary to find ways to accommodate additional housing and commercial development in WRIA 6. Where protection is pursued through property acquisition, we advocate that the project should provide for the perpetual protection, enhancement, and/or restoration of critical ecological processes and habitat structure.
- **Ecosystem Processes and Habitat Enhancement and Restoration:** Just as there is a need to find creative ways to combine protection actions with the need for additional residential and commercial development, it is necessary to accommodate landowner and community needs when developing enhancement and restoration projects. Enhancement and restoration projects will gain the support of the Board of Island County Commissioners under the following conditions: 1) neighboring ~~current~~ private and public uses and surrounding environment are protected; 2) there are willing landowners; 3) there is no adverse impact to Naval operations; and 4) there is a significant benefit for salmon.
- **Community Outreach, Education, and Participation:** Developing and maintaining regular community outreach and education programs is a critical component for salmon recovery. Developing these programs will require partnerships with groups that can provide education and outreach forums, advocacy for stewardship and sustainable actions, and opportunities for public participation.
- **Cultivating an Environment for Salmon Recovery:** Successful salmon recovery efforts have the best chance of success if implementation is carried out on a local level in an integrated manner. This approach needs to build and maintain linkages between all stakeholders; integrate salmon issues as an integrated component of water resource issues; encourage and nurture local, regional, and state partnerships; and advocate implementation of policies that support salmon recovery.

II. STATUS OF SALMON AND RELATED MARINE SPECIES

This plan supports multi-species (salmon, trout, and forage fish species) recovery throughout Puget Sound. The geographic scope of the WRIA 6 Salmonid Recovery Plan focuses on nearshore processes and habitats in the Whidbey Basin and along protected areas of the west Whidbey coast. Large sections of the shoreline in WRIA 6 have been proposed as critical habitat for Puget Sound Chinook (NOAA Fisheries) and bull trout (US Fish and Wildlife Service). The activities identified in this plan are based on the needs of listed salmon species and their associated forage fish species. It is believed that focusing on the needs of these species will support the other salmon and trout stocks that use WRIA 6 habitats.

A. Endangered Species Act (ESA)

The purposes of the Endangered Species Act of 1973 are "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved" and "to provide a program for the conservation of such endangered species and threatened species". The ESA provides guidance regarding: (1) the promulgation of protective rules (e.g. 4(d) rules), the listing determination process, designation of critical habitat, and recovery plans (Section 4); (2) conference and consultation processes that focus on activities with a federal nexus, i.e. involving and/or funded by federal agencies (Section 7); (3) activities determined to result in take (Section 9); (4) issuance of incidental take permits and habitat conservation plans (Section 10); and (5) citizen lawsuits (Section 11) (Long Live The Kings 2003).

Jurisdiction to implement the act is shared by NOAA Fisheries (formerly National Marine Fisheries Service or NMFS) for marine and anadromous fish species and the U.S. Fish and Wildlife Service (USFWS) for terrestrial plants and animals and fish that spend all or a majority of their life history in freshwater. For listed species in WRIA 6, NOAA Fisheries implements ESA for Chinook and USFWS implements ESA for bull trout. Both agencies are obligated under the ESA to protect against the risk of species extinction (Long Live the Kings 2003). Under the ESA, the "take" of endangered species is unlawful; take means to "harass, harm, pursue, hunt, shoot, wound, kill, trip, capture, or collect, or to attempt to engage in any such conduct." Harm has been further defined by NOAA Fisheries and USFWS as any act that actually kills or injures a listed species, including extensive habitat modification and degradation. Additional salient details of the Act and its implementation are summarized in the *Endangered Species Act Handbook for Local Governments in Washington* (Long Live The Kings 2003).

B. ESA and Salmon Listings

To restore threatened and endangered species requires knowledge of historical and current populations numbers, the life history of the stock, the critical habitats it uses during various life history stages, and how the species is impacted by other species. From this information recovery goals for the population are developed which consider the minimum number of reproducing individuals needed to sustain the species. While the recovery plans for Puget Sound Chinook and Hood Canal summer chum are being coordinated through the voluntary Puget Sound Shared Strategy process (see below), NOAA Fisheries bears ultimate responsibility to evaluate whether recommended actions and management strategies will lead to recovery and ultimate delisting of these species.

C. Recovery Requirements

To remove a species from the Endangered Species List it is necessary to determine that the species no longer is threatened by any of the following five factors (US Fish and Wildlife Service 2002):

- Destruction, modification or curtailment of its habitat or range.
- Overuse for commercial, recreational, scientific or educational purposes.
- Disease and predation.
- Inadequate regulatory mechanisms outside the ESA, taking into account efforts by the states and other organizations to protect the species and habitat.
- Other natural or manmade factors affecting the species' continued existence.

In a broad sense, recovery is defined by the NOAA Fisheries as a more open-ended concept that may reflect societal values in addition to biological values. This might include a desire to have robust populations that can support tribal, commercial and sport harvest; promote fully functioning aquatic and marine ecosystems; or provide opportunities for the public to appreciate salmon in the wild.

These requirements are mirrored in the Washington Statewide Strategy to Recover Salmon (Joint Natural Resources Cabinet 1999) which requires that all biological needs of salmon be met, and that populations and watersheds are healthy. The goal of the statewide strategy is to restore salmon, steelhead, and trout populations to healthy and harvestable levels and improve habitats on which fish rely.

The WRIA 6 lead entity's definition of recovery is the point at which WRIA 6 habitats provide a sufficient level of ecosystem functionality to support robust, self-sustaining salmon populations from Puget Sound rivers in our nearshore, together with small, local populations in some of our coastal streams.

D. Summary of Salmon Stocks Utilizing WRIA 6 Habitats

The life history of anadromous salmon covers time spent in freshwater, estuaries, marine nearshore, and the open ocean. Freshwater habitats are mainly used for spawning, incubation, and juvenile rearing. Estuaries and marine nearshore are where juveniles rapidly increase in size and make important osmoregulatory adjustments as they transition between fresh and saline waters. The open ocean is where significant feeding results in most of the body mass of the returning adults.

The central location of WRIA 6 in the Salish Sea, at the junction of Puget Sound, the Strait of Juan de Fuca and Georgia Strait, means that most Puget Sound juvenile and adult salmon and trout populations utilize WRIA 6 marine and nearshore waters to some extent. Based on the 2002 Salmonid Stock Inventory (Washington Department of Fish and Wildlife 2002), there are 207 Puget Sound salmonid stocks (Chinook, chum, coho, pink, sockeye, and steelhead). Appendix C lists these Puget Sound stocks and their status. Of these, 125 spawn in rivers that feed North and South Puget Sound, 41 spawn in rivers that feed into Hood Canal, and 41 spawn in rivers along the Strait of Juan de Fuca. Eight salmonid stocks (all summer run chum) are considered to be extinct. Appendix D summarizes the life history characteristics of the native salmon and trout that live in Puget Sound.

There is one independent coho stock recognized for Whidbey Island. This stock occurs in Maxwelton Creek on the southwest coast of Whidbey. Maxwelton also historically supported a chum run. In addition to the Maxwelton coho stock, coho and chum have been documented in Glendale Creek (southeast coast of Whidbey), and Chinook, coho, and chum have been documented in Kristoferson Creek (northeast coast of Camano) in recent years, even though the creek often goes dry during the summer months. Several streams on Whidbey and Camano provide habitat for small populations of residential

cutthroat trout. Cutthroat have been documented in Maxwelton, Glendale, North Bluff, Dugualla, and Chapman Creeks (Washington State Conservation Commission 2000).

The Skagit, Stillaguamish, and Snohomish are home to 47 of the stocks listed in the SaSI database (Washington Department of Fish and Wildlife 2002). These rivers all terminate into the protected waters of the Whidbey Basin (Skagit Bay, Port Susan, and Saratoga Passage). Ten of the 47 Whidbey Basin stocks are Chinook stocks and eight are fall chum stocks. Since Chinook and chum are the two Pacific salmon species that rely most heavily on shallow, nearshore habitats, juveniles from these stocks are likely to make up a large component of the salmon using Camano and Whidbey nearshore. However, it is likely that juveniles and adults from all of the North and South Sound and Hood Canal stocks spend time in WRIA 6 marine and nearshore habitats. Juveniles and adults from the Strait of Juan de Fuca stocks may also be occasional visitors.

Bull trout have also been documented in Whidbey and Camano nearshore waters. Regional scientists *believe* that most bull trout that utilize WRIA 6 habitats are from one of the Skagit, Stillaguamish, or Snohomish populations (Goetz et al. 2004). These basins are three of the eight core areas for Puget Sound bull trout. These fish migrate to and from their natal rivers seasonally and are generally found foraging in water deeper than two meters.

E. ESA Listed Species – Status and Recovery Goals

Puget Sound Chinook, Hood Canal summer chum, and Coastal-Puget Sound bull trout are all listed as threatened under the federal Endangered Species Act. Because of the central location of WRIA 6 in Puget Sound, it is likely that fish from all three of these species (as well as other salmon and trout species) utilize Whidbey and/or Camano shorelines at one time or another during their life cycles. While the summer chum and bull trout in WRIA 6 nearshore habitats are likely to be larger juveniles and adults, Chinook begin using these habitats when they are very small (fry migrants).

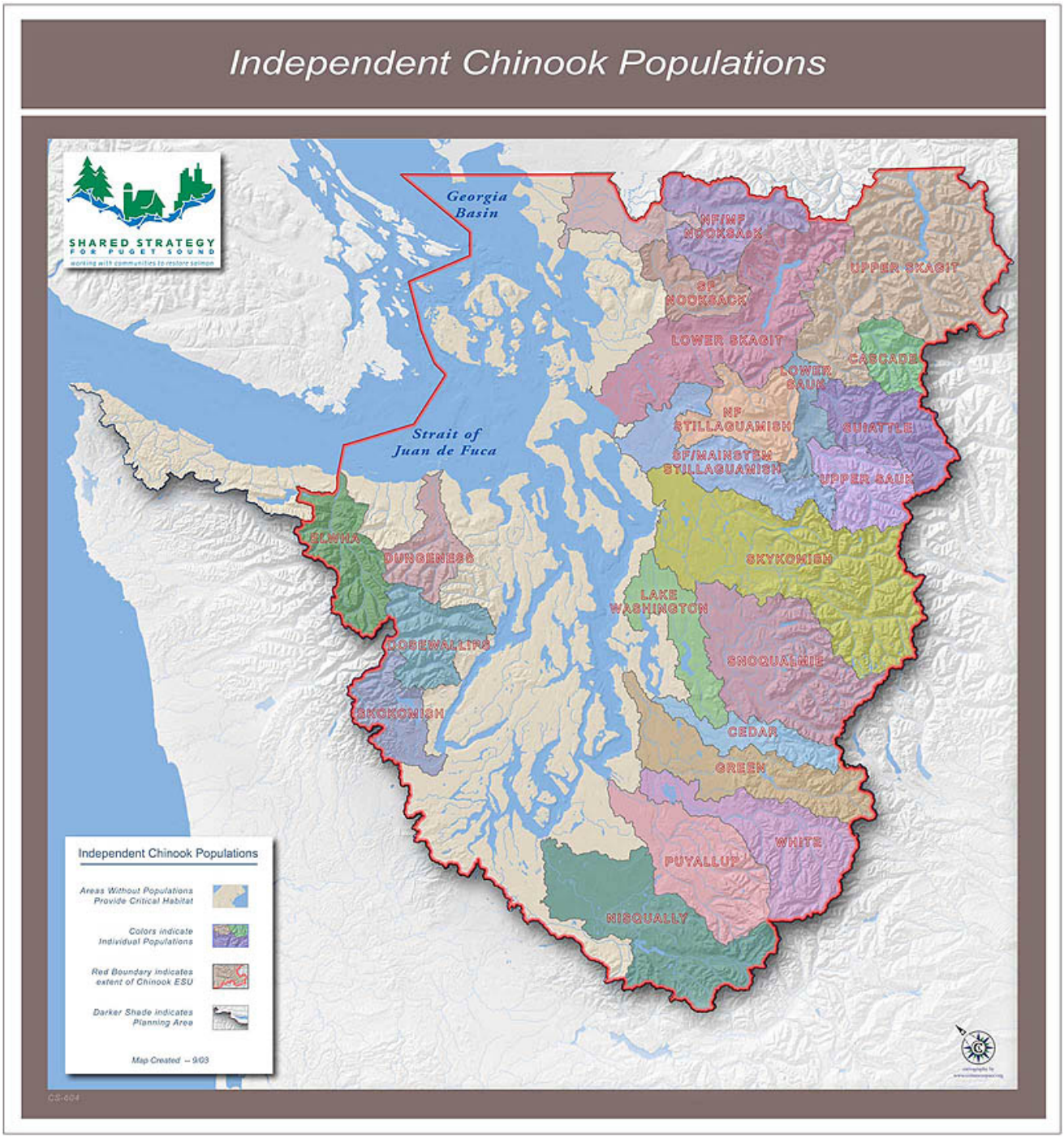
1. Chinook

NOAA Fisheries has appointed a Puget Sound Technical Recovery Team (TRT) to assist in development and evaluation of the Puget Sound Chinook Recovery Plan. The TRT has developed planning ranges and preliminary guidance for the recovery and delisting of the Puget Sound Chinook ESU (TRT 2002). The TRT recommends "at least 2 to 4 viable Chinook salmon populations in each of the 5 geographic regions" (geographic regions: North Sound, Central Sound, South Sound, Hood Canal, and North Olympic) with "one or more viable populations from each major genetic and life history group historically present within that geographic region" (TRT 2002).

A salmonid population is considered viable if it "has a negligible risk of extinction due to threats from demographic variation, local environmental variation, and genetic diversity changes over a 100-year time frame" (McElhany et al. 2000). An acceptable risk of extinction is 5% or less (TRT 2002). Population viability will be evaluated in terms of the following Viable Salmonid Population (VSP) parameters:

(1) abundance, the number of individuals in the population at a given life stage or time;
(2) productivity/growth rate: the actual or expected ratio of abundance in the next generation to current abundance;
(3) population spatial structure: how the abundance at any life stage is distributed among available or potentially available habitats; and
(4) diversity: the variety of life histories, sizes, and other characteristics expressed by individuals within a population (McElhany et al. 2000; TRT 2002).

While WRIA 6 contains no streams large enough to support independent Chinook populations, the county lies on the migration corridors of all 22 independent Chinook populations (figure 1) in the Puget Sound Evolutionarily Significant Unit (ESU). Table 1 is a hypothesis of the extent to which these populations



are likely to utilize the nearshore in WRIA 6 (Fresh 20043). The Skagit, Snohomish, and Stillaguamish rivers, which produce 10 of the 22 Chinook populations, terminate into the nearshore habitats of the Whidbey Basin.

Table 1 – Hypothesis of Puget Sound Juvenile Chinook Utilization of the WRIA 6 Nearshore (Fresh 2003)

Populations Areas (# of Populations)	**Admiralty Inlet**	**Whidbey Basin** (Skagit Bay/Port Susan/ Saratoga Passage)
Straits (2)	Some	None
Nooksack (2)	Some	None
Skagit (6)	*Significant*	*Significant*
Stillaguamish (2)	*Significant*	*Significant*
Snohomish (2)	*Significant*	*Significant*
Hood Canal (2)	Significant	Some
Lake Washington (2)	Significant	Some
Green (1)	Significant	Some
Puyallup-White (2)	Significant	Some
Nisqually (1)	Significant	Some

Since WRIA 6 does not have local planning ranges and targets for abundance and productivity; it is necessary for this plan to focus on activities that can support achievement of the planning targets established for Puget Sound stocks. This plan acknowledges the Chinook planning targets, developed jointly by the TRT, WDFW, and local tribes (Table 2), as our overall quantitative goals for Chinook recovery. The second column of table 2 provides an average of the number of spawning fish that returned to spawn in each of the 22 independent populations between 1996 and 2000 (*or between 1987 and 2001). The third column gives a range of the number of fish needed to sustain a population if one spawning pair of fish replaces itself (produces two fish that return to spawn). The Salmon TAG has developed goals, objectives and actions in this plan to support these planning targets. It is believed that efforts in WRIA 6 will have the most benefit for the populations from the Skagit, Stillaguamish, and Snohomish rivers.

Figure 1 - Puget Sound Independent Chinook Populations *(Shared Strategy for Puget Sound/ CommEnSpace, 2003)*

Table 2: Chinook Spawner Abundance Planning Targets & Ranges for Puget Sound Region
(TRT 2002)

			Planning Targets for Abundance (productivity level in parentheses)	
Population	**Mean Spawner Abundance for 1996-2000**	**Planning Range for Abundance**	**Low Productivity[1]**	**High Productivity[2]**
N. Fork Nooksack	120	16,000-26,000 (1.0)	16,000 (1.0)	3,800 (3.4)
S. Fork Nooksack	200	9,100-13,000 (1.0)	9,100 (1.0)	2,000 (3.6)
Lower Skagit	2,300	16,000-22,000 (1.0)	16,000 (1.0)	3,900 (3.0)
Upper Skagit	8,920	17,000-35,000 (1.0)	26,000 (1.0)	5,380 (3.8)
Upper Cascade	330	1,200-1,700 (1.0)	1,200 (1.0)	290 (3.0)
Lower Sauk	660	1,200-1,700 (1.0)	5,600 (1.0)	1,400 (3.0)
Upper Sauk	370	5,600-7,800 (1.0)	3,030 (1.0)	750 (3.0)
Suiattle	420	3,000-4,200 (1.0)	610 (1.0)	160 (2.8)
N. Fork Stillaguamish	660	600-800 (1.0)	18,000 (1.0)	4,000 (3.4)
S. Fork Stillaguamish	240	18,000-24,000 (1.0)	15,000 (1.0)	3,600 (3.3)
Skykomish	1,700	15,000-20,000 (1.0)	39,000 (1.0)	8,700 (3.4)
Snoqualmie	1,200	17,000-51,000 (1.0)	25,000 (1.0)	5,500 (3.6)
N Lake Washington	194*	17,000-33,000 (1.0)		
Cedar	398*			
Green	7,191*			
White	329*			
Puyallup	2,400	17,000-33,000 (1.0)	18,000 (1.0)	5,300 (2.3)
Nisqually	890	13,000-17,000 (1.0)	13,000 (1.0)	3,400 (3.0)
Skokomish	1,500*			
Dosewallips	26	3,000-4,700 (1.0)		
Dungeness	123*	4,700-8,100 (1.0)		
Elwha	1,319*			

**Represents spawner escapement 1987-2001.*

[1] The low productivity number in both the range and the target represents one adult fish return per spawner, also called the equilibrium point of 1:1 (recruits per spawner).

[2] The high productivity number represents the number of spawners at the point where the population provides the highest sustainable yield for every spawner. The productivity ratio is in parentheses for each population and represents the relationship of recruits per spawner (e.g., 3.8:1 for Upper Skagit)

2. Hood Canal Summer Chum

In the 1980s, the summer chum stocks experienced a severe drop in abundance, with returns declining from tens of thousands to an all time low of less than 800 spawners in 1990. In response to the alarming decline, the state and tribal co-managers implemented actions in 1992 to reduce the impacts of local fisheries on summer chum salmon and, together with the U.S. Fish and Wildlife Service (USFWS) and citizen groups, initiated hatchery supplementation programs on two summer chum stocks. In March of 1999, the National Marine Fisheries Service (NMFS) listed the summer chum originating from Hood Canal and the Strait of Juan de Fuca as a threatened species under the Endangered Species Act (ESA). The TRT has identified two historical populations of summer chum – the Hood Canal summer chum population (including Skokomish and Hood Canal streams) and the Strait of Juan de Fuca population (including Chimacum Creek, Dungeness River, and intervening streams). The co-managers have identified eight extant summer chum stocks along with recovery goals.

The Hood Canal Coordinating Council (HCCC) is developing detailed information on summer chum. Since very little is known about the ways in which summer chum utilize WRIA 6 habitats, activities undertaken in areas where summer chum are likely to be present will rely on information from the HCCC and the co-managers. Regional fisheries scientists hypothesize that a mixture of summer chum and fall chum utilize west Whidbey nearshore habitats, and the majority of chum found in the Whidbey Basin are from fall chum populations. It is hoped that an initial assessment of fish distribution along the west coast of Whidbey (being conducted by WA Trout during 2005) will help to identify areas of WRIA 6 habitat that are important to summer chum.

3. Bull Trout

While bull trout are more abundant in the north Puget Sound area, statewide their populations are low and in some cases declining. The U.S. Fish and Wildlife Service issued a final rule listing the Coastal-Puget Sound and St. Mary-Belly River distinct population segments as threatened on November 1, 1999 (64 FR 58910). The Coastal-Puget Sound distinct population segment is significant to the species as a whole because it contains the only anadromous form of bull trout in the coterminous United States, occurring in a unique ecological setting.

The Puget Sound Management Unit and the Olympic Peninsula Management Unit form the range of the Coastal-Puget Sound distinct population segment. The Puget Sound Management Unit includes all watersheds within the Puget Sound basin and the marine nearshore areas of Puget Sound. This management unit also includes the Chilliwack River watershed, a transboundary system flowing into British Columbia and discharging into the Fraser River. The Puget Sound Management Unit consists of eight core areas, with a total of 57 local populations and 5 potential local populations distributed among the core areas

The Puget Sound Bull Trout Recovery Unit Team (PSRUT) has provided recovery planning guidance for the Puget Sound bull trout recovery unit (PSRUT 2002). Since WRIA 6 does not have independent populations of bull trout, it is necessary for this plan to focus on activities that can support achievement of the planning targets established for Puget Sound stocks, particularly those in the Skagit, Stillaguamish, and Snohomish basins. This plan acknowledges the bull trout recovery guidance developed by the PSRUT, as our overall quantitative goals for bull trout recovery. In evaluating recovery for delisting, the PSRUT will consider the following characteristics within each core area population:

(1) Abundance: the number of adult spawners;
(2) Distribution: measured by the number of local populations and their spatial structure;
(3) trend: productivity or the reproductive rate of the population as measured by population trend and variability; and

(4) connectivity: the diversity of the population as measured by the persistence of the migratory life history forms and of the supporting functional habitat within the core area.

The critical habitat proposed for bull trout includes all of the nearshore around Camano and along the east side of Whidbey, nearshore along northwest Whidbey from Deception Pass to the north end of West Beach, and along southwest Whidbey from Possession Point to the east side of Cultus Bay. It is hypothesized that actions in the nearshore that improve habitat functions for salmon species will also improve habitat for bull trout since bull trout use the same habitats used by large juvenile and adult salmon.

F. Salmon Prey and Predators

Throughout their life salmon feed on a wide variety of prey organisms, including many kinds of freshwater and marine invertebrates and fishes; and at the same time, are fed upon by a wide variety of invertebrate and vertebrate predators and scavengers. Juvenile salmon are known to feed directly on salmon carcass flesh, salmon eggs, and aquatic macroinvertebrates that may have previously fed on salmon carcasses. Young juveniles feed on zooplankton and insects in the nearshore. As the salmon get bigger their diets shift to include forage fish species (sand lance, surf smelt, herring, and northern anchovy).

Salmon act as an ecological process vector, important in the transport of energy and nutrients between the ocean, estuaries, and freshwater environments. The flow of nutrients back upstream via spawning salmon and the ability of watersheds to retain them plays a vital role in determining the overall productivity of salmon runs. As a seasonal resource, salmon directly affect the ecology of many aquatic and terrestrial consumers, and indirectly affect the entire food web. The challenge for salmon, wildlife, and land managers is to recognize and account for the importance of salmon not only as a commodity resource to be harvested for human consumption, but also for their crucial role in supporting overall ecosystem health. Many species of wildlife for which hard earned environmental laws and significant conservation efforts have been established (e.g., grizzly bears, bald eagles, river otters, killer whales, beaver), play key roles in providing for the health and sustainability of the ecosystems upon which salmon depend. As the health of salmon populations improves, increases in the populations of many of the associated wildlife species would be expected. Salmon and wildlife are important co-dependent components of regional biodiversity (Cedarholm et al. 2000).

1. Forage Fish

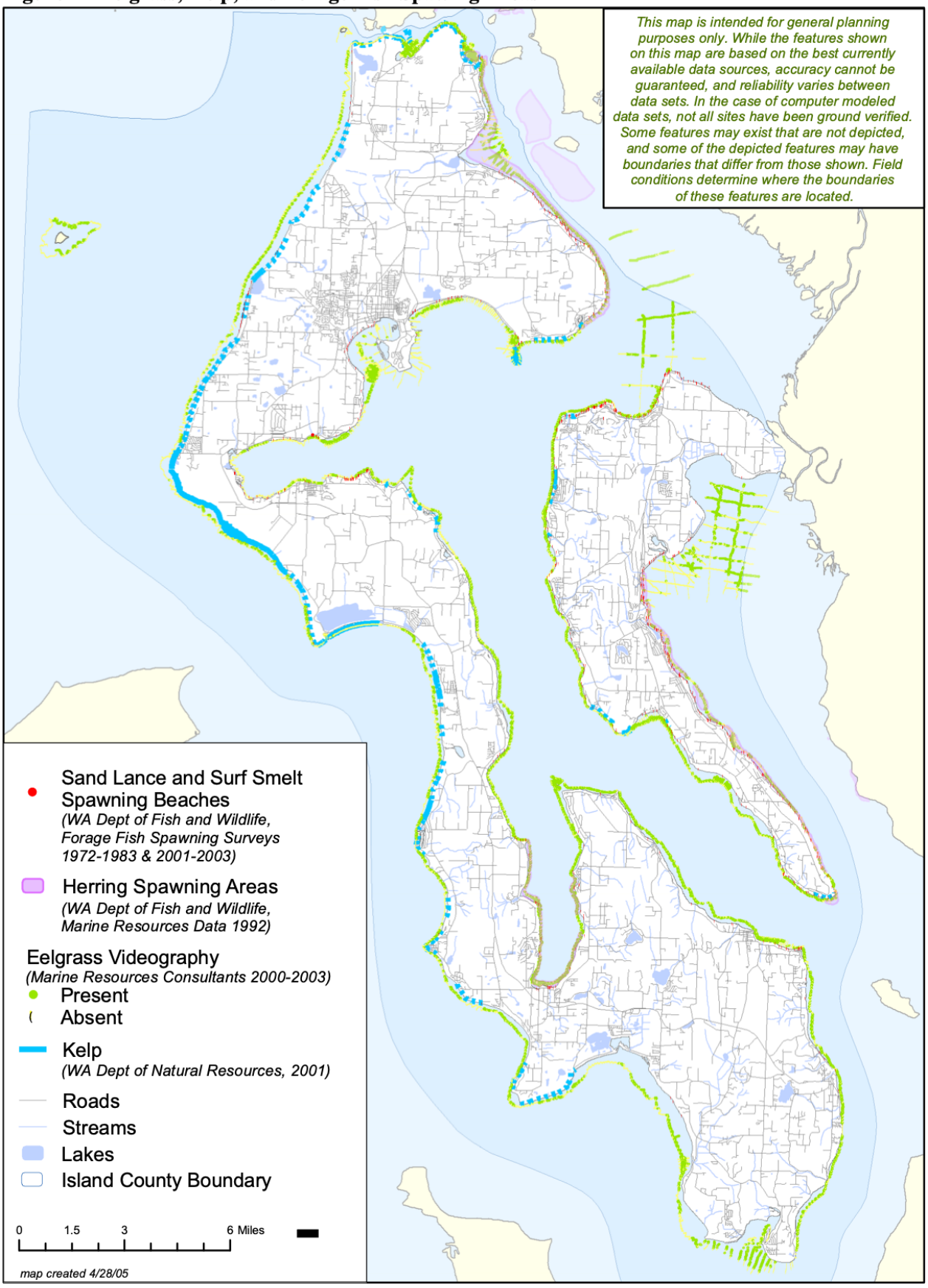
Many species of fish feed on forage fish. Appendix E summarizes the life history characteristics of the four major forage fish species: surf smelt, sand lance, Pacific herring, and northern anchovy. Major predators of herring include Pacific cod (42% of diet), whiting (32%), lingcod (71%), halibut (53%), coho (58%) and Chinook salmon (58%) (Environment Canada 1994). Sand lance and anchovies (Beauchamp 1987) are also important sources of food for fish. In the past, when sardines were abundant, they formed an important source of food for Chinook and coho salmon (Chapman 1936). The WRIA 6 nearshore provides extensive spawning-beach and intertidal eelgrass habitat (as shown in figure 2) for three important forage species – surf smelt, sand lance, and Pacific herring (data collected by Penttila 2001-03, Norris 2001-03). Protecting, enhancing and restoring these habitats are a critical link to the successful recovery of Puget Sound salmon.

Two of these species (sandlance and surf smelt) spawn on intertidal sand and gravel beaches. Good spawning beaches are characterized by sand and small gravel and good riparian shading, which keeps the eggs moist when the tide is out during incubation (Penttila 2000). In order to maintain these beach habitats, the longshore sediment drift processes must function and maintain the movement of sand and

gravel along the beach. Maintaining shoreline vegetation is also important to provide shading. Herring spawn on intertidal vegetation, laying their eggs on eelgrass or kelp. Figure 2 is a map of known spawning habitats for these three species in WRIA 6. The surf smelt and sand lance spawning beaches on this map represent sites where eggs from one or both of these species were found on the beach during surveys in 1972-1983 and/or 2001-2003. Since researchers believe that egg mortality is a key limiting factor for forage fish populations, the species that spawn in nearshore habitats are considered to be most vulnerable to shoreline development (Washington Department of Fish and Wildlife 1998). Anchovy and sardines spawn in open ocean habitats, and are considered less vulnerable to shoreline development impacts. Forage fish feed on plankton, so maintaining the integrity of the marine food web is important to maintaining this resource. Maintaining good water quality in areas where forage fish feed is important to maintaining this process.

The Forage Fish Management Plan was adopted by WDFW in 1998 and stresses a conservative approach to harvest management for each forage fish stock. Since forage fish species exhibit patterns of irregular stock stability, varying greatly from year to year, harvest management is based on estimates of stock biomass. There are 19 herring stocks in Puget Sound, eight are healthy, one moderately healthy, three degraded, one critical and six have not been assessed. No assessment for sand lance, surf smelt, anchovy or sardine are available; but there are indications that the sardine and anchovy stocks have been increasing and that the sand lance and surf smelt populations are fairly stable (Washington Department of Fish and Wildlife 1998).

Figure 2 - Eelgrass, Kelp, and Forage Fish Spawning Areas



2. Predation on Salmon – Marine Mammals and Other Species

While scientific documentation of predation on salmon in WRIA 6 waters is limited, a wide range of species are known to feed on juvenile and adult salmon. Staghorn sculpins are known to prey on salmon fry. Orcas, blue herons, osprey, seals, and sea lions prey on large juvenile and adult fish, with seals and sea lions often gathering for this purpose at bottlenecks such as river mouths where salmon concentrate before moving upstream. Sea lions have been observed feeding on steelhead, coho, sockeye, chum, and Chinook. Harbor seals have been observed feeding on pink salmon in the fall, steelhead in the winter and Chinook in the spring (NMFS 1997). In addition these species also prey on forage fish species, such as herring, anchovy, and smelt (NMFS 1997). For the Southern Resident orca, which spend up to nine months (March-November) in Puget Sound, salmon are the lifeblood and sustenance necessary for survival. Fluctuating salmon populations have contributed to flux in the Southern Resident orca population, which is currently depleted to endangered levels (Wiles 2004).

Between the 1920s and 1960s, Washington and Oregon ran state-financed bounty programs to reduce the number of seals and sea lions competing with commercial fisheries. The exact number of pinnipeds killed is unknown, but the programs were considered successful at reducing the populations of seals and sea lions in both states (NMFS 1997). The seal population began to rebound after the bounty program ended and the Marine Mammal Protection Act was passed in 1972. The Marine Mammal Protection Act established a federal responsibility to conserve marine mammals with management vested in the Department of Interior for sea otter, walrus, polar bear, dugong, and manatee. The Department of Commerce is responsible for cetaceans and pinnipeds, other than the walrus. Except for certain situations, the Act established a moratorium on taking and importation of marine mammals as well as products taken from them. The Act also established procedures for waiving the moratorium and transferring management responsibility to the States.

In the early 1970s, Newby (1973) estimated that 2,000-3,000 harbor seals resided in Washington. By 1995, the harbor seal population in Washington was estimated to have increased to at least 34,000 (NMFS 1997). While California sea lions were considered rare in Washington waters prior to the 1950s, over 1,000 sea lions have been counted in Puget Sound in recent years (Jeffries et al. 2000). It is estimated that today's populations are approximately the size of the populations before European settlement. According to the *Atlas of Seal and Sea Lion Haulout Sites in Washington (2000),* there are several hundred haulout sites (out of water resting sites) in Puget Sound, 26 of which are near Whidbey and Camano Island (14 are mapped within the WRIA 6 geographic area). Of these 26 sites, 23 are used by harbor seals, twelve are used by California sea lions, and one site is also used by Northern Elephant seals (Jeffries et al. 2000). Figure 3 is a map of these sites and shows a rough estimate of the number of animals that have been counted at each site. Harbor seals are a non-migratory species, breeding and feeding in the same area throughout the year. California sea lions are migratory and only the males make the trip to Puget Sound from their breeding rookeries off the coast of California and Mexico.

The reports of seal and sea lion predation on salmon have increased in recent years. This raises concerns that predation on salmon by increased numbers of seals and sea lions may be significantly impacting depleted, threatened, and endangered salmon stocks (NMFS 1997). In 1994, Congress amended the Marine Mammal Protection Act. The amendment included the formation of a Pinniped Task Force to examine impacts of seals and sea lions on fishery stocks. Several areas that are in or contiguous with WRIA 6 were identified in the Pinniped Task Force report, *NOAA Investigation of Scientific Information on the Impacts of California Sea Lions and Pacific Harbor Seals on Salmonids and on the Coastal Ecosystems of Washington, Oregon, and California (1997),* as areas where depressed stocks may be vulnerable to predation. These areas include:

- the Strait of Juan de Fuca where harbor seals are present year round and California sea lions are present during the fall, winter , and spring;

- the Eastern Bays, including Bellingham Bay, Skagit Bay, and Port Susan, where harbor seals are present year round; and
- Puget Sound where harbor seals are present year-round and California sea lions are present during the fall, winter, and spring.

Large groups (hundreds) of sea lions and seals have been observed near the mouths of the Snohomish, Stillaguamish, and Skagit Rivers. Adult salmonids are most vulnerable to seal and sea lion predation during their spawning migrations, especially where their movement is constricted. The vulnerability of juvenile salmonids is affected by their size during outmigration. Juveniles that remain in the estuaries and nearshore areas as they grow, and fish that migrate as sub-yearlings are more vulnerable to predation than fish that move offshore when they are small (NMFS 1997).

The Working Group that developed the NOAA Investigation (NMFS 1997) concluded that "where salmonid populations are at low levels, and particularly where salmonid passage is restricted by man-made structures, such as the Ballard Locks, pinniped predation can affect salmonid stocks. Even in areas without man-made passage constrictions, pinniped predation on small salmon runs can be substantial…." The NMFS Working Group (1997) also concluded that "resource managers and the public must find solutions that conserve all species in the ecosystems, especially those that are severely depressed or listed under the ESA, while allowing optimum yield for healthy living marine resources."

Jeffries et al. (2003) concluded, that the given the increase in harbor seal populations, "if [the population] is formally determined to be at OSP [optimal sustainable population], NMFS could return management authority for harbor seals to Washington State." Jeffries et al. (2003) concludes that "selective removal of harbor seals around river mouths is unlikely to affect the status of harbor seal populations in Washington State. It is evident that harbor seal stocks in Washington could decline by 20% and still be above MNPL [maximum net productivity level].

The National Marine Fishery Service report on seal and sea lions (NMFS 1997) recommends:

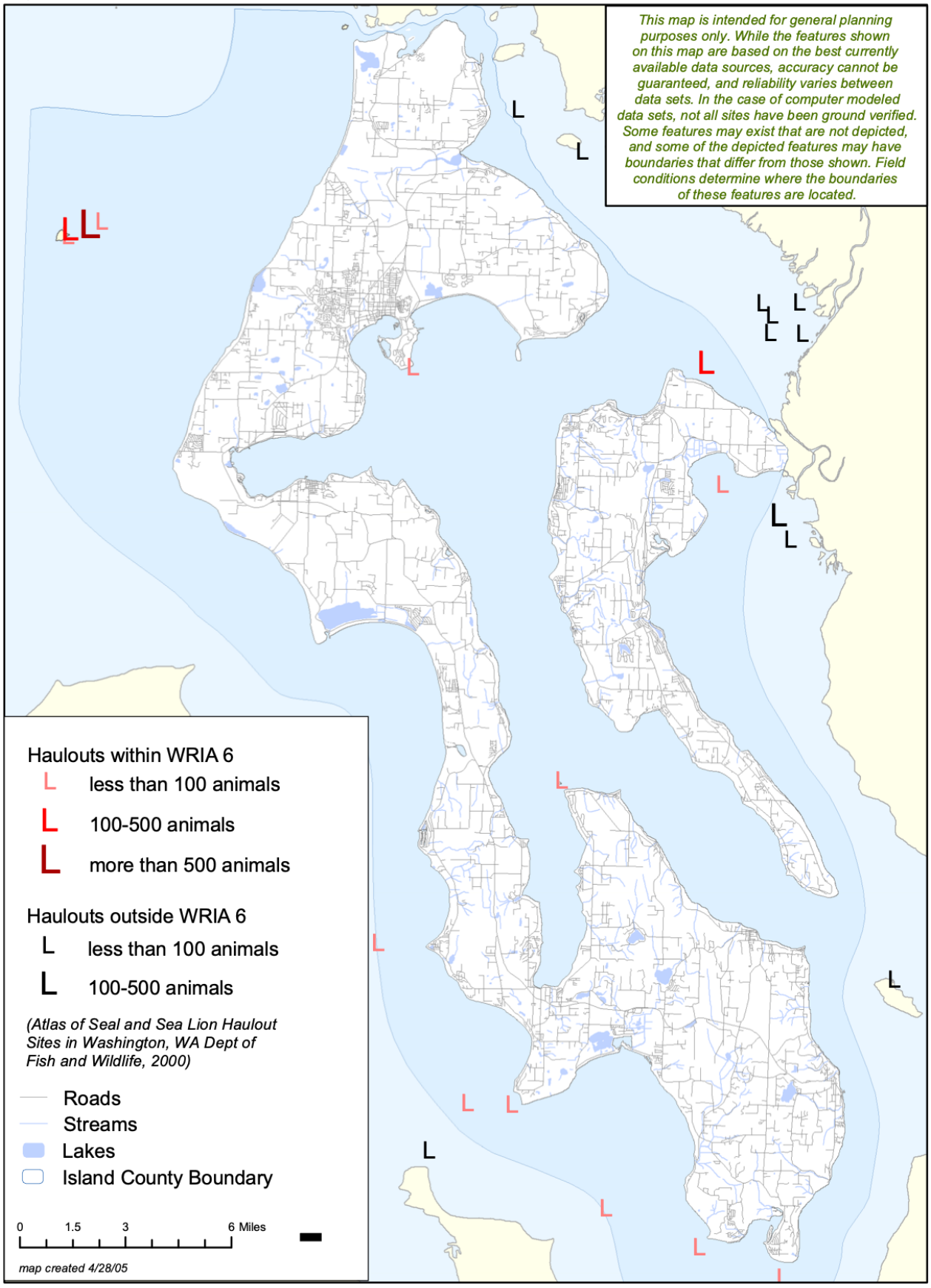
> "In situations where California sea lions or Pacific harbor seals are preying on salmonids that are listed or are proposed/candidates for listing under the ESA, immediate use of lethal removal by state or federal resource agency officials would be authorized. This authorization would only apply to those areas where resource agencies have determined that there is an urgency to immediately remove pinnipeds lethally, without having to expend resources on non-lethal methods that are not likely to provide immediate resolution to the conflict. … Under this authorization, lethal removal would occur only in specific areas where the conflicts occur, such as locations where salmonid passage is restricted or impeded and only during the period when affected salmonids are migrating through the area. …"

Due to the possibility that predation on salmon by marine mammals and other species may be an issue for salmon stocks at risk of extinction, the WRIA 6 salmon recovery lead entity recommends that this issue be examined by the Washington Department of Fish and Wildlife and NOAA Fisheries. While management of salmon predator populations is outside of Island County's jurisdictional authority, the WRIA 6 salmon recovery lead entity committees plan to:

1) keep up with information about these marine mammal populations,
2) encourage the state and federal agencies to determine if it would be appropriate for NOAA Fisheries to transfer management oversight of pinnipeds to the WA Department of Fish and Wildlife, and
3) assist with studies of predator impacts on salmon in WRIA 6 waters.

Citizens with concerns about predation issues are encouraged to contact the state or federal agency with jurisdiction over these species.

Figure 3 - Seal and Sea Lion Haulout Sites



III. Regional Factors Influencing Salmon Viability

A. Harvest

Harvesting salmon helped form the early history of the Puget Sound region and today remains an important activity to many citizens of the Pacific Northwest region. The marine waters surrounding Camano and Whidbey Islands are major migratory routes for adult salmon returning to the rivers of Puget Sound and as such are productive sport and commercial fishing areas.

Sport fishing for salmonids in WRIA 6 takes place from both shore and boats. Among the more popular shore-fishing locations are Bush Point and Keystone Spit on the west shore of Whidbey Island, where adult salmon tend to migrate along the shoreline. Fishing from boats focuses on shallower areas such as Possession Sound and Mutiny Bay, where tides, currents and sea-bottom characteristics concentrate the food adult salmon eat, and in constricted areas such as Deception Pass. As recently as a few decades ago, nearshore in WRIA 6 provided salmon in abundance to relatively unskilled anglers fishing from kickerboats out of local resorts.

1. Puget Sound Salmon Management Plan

Today, harvest of anadromous salmon in Puget Sound is controlled by the principles of the 1985 Puget Sound Salmon Management Plan (PSSMP) which lays out the legal basis for the conservation and allocation of salmon between treaty Tribes and non-treaty harvesters. The PSSMP is the framework for planning and managing harvest. This plan was developed to ensure conservation of salmon stocks, treaty rights are upheld, and equitable sharing of harvest opportunity and benefits are realized. The fishing rights of individual tribes are geographically limited to 'usual and accustomed' areas. The Puget Sound Tribes and the Washington State Department of Fish and Wildlife (WDFW) are co- managers for the salmon resource and have the responsibility to manage in a way that protects weak salmon populations while providing harvest opportunities on healthy runs.

In the *Comprehensive Management Plan for Puget Sound Chinook* (2004), harvest is constrained to the extent necessary to enable rebuilding of natural Chinook populations in the Puget Sound ESU, provided that habitat capacity and productivity are protected and restored. It includes explicit measures to conserve and rebuild abundance, and preserve diversity among all the populations that make up the ESU. The ultimate goal of the Chinook component of the PSSMP, along with concurrent efforts to protect and restore properly functioning Chinook habitat, is to rebuild natural Chinook productivity to a level where Chinook populations will be sufficiently abundant and resilient to perform their natural ecological function (in freshwater and marine systems); provide related cultural values to society; and sustain commercial, recreational, ceremonial, and subsistence harvest.

The annual process of setting the number of fish that can be caught during a fishing season begins each year in the late winter. The co-managers develop a pre-season forecast of the quantity of salmon expected to return. This estimate is based on the number of adult salmon which returned to the river to spawn 3, 4, and 5 years earlier whose progeny are expected to contribute to the current population of 3, 4, and 5 year old salmon which will make up the run size being estimated. The run size is then adjusted up or down to account for environmental conditions that prevailed in the river or ocean during the life of each year class of salmon. For example, a flood may have caused significant loss of juvenile salmon 3 years earlier negatively affecting the number of juvenile salmon that eventually outmigrated from the river and ultimately affects the number of adults returning. This, and other salmon population information, is assembled into a computer model that predicts the effects of different regulation options on salmon populations. The results are then compared to conservation goals, obligations under U.S.- Canada treaties, and allocation mandates and agreements.

Fishing seasons are generally set by April of each year. Once fishing begins fishery managers track harvest rates to determine if the actual catch seems reasonable given the preseason run-size forecast. Fishing seasons may then be modified up or down to adjust for differences between the current harvest / population estimate and the preseason estimate. For example, a fishery may be closed because a quota has been reached; fishing rules may be modified in-season to allow recreational or commercial fishing to increase or decrease; or fishing opportunities may be changed if information from test fisheries indicates that the number of fish actually returning is substantially different from pre-season estimates.

For healthy salmon stocks such as the Skagit River pink salmon, fishing seasons and harvest levels are set which provide for adequate escapement to sustain the run of pinks and allow opportunities to harvest fish which are over and above these needs. In the case of hatchery reared coho and fall Chinook harvest levels are set to capture the majority of returning fish since only a small number of adults are necessary to meet the egg requirements of the hatchery program.

2. Fishery Enforcement

Non-treaty commercial and recreational fishery regulations are enforced by WDFW. The WDFW Enforcement Program currently employs 163 personnel. Of that number, 156 are fully commissioned Fish and Wildlife officers who ensure compliance with licensing and habitat requirements, and enforce prohibitions against the illegal taking or poaching of fish and wildlife.

Each tribe exercises authority over enforcement of tribal commercial, ceremonial, and subsistence fishing regulations, whether fisheries occur on or off their reservation. In some cases enforcement is coordinated among several tribes by a single agency (e.g. the Point No Point Treaty Council is entrusted with enforcement authority over Lower Elwha Klallam, Jamestown S'Klallam, and Port Gamble S'Klallam, tribal fisheries). Enforcement officers of one tribal agency may be cross-deputized by another tribal agency, where those tribes fish in common areas. Prosecution of violations of tribal regulations occurs through tribal courts and governmental structures.

Participation by Indian and non-treaty fishers in pre-season fishery planning, at local meetings conducted by tribal resource managers and WDFW, and through the Pacific Fisheries Management Council hearings and the North of Cape Falcon forum, promotes education about salient conservation concerns that are of particular relevance to planning fisheries. These forums also promote a wide awareness of changes in regulations, well in advance of the onset of most fisheries, directly to fishers and through the news media.

The response of salmon populations to habitat protection, enhancement, and restoration efforts in WRIA 6 will depend, in part, on the changes in harvest regulations on Puget Sound stocks. While there is an active recreational fishery that includes intensively fished areas along the west coast of Whidbey and in Possession Sound, these activities are regulated by the state and will likely have little to no impact on regional recovery efforts.

B. Hatcheries

For more than a century, hatcheries have produced fish for harvest. Today, hatcheries provide the foundation for the state's vastly popular recreational fisheries and the thousands of jobs that depend on them. But in recent years, hatcheries have taken on an additional new role. They are becoming an essential tool in the conservation of native salmon stocks. Indeed, as far back as 1977, long before any fish species was listed under the Endangered Species Act, a WDFW hatchery was being used to stave off extinction for a spring Chinook stock. Presently, about a third of the state's hatcheries are used in some capacity for wild stock conservation work.

To ensure hatcheries can carry out this dual role of wild stock conservation and sustainable fisheries in an environmentally sound manner, Tribal, federal, state, and private scientists have joined in a process called the Hatchery Reform Project, established by Congress. The Hatchery Scientific Review Group (HSRG), that leads this project, is tasked with examining hatchery operations and determining what structural and operational changes are necessary. The goal of this collaborative effort, launched in 2000 and facilitated by the non-profit conservation group Long Live the Kings, is to make sure the best available science is developed and applied in the years ahead as hatcheries fulfill their new dual role. Through the HSRG review two primary purposes of hatchery programs were confirmed: 1) help conserve naturally spawning populations, and 2) provide fish for harvest. Many hatchery programs are designed to provide both harvest and conservation benefits.

There are no major hatchery operations in WRIA 6. The only active rearing facility is at Possession Point. This facility is run by the Stilly-Snohomish Fisheries Enhancement Task Force and since 2000 has produced between 25,000 and 55,000 coho per year. Given the small number of fish released from this facility, these fish are unlikely to have a significant competitive impact on other salmon using Island County nearshore habitats. The response of salmon to habitat protection, enhancement, and restoration within WRIA 6 will depend more on the ways in which hatcheries are managed in surrounding watersheds. We will need to rely on these watersheds and regional scientists to determine 1) what sorts of competitive interactions are occurring in nearshore habitats between wild and hatchery stocks and 2) what changes should be made to hatchery operations to alleviate pressures caused by competition.

C. Hydropower

WRIA 6 has no hydroelectric facilities of significance. To gain the greatest benefit from efforts within WRIA 6 to protect, enhance, and restore nearshore habitat for salmon, hydropower facilities in surrounding watersheds must be managed with salmon in mind.

IV. Primary Local Factors Influencing Salmon Viability - Ecosystem Processes and Habitat Functions

From a Puget Sound perspective, WRIA 6 is sometimes divided into four regions: East Strait of Juan de Fuca (northwest Whidbey), Admiralty Inlet (central western Whidbey), South/Central Sound (southern Whidbey), and Whidbey Basin (eastern Whidbey and all of Camano – Skagit Bay, Port Susan, and Saratoga Passage). For the purposes of this plan, we've combined the western shore of Whidbey into the Admiralty Inlet region and Skagit Bay, Port Susan, Saratoga Passage, and Possession Sound into the Whidbey Basin region.

From a salmon's perspective, WRIA 6 is made up of three ecosystem categories: marine waters, nearshore, and coastal streams. Whidbey and Camano Islands are surrounded by deep marine water in many places. The nearshore is defined as the estuarine/delta, marine shoreline and areas of shallow water from the top of the coastal bank or bluffs to the water at a depth of about 10 meters relative to Mean Lower Low Water (the average depth limit of light penetration). This zone incorporates those geological and ecological processes, such as sediment movement, freshwater inputs and sub-tidal light penetration, which are key to determining the distribution and condition of aquatic habitats. By this definition, the nearshore extends landward into the tidally influenced freshwater areas of estuaries and coastal streams (Puget Sound Nearshore Ecosystem Restoration Project 2003). In general the nearshore occupies a fairly narrow band around each island, with notable exceptions in Skagit Bay and Port Susan. The streams on Whidbey and Camano are small, coastal streams. Many are quite short with intermittent or ephemeral flow and generally do not provide a sufficient flow of water to support salmonids. Kristoferson Creek on Camano is one of the creeks that goes dry during the summer months, but is used by juvenile salmon during the wet months. Others, such as Maxwelton and Glendale Creeks on Whidbey Island, generally flow throughout the year and support small populations of resident and anadromous salmonids. Maxwelton is the largest watershed in Island County, with a mainstem of 4.05 miles and covering 11.6 sq. miles (Washington State Conservation Commission 2000, Williams et al. 1975). There are 126 sub-basins; 86 on Whidbey and 40 on Camano. A few of these are true watersheds where all the water in the sub-basin drains to the Sound along a single stream; but most are coastal drainage areas where there are multiple drainage pathways to the sound.

This plan focuses on the nearshore, since this ecosystem provides the greatest number of functions to the greatest number of salmon and trout stocks and life history stages in our WRIA.

A. Landscape Context

Landscape connectivity between habitats is an important component for maintaining and recovering salmon, particularly juvenile salmon. Salmon recovery is a life cycle process requiring protection of all habitats; salmon are always going someplace and coming from someplace else.

1. Regional Context

Three geographic areas (based on sub-basins and associated shorelines) have been prioritized in WRIA 6 (Figure 4). These areas are prioritized based on their landscape context – the distance of the sub-basins shoreline from the three rivers that terminate into the Whidbey Basin and the priority of the adjacent geographic area. Designation of these areas was also influenced by a qualitative assessment of the number of stocks likely to utilize the shoreline and whether or not the shoreline is included in a proposed critical habitat designation (Chinook and/or bull trout). The sub-basins are included in these geographic areas because of the close relationship between the uplands and the nearshore in coastal sub-basins.

It should be noted:

- All of WRIA 6 shorelines are included in the proposed critical habitat definition for Chinook (except for areas that are exempt because they are associated with Navy activities). The processes and habitats in all three geographic areas are considered important to the recovery of salmon.
- While this strategy assigns priority to the development and implementation of protection, enhancement, and restoration projects in geographic area 1, there will be projects from all three areas that take priority due to time and/or community considerations.

Geographic Area 1 (top priority) includes the WRIA 6 sub-basins and shorelines of Deception Pass, Skagit Bay, and Port Susan. These shorelines are within ~5 miles of the mouths of the Skagit, Stillaguamish, and/or Snohomish rivers. This area is utilized by the largest number of Chinook fry migrants, from these rivers, during their first day of nearshore migration. The shorelines are primary pathways for bull trout migrating between these rivers. And the area is used heavily by juveniles and adults from the 47 salmon and trout stocks that originate in these rivers; over 20% of the stocks in Puget Sound.

Geographic Area 2 (medium priority) includes the WRIA 6 sub-basins and shorelines of Saratoga Passage, Possession Sound, Southeast Admiralty Inlet (Double Bluff to Possession Point), and Northwest Whidbey (Deception Pass to the north end of West Beach). The Saratoga Passage and Possession Sound shorelines and sub-basins were included because they are within the Whidbey Basin, which is an area that has been regionally recognized as important to all south and central Puget Sound stocks. Southeast Admiralty Inlet was included because this section of the south Whidbey coast is likely to be used by juveniles from a large number of south and central Puget Sound stocks and part of this area is included in the bull trout critical habitat definition. Northwest Whidbey was included because it is adjacent to the top priority area and it is included in the bull trout critical habitat definition.

Geographic Area 3 (lower priority) includes the WRIA 6 sub-basins and shorelines of the west side of Whidbey, south of West Beach and north of Double Bluff. This area has been given low priority because it is not adjacent to any of the rivers with natal populations and it is at the entrance to Puget Sound and most habitats are impacted by high wave energy and current energy. It is hypothesized that West Whidbey habitats function primarily as migration corridors and for food production for larger juveniles and returning adults.

2. Local Context

Landscape context can be evaluated on a regional scale, as described above, and on a local scale. Local landscape connectivity is the basis for the principles of salmon recovery, described by Spence et al (1996). These principles focus on the size and shape of habitat areas and the connectivity between these areas. These landscape principles include:

- large blocks of habitat are preferable to small blocks;
- blocks of habitat close together are superior to distant blocks;
- contiguous, functioning blocks of different habitat types are preferable to fragmented, degraded blocks;
- interconnected blocks are better than isolated blocks; and
- corridors between high quality habitats work best when they resemble the desired habitat.

These principles are included in the ranking criteria to evaluate the local landscape merit of protection, enhancement, and restoration projects.

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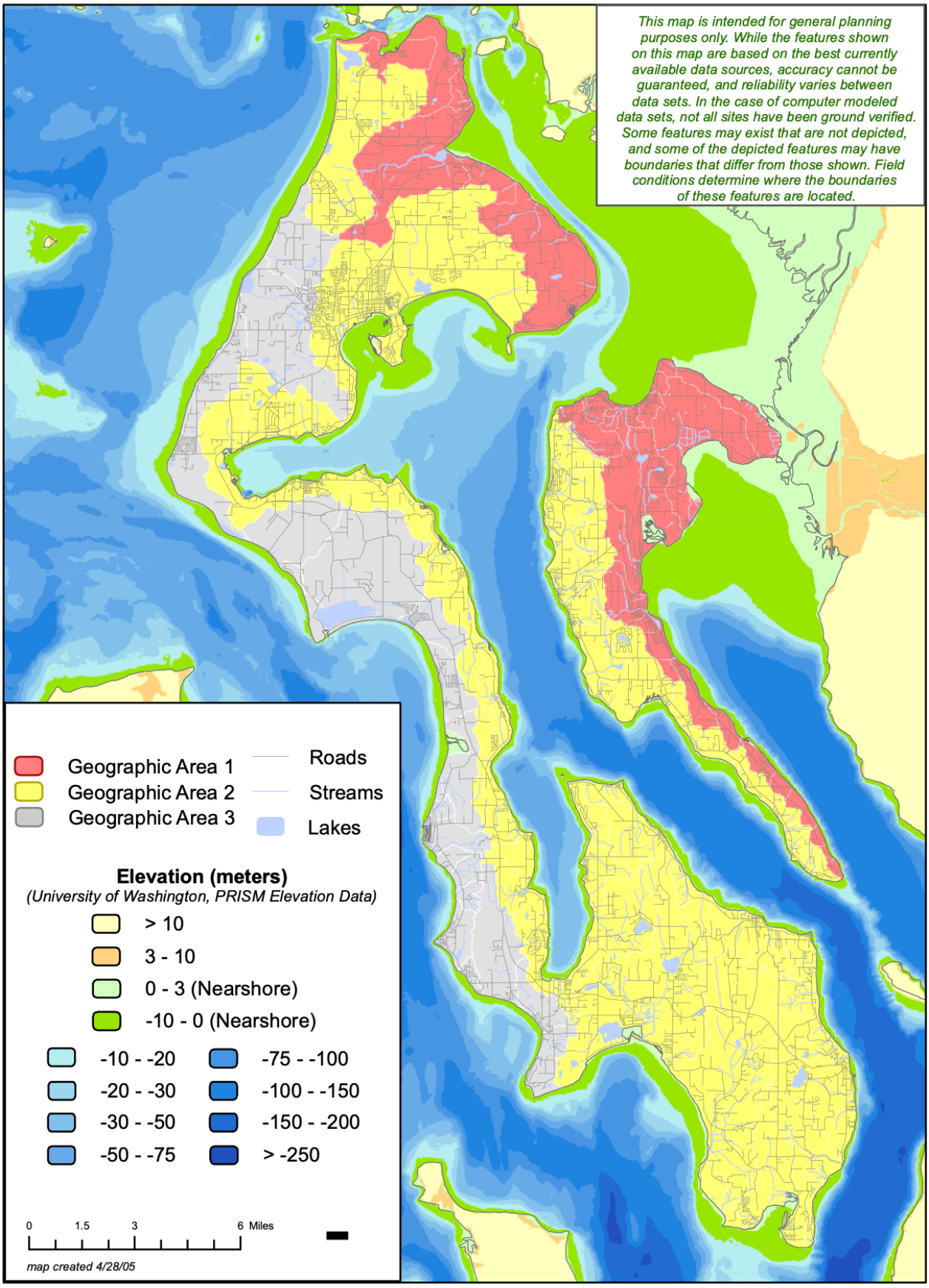
Figure 4 - Geographic Areas



Ecosystem Processes

Ecosystem processes are the actions that form and shape habitats and are inherently involved in providing habitat functions. There are four primary ecosystem process categories: water cycle, mineral cycle, biological interactions (community dynamics), and energy flow. Each of these categories includes a range of actions that interact with the local geology, hydrology, and biology to create habitats and provide habitat functions.

A generalized model of the relationship between ecosystem processes and habitat functions for salmon can be described in the following way. An ecosystem process occurs and results in physical, chemical, and biological reactions. These physical, chemical, and biological results interact to create a particular habitat type. The habitat characteristics determine the functions available for salmon.

1. Nearshore Processes

The nearshore is the interface between riverine and marine ecosystems and the principal source of interaction between people and the sea. Because of their focal location within the landscape, nearshore ecosystems are tremendously dynamic and complex, and they provide a wide array of functions for multiple plant and animal species, including Pacific salmon and their prey (Shreffler and Thom 1993).

Nearshore ecosystems produce, trap, cycle, and export energy; filter domestic wastes; retain and modulate freshwater runoff; buffer adjacent land areas from the force of marine waters; provide critical habitat for fish and wildlife migrations, feeding, refuge, and reproduction; and moderate extremes in air and water temperature (Duxbury 1987, Thom 1987). Key nearshore processes include: hydrologic inputs (precipitation, groundwater, river, and oceanographic), tidal exchange (tidal circulation and connectivity), sediment transport and accretion (bluff and river sediments), nutrient transformation and cycling, food webs (photosynthesis, secondary production, detritus processing), community dynamics, and organic matter deposition (including the deposition of large woody debris). When nearshore ecosystems become structurally or functionally disconnected or fragmented, because of either environmental or anthropogenic change, ecological processes are lost or degraded and Pacific salmon are adversely affected (Spence et al 1996).

While these processes are all important to providing nearshore functions for salmon, natural hydrologic patterns and inputs, sediment transport and tidal exchange are the three physical, habitat-forming processes in the nearshore. Naturally functioning nutrient dynamics, food webs, and community dynamics (chemical and biological processes) are critical elements for nearshore productivity. When evaluating protection, enhancement, and restoration projects, **high priority** will be given to projects that address physical, habitat-forming processes, and **moderate priority** will be given to projects that address chemical and biological processes that impact productivity, including activities that support or enhance water quality. **Lower priority** will be given to stream and upland processes that are indirectly related to nearshore habitats.

An assessment of the shoreline sediment transport in Island County was completed by Coastal Geologic Services in 2005. As a part of this assessment, on site evaluations of all of Island County's shoreline were completed and the shoreline was categorized according to the role that the shoreline segment plays in the movement of shoreline sediment (feeder bluff, transport zone, accretion area, etc.). Figure 5 shows the results of this assessment.

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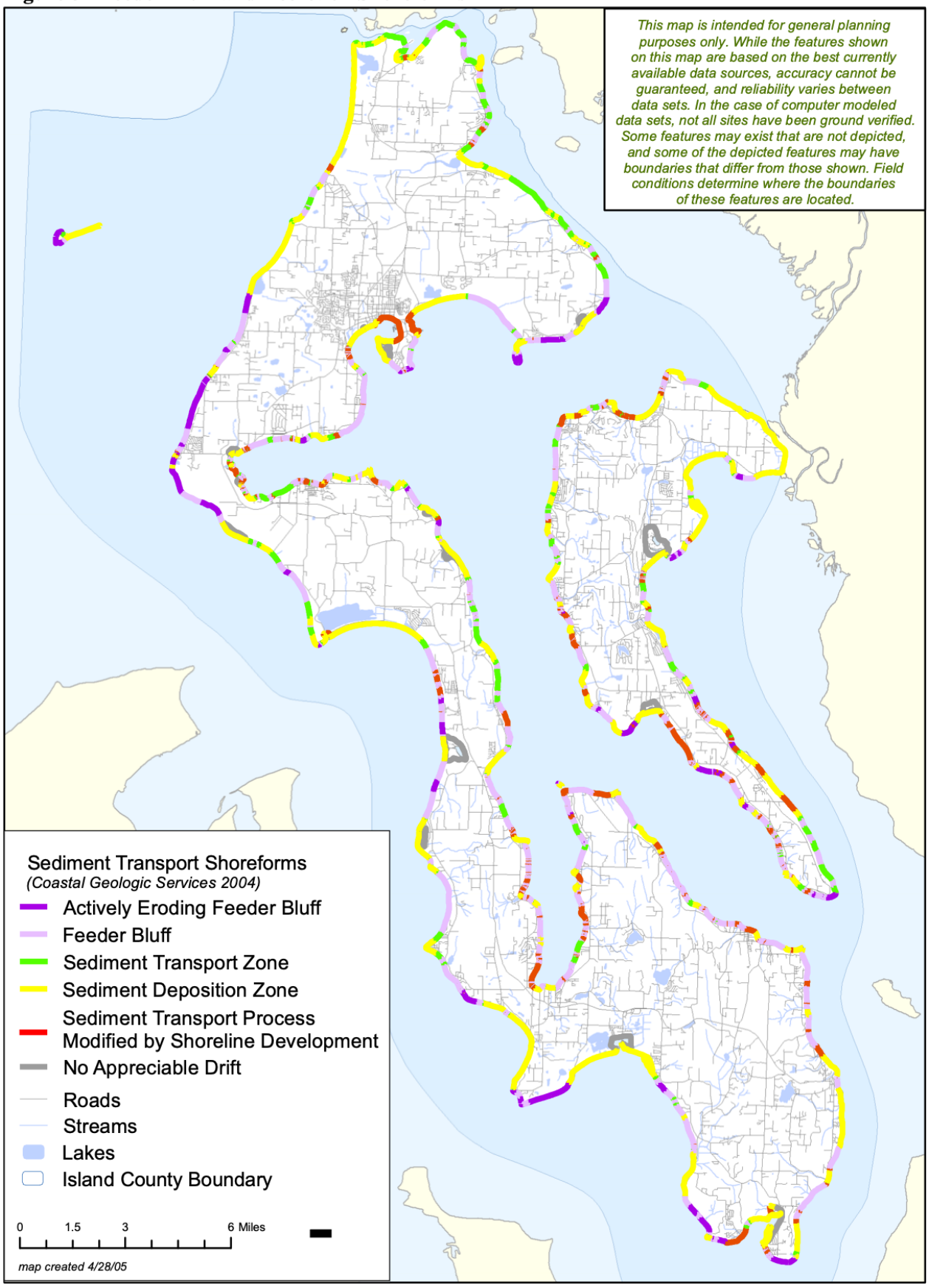
Figure 5 - Feeder Bluff and Accretion Shoreforms



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2. Coastal Stream Processes

Coastal streams provide an important transportation corridor for upland sediments, nutrients, and organic matter. Streams also provide important habitat for fish and wildlife and influence localized nearshore water temperatures and productivity. Key coastal stream processes include water flow, erosion/ deposition, channel migration, nutrient transformation and cycling, and riparian dynamics. These streams contribute to the health of salmon populations even if they do not directly support a salmon or trout population.

B. WRIA 6 Habitats

Nearshore areas support large and diverse salmon and wildlife populations. The shorelines in WRIA 6 are believed to provide critical habitats for rearing, shelter from predators, migration, and physiological transition. All species of juvenile salmon use nearshore habitats as fry, smolt, or yearling stages, as do returning adults.

The shallow water lying between the major salmon-producing rivers of the mainland and the islands of Camano and Whidbey provides a migratory path for juvenile salmon transitioning into marine waters. The habitats in these areas are predominantly mudflats, marshes and eelgrass meadows; habitats that are extremely productive. A study by Thom et al. (1989) described the importance of these habitats through the season, and concluded that mudflats are most important early in the outmigration season during the peak in epibenthic prey production. Eelgrass and kelp provide important shelter for young fish. As long as natural freshwater inputs are maintained along a shoreline, protected shorelines may provide osmoregulatory refuge for early migrants. These fish rely on freshwater lenses to provide connectivity between and within protected habitats.

Fry migrants, delta migrants, and parr migrants feed on plankton and insects. Yearling juvenile salmon typically feed on other fish and pelagic (crabs, shrimp, forage fish larvae) organisms. Bands of eelgrass and kelp beds along the shorelines provide habitat for some of these prey species, shelter from predation by other marine organisms, and cover for migration during lower tides. Large woody debris in high intertidal debris jams along protected shorelines trap and hold organic debris mats and sediment forming microhabitats providing “hot spots” for organisms such as amphipods, isopods, and insects (nearshore prey species).

The pocket estuaries in WRIA 6 are believed to be particularly important for early migrating Chinook, chum, pink salmon fry and forage fish. In addition, they are also used by a variety of other fish including juvenile sculpins, flat fish, stickleback, and shiner perch. Pocket estuaries are non-natal, small lagoons and coastal stream mouths that provide critical habitat for rearing, shelter from predators and high wave energy, and physiological transition. These habitats have very low energy regimes, high productivity, and seasonally diluted salinity regimes (Beamer et al. 2003). Pocket estuaries are distinct from delta estuaries, which are continuations of the natal rivers where the salmon spawn. Wild Chinook fry migrants have been shown to utilize pocket estuary habitats within Skagit Bay from later winter through spring (Beamer et al. 2003), while water temperatures are cool. These young fish are typically sensitive to high salinities and these habitats are thought to be important areas for physiological transition. In this study, juvenile forage fish were also observed rearing in these habitats.

Coastal streams in WRIA 6 are too small to support economically important runs of salmon, but some have small, local populations that support the genetic diversity of the Puget Sound stocks. These streams also provide an important resource for salmon recovery in the region because of their cumulative contribution to the Puget Sound food web. These streams deliver freshwater and terrestrial invertebrates to the nearshore, providing important food for fish rearing near these systems.

1. Habitat Classifications

There are a number of classification schemes for nearshore habitats. The WRIA 6 lead entity is currently using the Washington State Shore Zone Inventory assessment of geomorphic classes derived from the British Columbia physical shore zone mapping system (Washington Department of Natural Resources 2001b) to classify nearshore habitats. Figure 6 is a map of WRIA 6 shoreline units using this classification. Table 3 summarizes the distribution of shoreline habitat types. This classification system identifies the basic geomorphology and sediment composition of each nearshore area. The WRIA 6 shorelines are divided into the following 13 classifications:

- Cliff with Sand Beach
- Rock Cliff
- Ramp with gravel and sand beach
- Ramp with gravel beach
- Ramp with sand beach, narrow
- Sand and gravel beach, narrow
- Gravel beach, narrow
- Sand beach
- Sand and gravel flat or fan
- Sand flat
- Mud flat
- Marsh
- Man-made, permeable

This classification identifies over 40% of Whidbey and Camano shorelines as sand and gravel beach, and over 40% as sand and gravel flats or sand flats. These habitat types are associated with high productivity and are frequently in area of low wave energy. The remaining 20% of the shoreline is split between the other 10 geomorphology classes.

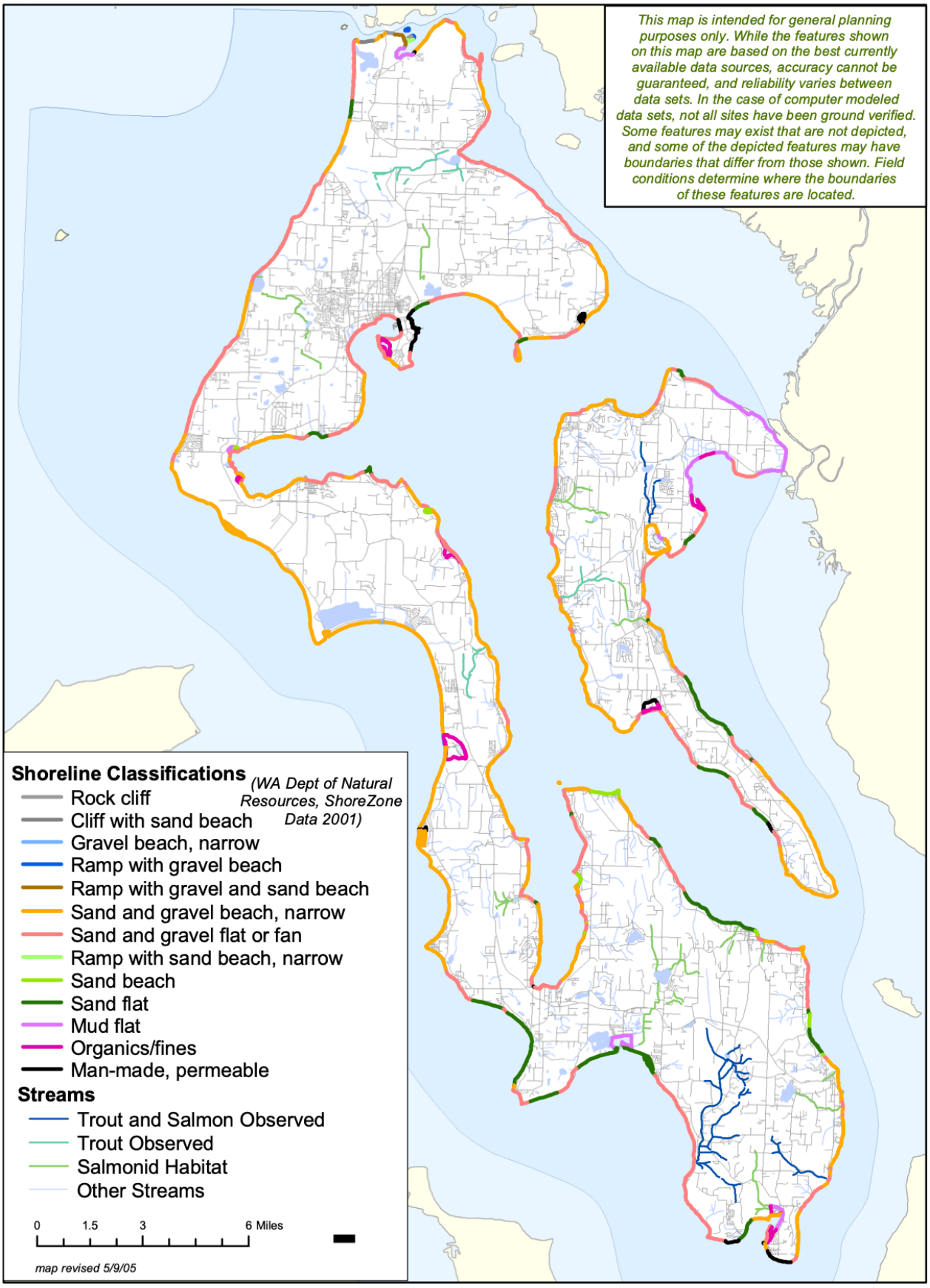
While the summary in table 3 is based on the best current available data sources for shoreline habitat classification, accuracy cannot be guaranteed. Some Whidbey and Camano shoreline areas may exist that are not included in this data set, and some shoreline areas may have been classified incorrectly. Examples of inaccurate classifications include parts of the east Camano shoreline. In addition, some features, such as pocket estuaries (non-natal coastal lagoons) were not included in this shoreline data set. Researchers at the Skagit River System Cooperative, using a geomorphology model and historic maps and photos, identified the historical and current locations of pocket estuaries in the Whidbey Basin.

Table 3 – Summary of WRIA 6 Shoreline Habitat Classifications *

	Geographic Area 1			Geographic Area 2							
WRIA 6 Nearshore Habitat Classification (BC Geomorphic Classes) [miles]	Skagit Bay Whidbey	Skagit Bay Camano	Port Susan	Saratoga Passage Whidbey	Saratoga Passage Camano	Possession Sound	SW Whidbey	NW Whidbey	Geographic Area 3 West Whidbey	**Total Island County Miles**	Percent of Total
Cliff with sand beach	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.3**	0.2%
Rock cliff	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.6**	0.3%
Gravel beach, narrow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	**0.5**	0.2%
Sand beach	0.0	0.0	0.0	0.0	2.5	0.5	0.0	0.0	0.0	**3.0**	1.4%
Ramp with gravel and sand beach	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.7**	0.3%
Ramp with gravel beach	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.4**	0.2%
Ramp with sand beach, narrow	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.2**	0.1%
Sand and gravel beach, narrow	6.7	3.0	8.7	11.6	25.7	5.1	1.2	1.7	26.6	**90.4**	42.4%
Mud flat	0.9	3.5	3.0	0.0	0.5	0.0	2.7	0.0	0.0	**10.5**	4.9%
Sand flat	0.4	0.3	2.9	1.5	4.6	1.0	5.4	0.6	3.4	**20.0**	9.4%
Sand and gravel flat or fan	9.5	2.2	6.1	6.2	24.9	3.3	7.3	2.0	9.2	**70.7**	33.1%
Marsh	0.0	0.0	1.5	0.8	3.5	0.0	1.5	0.0	2.4	**9.8**	4.6%
Man-made, permeable	1.2	0.0	0.0	1.0	2.3	0.0	1.3	0.0	0.4	**6.1**	2.9%

**This table is based on the Washington Shore Zone data set which generalizes some shoreline features. This table gives a general summary of WRIA 6 habitats. Accuracy at site locations cannot be guaranteed.*

Figure 6 - Shoreline Habitat Classifications



2. Habitat Functions for Salmon

The Northwest Straits Nearshore Habitat Evaluation (Anchor Environmental 2002) identifies five primary nearshore habitat functions for juvenile salmon: high-energy refuge, physiological refuge, predator refuge, migration corridors, and food production. Three of these functions - predator refuge, migration corridors, and food production - are also important for adult salmon. The Northwest Straits Evaluation also focused on spawning habitat for forage fish. Since forage fish feed on plankton, regional scientists believe that the highly productive habitats like mudflats, sand flats, and marshes are particularly important for maintaining these populations (Graber, B. 2004). Marshes and pocket estuaries are also particularly important as shelter from predators (Beamer et al. 2004). Table 4 summarizes the level of function that we believe each of the habitat types provides for juvenile salmon, adult salmon, and forage fish. This table is based on the nearshore habitat functions identified in the NW Straits Evaluation.

The following prioritization of habitats is based on the functions that habitats provide for salmon and forage fish (Anchor Environmental 2002) and hypotheses about how these habitats support the VSP parameters. The importance of a habitat area is enhanced if it is contiguous to eelgrass, kelp beds, or bordered by marine riparian vegetation and/or upland forest.

- **High priority** habitats include mud flats, marshes, and pocket estuaries. Marshes and pocket estuaries provide shelter from predators, refuge from high-energy waves, and are key areas for food production. These areas are particularly important for young salmon life-stages and pocket estuaries provide the right conditions for physiological transition for fry migrants outside of the delta estuaries. Mudflats are highly productive habitats providing plankton for young salmon and forage fish; this habitat type covers significant areas in Skagit Bay and Port Susan. In terms of Viable Salmon Population (VSP) parameters, refuge areas and highly productive areas support the productivity (survival) of salmon populations. Pocket estuaries support the abundance and diversity of salmon populations.

- **Moderate priority** habitats include sand flats/beaches and sand/gravel beaches. These habitats are often associated with eelgrass beds and depending on the size of the sand and gravel may support forage fish spawning. Juvenile and adult salmon are frequently found foraging along these shorelines. These areas support the productivity of salmon populations.

- **Lower priority** habitats include gravel (cobble) beaches, rock cliffs, and man-made structures. While these areas may be associated with eelgrass or kelp beds, they are frequently along shorelines that experience high-energy waves and currents – areas that salmon move through (migrate through) quickly. While maintaining the natural functions of these habitats is important for landscape connectivity and salmon migration, these areas are not generally highly productive and do not provide significant shelter.

Table 4 –Habitat Functions for Salmon and Forage Fish *(adapted from the NW Straits Nearshore Habitat Evaluation 2002)*

	Juvenile Salmon					Adult Salmon			Forage Fish			
	High Energy Refuge	Osmoregulatory Refuge	Predation Refuge	Migration Corridor	Food Production	Predation Refuge	Migration Corridor	Food Production	Spawning (substrate)	Spawning (eelgrass likely)	Rearing	Predation Refuge
Cliff with sand beach			*	*	*		*					
Rock cliff				*			*					
Ramp with gravel and sand beach	X		*	**X**	*	*	**X**	*		**X**	*	*
Ramp with gravel beach	X		*	**X**	*	*	**X**	*		**X**	*	*
Ramp with sand beach, narrow	**X**		*	**X**	X	*	**X**	*		X	*	*
Sand and gravel beach, narrow	**X**		*	**X**	X	*	**X**	X	**X**	**X**	*	*
Gravel beach, narrow	X		*	X	*	*	**X**	*		*	*	*
Sand beach	**X**		**X**	**X**	**X**	X	**X**	X		**X**	*	*
Sand and gravel flat or fan	X		X	**X**	X	X	**X**	X	**X**	**X**	**X**	*
Sand flat	**X**	*	**X**	**X**	**X**		*	X	X	**X**	**X**	*
Mud flat	**X**	*	**X**	**X**	**X**		*	X		*	**X**	*
Marsh	**X**	X	**X**	**X**	**X**	X	*	**X**		*	**X**	**X**
Man made permeable				*			*	*		*	*	*
Pocket Estuaries (may occur in many of these areas)	**X**	**X**	**X**		**X**			**X**			**X**	**X**
X=high X=medium *=low												

3. Assessment of Current Salmon and Forage Fish Habitats – Protection

The Northwest Straits Nearshore Habitat Evaluation (Anchor Environmental 2002) assessed the conservation and restoration potential of shorelines in the seven Northwest Straits Commission counties. The conservation assessment is used to provide a summary of important, functioning habitats (habitats with very high, high and moderate conservation potential) along WRIA 6 shorelines. Figure 7 shows the

shoreline segments with very high, high, and moderate conservation scores. Table 5 summarizes protection opportunities by geographic area. Accessible pocket estuaries have also been included on this map. Project sponsors are encouraged to use these maps as an initial assessment tool when planning salmon recovery protection projects. While the scores for juvenile salmon and forage fish use some of the same parameters, the juvenile salmon score incorporates components that were given weighted scores based on the five habitat functions each component provides. Thus, the final scores are in different scales.

- For juvenile salmon, this assessment scored shoreline segments based on the five habitat functions (high energy refuge, physiological refuge, predator refuge, migration corridor, and food production), an assessment of the adjacent biological habitat (vegetation), an assessment of regional landscape context (distance to natal rivers), and a shoreline modification score (shoreline armoring, overwater structures, shoreline fill, upland development, and outfalls). The juvenile salmon conservation score ranged from 0.0 to 0.7; very high (0.70-0.56), high (0.56-0.42), and moderate (0.42-0.28).
- For forage fish, this assessment scored shoreline segments based on historical forage fish records, physical habitat, adjacent biological habitat (vegetation), landscape context, and a shoreline modification score (shoreline armoring, overwater structures, shoreline fill, upland development, and outfalls). The forage fish conservation score ranged from -30 to 95; very high (95-70), high (70-45), and moderate (45-20).

Table 5 – Summary of WRIA 6 Nearshore Protection Opportunities*

Juvenile Salmon Conservation Score	**Very High (0.70-0.56)**	**High (0.56-0.42)**	**Moderate (0.42 - 0.28)**	**Low (0.28 -014**	**Very Low (0.14 - 0.0)**
Island County	**9%**	**59%**	**17%**	**13%**	**2%**
Geographic Area 1	**16%**	**59%**	**6%**	**18%**	**2%**
Skagit Bay	14%	62%	7%	13%	3%
Port Susan	17%	54%	4%	35%	0%
Geographic Area 2	**8%**	**67%**	**11%**	**13%**	**1%**
Saratoga Passage	6%	69%	9%	14%	2%
Possession Sound	0%	69%	6%	26%	0%
SW Whidbey	20%	68%	4%	8%	0%
NW Whidbey	0%	13%	87%	0%	0%
Geographic Area 3	**6%**	**37%**	**49%**	**7%**	**2%**
Forage Fish Conservation Score	**Very High (95-70)**	**High (70-45)**	**Moderate (45 - 20)**	**Low (20 - -5)**	**Very Low (-5 - -30)**
Island County	**20%**	**22%**	**33%**	**19%**	**6%**

Geographic Area 1	**32%**	**27%**	**20%**	**11%**	**11%**
Skagit Bay	41%	23%	17%	8%	11%
Port Susan	23%	27%	26%	19%	4%
Geographic Area 2	**21%**	**29%**	**26%**	**19%**	**6%**
Saratoga Passage	26%	33%	23%	14%	4%
Possession Sound	26%	26%	37%	9%	2%
SW Whidbey	0%	5%	39%	39%	18%
NW Whidbey	0%	53%	0%	47%	0%
Geographic Area 3	**1%**	**0%**	**69%**	**24%**	**6%**

**This evaluation is based on the Washington Shore Zone data set which generalizes some shoreline features. Accuracy at site locations cannot be guaranteed.*

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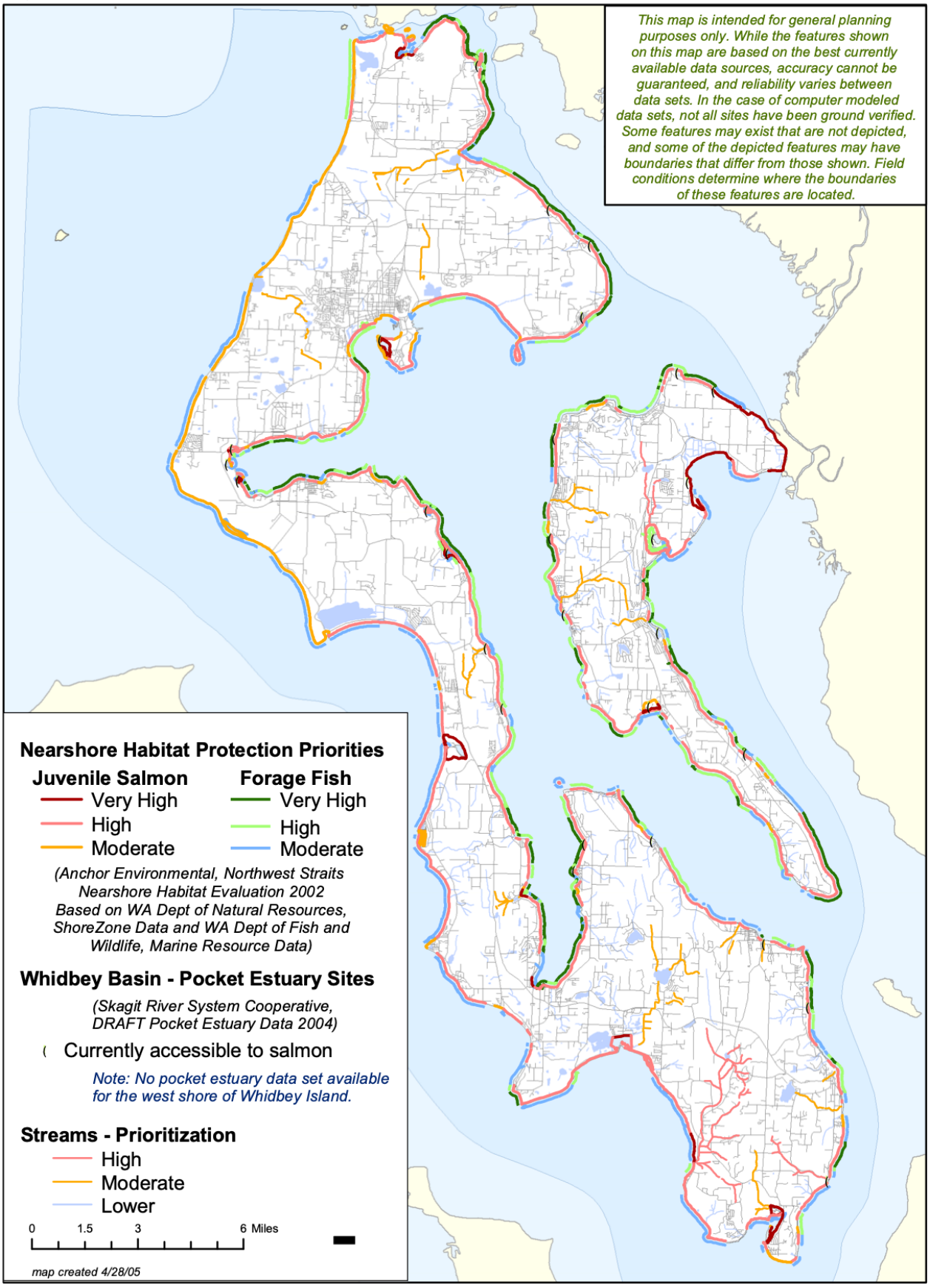
Figure 7 - Northwest Straits Nearshore Habitat Evaluation: Protection



C. WRIA 6 Limiting Factors

The physical, chemical, and biological processes that drive habitat formation and ecosystem functions have natural patterns of cyclic, periodic, and/or stochastic change. These natural variations are an integral part of the way our ecosystems work. Human activities, particularly the activities that we use to change and control our environment, alter the natural patterns of physical, chemical, and biological processes. Altering the way that these processes naturally occur leads to changes in habitat structure and ecosystem functions. This leads to changes in the functions that habitats can provide for fish, in many cases decreasing the level of a habitat function and thus adversely impacting salmon populations. Activities that adversely impact salmon abundance, productivity, diversity, and/or spatial structure are limiting factors for salmon recovery.

Salmon abundance and productivity are limited in part by the amount of habitat available for juvenile salmon to find a protected and suitable environment for rearing. Studies in the Skagit River system show that when the number of fry in the river exceeds the delta's capacity to support them, they seek alternative, non-natal estuarine habitat along the WRIA 6 nearshore. Habitat loss reduces spatial structure, as juvenile salmon find fewer places along the nearshore to feed, transition from fresh water to saltwater, and take refuge from natural predators and high-energy marine environments. The loss of different types of habitat reduces the nearshore's ability to support a diversity of life-history types. This compresses the salmon population and reduces its resilience in bouncing back from abnormal weather or catastrophic events. The loss of habitat that supports forage fish populations reduces the available food supply for salmon, greatly limiting the nearshore's capability to support abundance.

The limiting factors for salmon recovery in WRIA 6 were identified in the *Salmon Habitat* Limiting Factors Report (Washington State Conservation Commission 2000). This report identified limiting factors on habitat due to:

- Human Impacts on Physical Processes (sediment transport, tidal exchange, and hydrologic cycles):
  - Altered nearshore sediment transport due to existing or new shoreline/overwater structures (docks, piers, bulkheads, jetties, marinas)
  - Altered stream sediment transport due to upland land use practices and channel alterations due to culverts, and loss of riparian large woody debris
  - Altered tidal exchange due to existing or new shoreline modifications (filled wetlands and dredged channels) and tide control structures (dikes, tidegates, wetland and stream outlets confined to culvert outfalls)
  - Altered hydrology (streamflow quantity and pattern) due to surface and ground water allocations, upland land use patterns, and increased impervious surface
- Human Impacts on Chemical and Biological Processes (nutrient dynamics, food webs, and community dynamics):
  - Altered nutrient dynamics due to upland, shoreline, or boat wastewater discharge
  - Altered nutrient dynamics due to upland or shoreline nonpoint runoff and stormwater discharge
  - Altered food webs and community dynamics due to spills (toxics/oil) from vessels or shoreline facility, introduction of invasive species, impacts of harvest, and impacts of hatchery and aquaculture facilities

Appendix F provides conceptual diagrams of the ways in which these actions impact habitat functions and viable salmon population parameters. Table 6 summarizes the actions that act as limiting factors on habitats that provide key functions for juvenile salmon, adult salmon, and forage fish in WRIA 6.

Table 6 – Summary of Actions Impacting WRIA 6 Salmon Habitats

Limiting Factors (Primary Process impacted) (ST) = Sediment Transport (TE) = Tidal Exchange (H) = Hydrology (NT) = Nutrient Transport (FW) = Food Webs (CD) = Community Dynamics	Shoreline Armoring (ST)	Shoreline Structures (ST)	Overwater Structures (ST, FW)	Shoreline Fill (TE, ST)	Wetland Modifications (ST, TE, NT)	Riparian Removal (NT, FW)	Streamflow modifications (H, ST)	Wastewater/ stormwater discharge (NT, H)	Invasive Plants (ST, TE, NT, FW)	Toxic/ Oil Spill (NT, FW, CD)	Nonpoint Runoff (NT, FW)	Marine Debris (FW)	Hatchery Fish (CD)
Juvenile Salmon													
High Energy Refuge													
Sand and/or gravel beaches/spits/flats with intertidal and/or subtidal vegetation	**X**	**X**	**X**							**X**	**X**		**X**
Marshes				**X**	**X**			**X**	**X**	**X**	**X**	**X**	**X**
Pocket Estuaries	**X**	**X**		**X**	**X**			**X**	**X**	**X**	**X**	**X**	**X**
Physiological Refuge													
Marshes				**X**	**X**		**X**	**X**	**X**	**X**	**X**	**X**	**X**
Pocket Estuaries	**X**	**X**		**X**	**X**		**X**	**X**	**X**	**X**	**X**	**X**	**X**
Juvenile and Adult Salmon													
Migration Corridors													
Cliffs			**X**							**X**			
Sand and/or gravel beaches			**X**							**X**			
Marshes				**X**	**X**				**X**	**X**	**X**	**X**	
Juvenile and Adult Salmon, Forage Fish													
Predation Refuge													
Sand and/or gravel beaches/spits/flats with intertidal and/or subtidal vegetation	**X**	**X**	**X**			**X**		**X**		**X**	**X**		**X**
Marshes				**X**	**X**	**X**		**X**	**X**	**X**	**X**	**X**	**X**
Pocket Estuaries	**X**	**X**		**X**	**X**	**X**		**X**	**X**	**X**	**X**	**X**	**X**
Food Production													

Sand and/or gravel beaches/spits/flats with intertidal and/or subtidal vegetation	X	X	X			X		X	X	X	X		X
Mudflats			X		X			X	X	X	X	X	X
Marshes				X	X	X	X	X	X	X	X	X	X
Pocket Estuaries	X	X		X	X	X	X	X	X	X	X	X	X
Coastal Streams						X	X	X	X	X	X		X

1. Assessment of Historic Salmon and Forage Fish Habitats in WRIA 6

A complete assessment of historic salmon habitats in WRIA 6 has not been completed but, a number of habitat assessments have been completed since 2000. These include:

- *Salmon Habitat Limiting Factors Report for WRIA 6* (Washington State Conservation Commission 2000) - provides an initial inventory of limiting factors, emphasis on watershed health and estuary habitat
- *Data Summary for Island County Estuarine Restoration Program: Six Selected Sites* (Sheldon & Associates 1999) – site summaries and initial restoration recommendations for Maxwelton Estuary, Deer Lagoon, Crockett Lake, Crescent Harbor Marsh, Swantown Lake, and Triangle Cove
- *Island County Estuarine Restoration Program* (Sheldon & Associates 2001) - site summaries and initial restoration recommendations for eighteen WRIA 6 estuaries, including updates for the six in the previous document
- *Northwest Straits Nearshore Habitat Evaluation* (Anchor Environmental 2002) – assessment of nearshore conservation and restoration potential in the seven NW Straits Commission counties based on WA ShoreZone data and criteria evaluating the habitat functions
- *Island County Forage Fish Spawning Beaches* (WA Dept of Fish and Wildlife 2003-04) – survey of forage fish spawning beaches by WDFW and volunteers
- *Island County Eelgrass* (Marine Resources Consultants 2002-04) – videography of eelgrass beds
- *Island County Shoreline Hardening* (Clyde Johnson 2002-04) – GPS survey of all shoreline structures
- *Assessment of Drift Cell Function* (Coastal Geologic Services 2003-04) – Field assessment of feeder bluffs, transport zones and accretion areas, identification of conservation and restoration opportunities
- *Identification and Assessment of Whidbey Basin Pocket Estuaries* (Skagit River System Cooperative 2003-present) – Geological identification of historical extent of pocket estuaries in Whidbey Basin and evaluation of current accessibility of habitat to salmon
- *Maxwelton and Chapman Creeks: Assessment and Recommendations* (WA Trout 2004) – Assessment of stream habitat, fish distribution and culvert passage
- *Puget Sound Spartina* (WA Dept of Agriculture, annual) – Annual assessment of extent of *Spartina anglica* and control efforts

Each of these assessments provide important information about current habitat conditions, and the WRIA 6 lead entity committees will be using detailed, local information collected in these surveys to develop more specific habitat recommendations as fish distribution data becomes available. Project sponsors are encouraged to use these resources as they develop project proposals. It should be noted that restoration recommendations included in these assessments need to be evaluated for community feasibility using the feasibility criteria in Appendix G. Restoration projects will gain the support of the Island County Commissioners under the following conditions:

- Neighboring private and public uses and surrounding environment are protected,
- There are willing landowners,
- There is no adverse impact to Naval operations, and
- There is a significant benefit for salmon.

This summary of impacted habitats is based on the Northwest Straits Nearshore Habitat Evaluation, which identified bulkheads, riprap, overwater structures, marinas and sewer outfalls as key human impacts to nearshore function. These shoreline alterations are the key impacts to the two habitat-forming processes, sediment transport, and tidal exchange. A summary of WRIA 6 shoreline alterations is presented in Table 7. Figure 8 shows the locations of these alterations along with data on Spartina, pocket estuaries, and feeder bluffs.

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Figure 8 - Shoreline Alterations

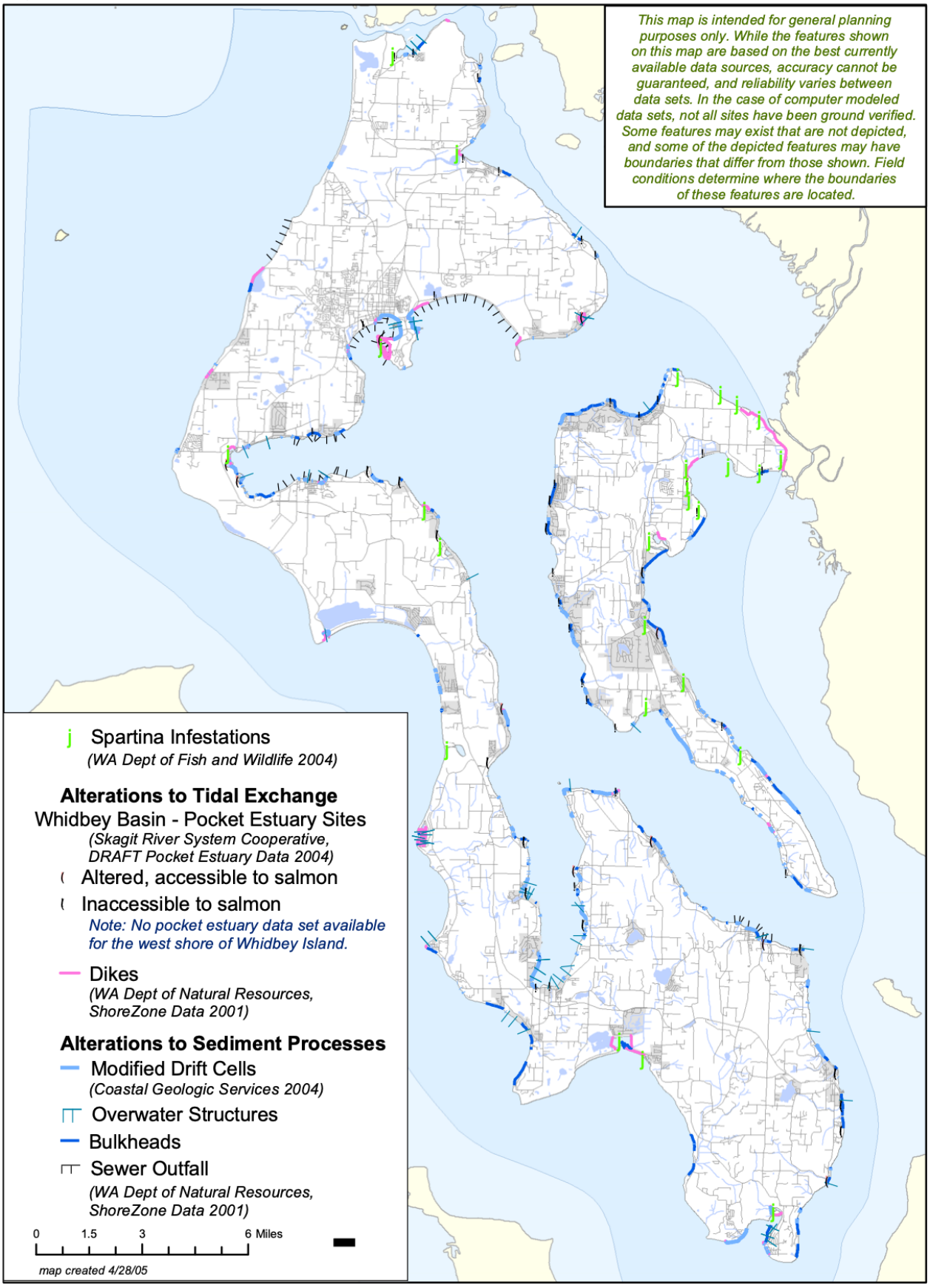

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Table 7 – Summary of Human Alterations to WRIA 6 Nearshore*

	Skagit Bay	Port Susan	Saratoga Passage	Possession Sound	SW Whidbey	NW Whidbey	West Whidbey	Total
Geographic Areas	**1**		**2**				**3**	
Altered Shoreline Sediment Transport								
Bulkheads *(WA Shore Zone Data, 2001)*								
Length (miles) *~15% of Shoreline*	5.4	6.6	11.2	3.1	2.8	0	3.9	**33**
Marinas and Overwater Structures *(WA Shore Zone Data, 2001)*								
Number of Sites	3	0	19	3	1	0	5	**31**
Length (miles) *~5% of Shoreline*	1.5	---	5.3	0.5	1	---	3	**11**
Altered Tidal Exchange and Hydrology								
Pocket Estuaries - Whidbey Basin (*DRAFT DATA - Skagit River System Cooperative, 2004*)								
Total	17	9	41	5	No Data	No Data	No Data	**72**
Number Inaccessible to Fish	10	4	15	0	---	---	---	**29**
Number Having Impaired Accessibility for Fish	1	1	7	2	---	---	---	**11**
Pocket Estuaries – West Whidbey (*Aerial Photos, 2001 and Limiting Factors Report, 2000*)								
Total	NA	NA	NA	NA	6	0	8	**14**
Number Inaccessible to Fish	---	---	---	---	4	---	4	**8**
Number Having Impaired Accessibility for Fish	---	---	---	---	2	---	1	**3**
Dikes *(WA Shore Zone Data, 2001)*								
Number of sites	4	5	15	0	6	0	5	**35**
Length (miles) *~10 % of Shoreline*	3.8	1.3	8.5	---	2.5	---	3.9	**20**
Altered Productivity (Nutrient Transport/Cycle and Food Web)								
Sewer Outfalls *(WA Shore Zone Data)*	0	0	5	0	0	0	1	**6**

Shoreline Communities (Rural Residential Zoning and Beach/Spit Communities >10 dwellings – Aerial Photos, 2001)								
Number	5	8	24	4	6	1	12	**60**
Length (miles) *~30% of Shoreline*	8.2	8.1	23.0	4.6	6.6	.5	8.8	**64**
Spartina *(WA Department of Fish and Wildlife, 2004)*								
Number of Sites	7	10	5	0	3	0	1	**26**
Acres - 1995	123	215	13	---	70	---	2	**423**
Acres - 2004	74	92	9	---	3	---	2	**180**

*Many of the categories in this table are based on the Washington Shore Zone data set which generalizes some shoreline features. This table gives a general summary of alterations to the WRIA 6 shoreline. Accuracy at site locations cannot be guaranteed.

It should be noted that while WRIA 6 freshwater and marine ecosystem processes and habitats have been degraded over time, the impacts are not as far reaching as those in many of the surrounding watersheds. Of the 212 miles of shoreline in WRIA 6, approximately 25% have been altered by development. In urban areas of Puget Sound, nearshore development has altered 90-100% of the historical habitats. A recent analysis by NOAA Fisheries of nearshore modifications along the east side of the Whidbey Basin, estimates more than 50% of the Skagit, approximately 70% of the Stillaguamish, and approximately 65% of the Snohomish nearshore have been modified (Sands 2004).

The nearshore habitats in WRIA 6 that have been most significantly impacted by human activities are areas that were historically highly productive, protected bays, lagoons and marshes, providing a wide range of functions to salmon and forage fish. Protection of the remaining accessible marshes and lagoons is imperative to the regional salmon recovery efforts. Voluntary enhancement and restoration of the degraded and inaccessible habitats is another key to Puget Sound salmon recovery.

2. Restoration Opportunities

Where we have significant scientific knowledge and local commitment to restoration of key nearshore environments, we should act; where these conditions are not present, restoration projects should wait until willing landowners, scientific justification, and efficient use of public resources can be assured. Partial restoration or enhancement should be considered when full restoration is not feasible.

The Northwest Straits Nearshore Habitat Evaluation (Anchor Environmental 2002) assessed the conservation and restoration potential of shorelines in the seven Northwest Straits Commission counties. The restoration assessment is used to provide a summary of areas with very high and high restoration potential along WRIA 6 shorelines. Figure 9 shows the shoreline segments with very high and high restoration scores. Impacted, but accessible pocket estuaries have also been included on this map. Table 8 summarizes the distribution of restoration opportunities by geographic area. Project sponsors are encouraged to use these maps as an initial assessment tool when planning salmon recovery restoration (or enhancement) projects.

- For juvenile salmon, this assessment scored shoreline segments based on the five habitat functions (high energy refuge, physiological refuge, predator refuge, migration corridor, and food production), an assessment of the adjacent biological habitat (vegetation), an assessment of regional landscape context (distance to natal rivers), and a shoreline modification score (shoreline armoring, overwater structures, shoreline fill, upland development, and outfalls). The juvenile salmon restoration score ranged from 0.0 to 0.7; very high (0.70-0.56) and high (0.56-0.42).
- For forage fish, this assessment scored shoreline segments based on historical forage fish records, physical habitat, adjacent biological habitat (vegetation), landscape context, and a shoreline modification score (shoreline armoring, overwater structures, shoreline fill, upland development, and outfalls). The forage fish restoration score ranged from 25 to 175 for shoreline segments where the modification score did not equal zero; very high (175-145) and high (145-115).

In many cases, restoration of marsh and estuary habitats conflicts with current land use or is perceived as a threat to water resources, public health, or the integrity of residential structures. The WRIA 6 lead entity encourages project sponsors and communities to find ways in which the needs of human and the needs for fish can coexist. At this time, enhancement and restoration projects at historic pocket estuaries, sites where the habitat is no longer accessible to salmon, are generally considered unlikely in WRIA 6. Many of these sites do not pass the feasibility criteria assessment (Appendix G). There are a few notable exceptions, like the ongoing project at Crescent Bay. Appendix H provides a map of these sites.

Restoration projects will gain the support of the Island County Commissioners under the following conditions:

- Neighboring private and public uses and surrounding environment are protected,

- There are willing landowners,
- There is no adverse impact to Naval operations, and
- There is a significant benefit for salmon.

These conditions have been included in the project feasibility criteria developed by the Salmon TAG (Appendix G). WRIA 6 enhancement and restoration proposals that are reviewed and recommended for funding under grant programs by the WRIA 6 salmon recovery lead agency committees should give consideration to impacts on the neighboring community and include: a monitoring and evaluation component. Projects that are being considered for SRFB funding will be ranked using criteria that evaluates the benefits to salmon and community benefits (Appendix I).

Table 8 – Summary of WRIA 6 Nearshore Restoration Opportunities*

Juvenile Salmon Restoration Score	**Very High (0.70-0.56)**	**High (0.56-0.42)**	**Moderate (0.42 - 0.28)**	**Low (0.28 -014**	**Very Low (0.14 - 0.0)**
Island County	3%	13%	7%	65%	12%
Geographic Area 1	**6%**	**16%**	**5%**	**70%**	**3%**
Skagit Bay	8%	9%	6%	71%	6%
Port Susan	3%	26%	3%	68%	0%
Geographic Area 2	**2%**	**15%**	**7%**	**71%**	**5%**
Saratoga Passage	2%	15%	7%	75%	2%
Possession Sound	0%	24%	8%	69%	0%
SW Whidbey	3%	12%	8%	73%	4%
NW Whidbey	0%	0%	0%	0%	100%
Geographic Area 3	**0%**	**7%**	**9%**	**42%**	**42%**
Forage Fish Restoration Score	**Very High (95-70)**	**High (70-45)**	**Moderate (45 - 20)**	**Low (20 - -5)**	**Very Low (-5 - -30)**
Island County					
Geographic Area 1	**2%**	**15%**	**3%**	**8%**	**2%**
Skagit Bay	3%	14%	2%	10%	4%
Port Susan	1%	19%	5%	7%	0%
Geographic Area 2	**5%**	**8%**	**10%**	**8%**	**3%**
Saratoga Passage	7%	9%	11%	7%	3%

Possession Sound	2%	8%	18%	3%	1%
SW Whidbey	0%	5%	1%	19%	5%
NW Whidbey	0%	0%	0%	0%	0%
Geographic Area 3	**0%**	**2%**	**9%**	**8%**	**5%**

**This evaluation is based on the Washington Shore Zone data set which generalizes some shoreline features. Accuracy at site locations cannot be guaranteed.*

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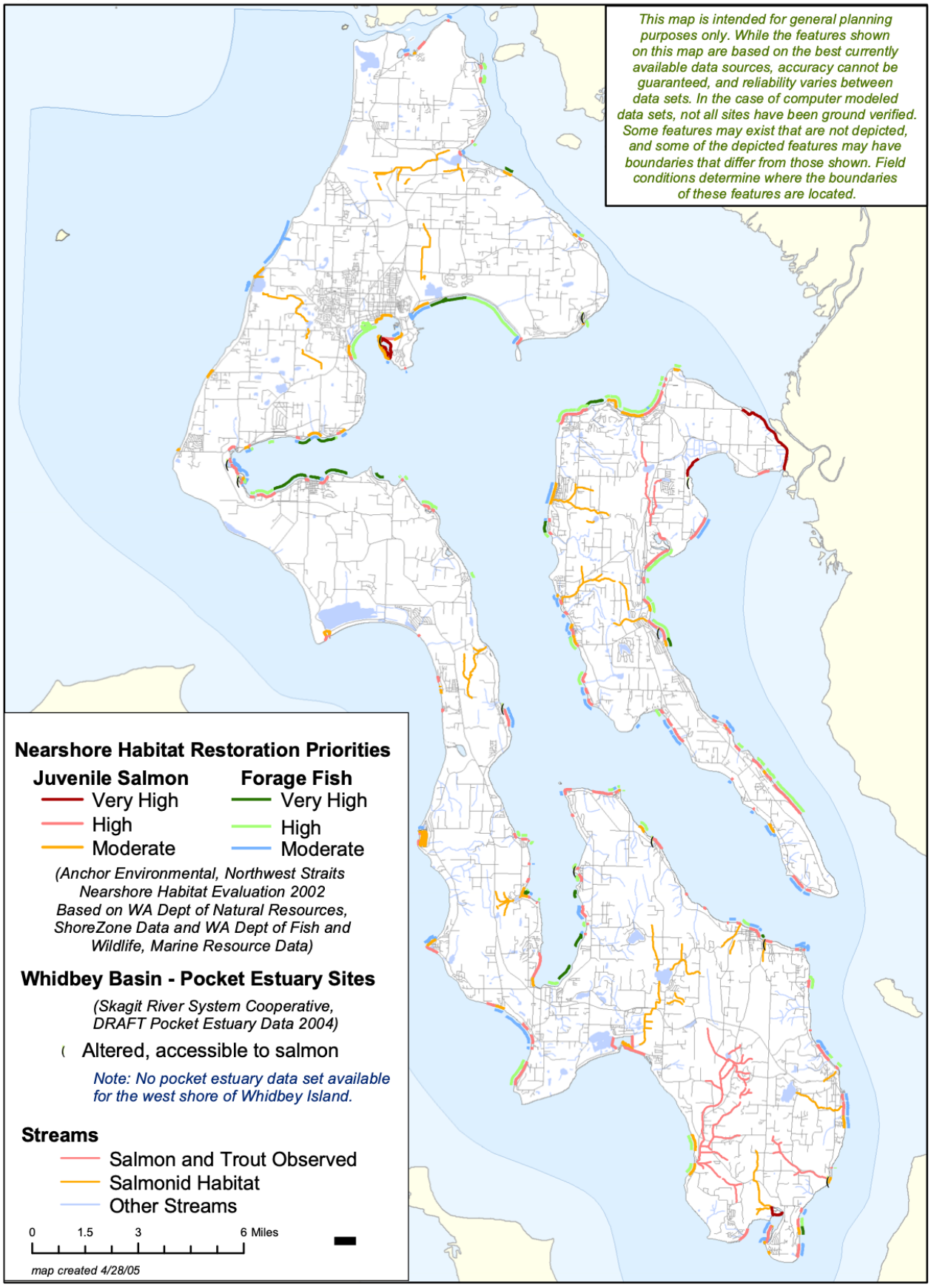
Figure 9 - Northwest Straits Nearshore Habitat Evaluation: Restoration



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V. STRATEGY

The WRIA 6 Salmon Strategy has adopted an integrated and comprehensive approach to salmon recovery. Salmon recovery should be seen as an integral part of water resource management in the WRIA. The Salmon Strategy employs three core elements to address salmon recovery. These are:

- *providing access to technologies and the best science combined with*
- *promotion of improved salmon recovery practices and facilities, and*
- *support for long-term sustainability through the creation of an enabling environment in which salmon recovery activities can be supported and take place.*

While a comprehensive approach is encouraged for maximum impact, selective or sequential approaches (e.g., starting with promotion of improved practices) can be effective entry points.

A. Strategy Overview

1. WRIA 6 conceptual approach

Our conceptual approach places the highest priority on protecting healthy nearshore processes and habitats because this will benefit all juvenile and adult salmon. Protection will result from a combination of current land use regulations and voluntary actions. Focusing on protection is generally less expensive, provides more certainty of success, and is less difficult than restoring damaged processes and habitats. While land use regulations are an important tool for protecting ecosystem processes and habitats, this plan focuses on the voluntary actions that can enhance the level of protection offered by regulations. Developing strong community understanding of salmon needs and participation in salmon related activities are also a high priority.

Where we have significant scientific knowledge and local commitment to restoration of key nearshore environments, we should act; where these conditions are not present, restoration projects should wait until willing landowners, scientific justification, and efficient use of public resources can be assured. Where data gaps (scientific, community, and economic) exist, it is important to work with local and regional partners to fill these gaps in our knowledge. Partial restoration (enhancement) should be considered when full restoration is not feasible.

For protection, enhancement, and restoration actions, this strategy identifies priority geographic areas, shorelines and sub-basins with high current or potential functionality for salmon and forage fish, and priority actions. It does not identify a prioritized list of sites or site specific actions. Site identification and site specific actions should be developed by project sponsors in conjunction with willing landowners and interested community stakeholders. Project proposals will be evaluated using feasibility criteria that evaluate factors such as landowner willingness, timeliness, and community support (Appendix G).

2. Guiding Principles

In order to produce a Salmon Recovery Plan that resonates with property owners, citizens, elected officials, scientists, government agencies, and environmental interests, we knew that certain guiding principles were necessary. The following principles set the framework for WRIA 6's ESA response.

Examples of current actions related to these principles can be found in the Supporting Conditions section in the Implementation chapter.

- **Salmon Recovery Requires a Long Term View and Commitment:** The goals of this plan will take decades, possibly centuries to achieve. The actions in this plan are initial steps. As we add to our knowledge about juvenile and adult salmon utilization of WRIA 6 habitats, we will revise and update our action plan to best support regional recovery efforts.
- **Best Available Science and Appropriate Technologies:** It is critical that salmon recovery activities be based on comprehensive and current fisheries science and habitat information. Filling key existing data gaps and integrating this new information into future versions of this recovery document are high priorities in WRIA 6.
- **Ecosystem Processes and Habitat Enhancement and Restoration:** Just as there is a need to find creative ways to combine protection actions with the need for additional residential and commercial development, it is necessary to accommodate landowner and community needs when developing enhancement and restoration projects. Enhancement and restoration projects will gain the support of the Board of Island County Commissioners under the following conditions: 1) neighboring private and public uses and surrounding environment are protected; 2) there are willing landowners; 3) there is no adverse impact to Naval operations; and 4) there is a significant benefit for salmon.
- **Community Outreach, Education, and Participation:** Developing and maintaining regular community outreach and education programs is a critical component for salmon recovery. Developing these programs will require partnerships with groups that can provide education and outreach forums, advocacy for stewardship and sustainable actions, and opportunities for public participation.
- **Cultivating an Environment for Salmon Recovery:** Successful salmon recovery efforts have the best chance of success if implementation is carried out on a local level in an integrated manner. This approach needs to build and maintain linkages between all stakeholders; integrate salmon issues as an integrated component of water resource issues; encourage and nurture local, regional, and state partnerships; and advocate implementation of policies that support salmon recovery.

B. WRIA 6 Salmon Recovery Goals and Objectives

The following goals and objectives may be implemented by any number of community or agency groups, as appropriate. The goals and objectives have been written to provide a salmon recovery strategy framework that will enable recovery actions when the time, resources, and landowner willingness are available. The implementation plan (section 6) identifies actions that we will try to accomplish in the next 10 years. The action plan includes brief statements of potential implementing organizations and estimates of cost.

This strategy does not include quantitative goals for ecosystem processes and habitats. The WRIA 6 Salmon TAG feels that there is insufficient data linking habitat functions with salmon population dynamics to provide the basis for quantitative restoration goals. It will be necessary to work with neighboring watersheds to identify the types and amounts of habitat that are critical for recovery of their stocks. Evaluation of recovery potential using the Ecosystems Diagnostics and Treatment (EDT) model has identified restoration of nearshore habitat as an important component in some of these watersheds. Collaborative work with these watersheds will be necessary to identify what part WRIA 6 can play in achieving these habitat goals. Since salmon from every stock in Puget Sound pass through WRIA 6 at some point, it is clear that protecting these habitats to the best of our ability is the first step.

Actions for these goals are developed in the implementation chapter.

Goal 1: Over the long term, achieve a net increase in salmon habitat through protection, enhancement, and restoration of naturally-functioning ecosystems that support self-sustaining salmon populations and the species that depend on salmon.

Objectives:

1. Inventory and prioritize WRIA 6 nearshore and fresh-water habitats.
2. Protect existing high-quality nearshore and stream habitats.
3. Restore critical rearing habitats for forage fish and salmon.

If further habitat losses are to be avoided, habitat protection must be pursued with new determination given the challenges related to continued population growth. Population growth and the demand for shoreline residential access and views will put pressure on the WRIA 6 nearshore habitats in the decades ahead. The main planning and regulatory tools to help protect habitat in the face of this growth are the Washington State Growth Management Act and Shoreline Management Act. These tools are implemented through local Critical Areas ordinances and Shoreline Masters Programs. While these regulatory tools have important roles in habitat protection, this strategy focuses on voluntary opportunities to increase the levels of protection through stewardship, conservation easements, and acquisitions. This strategy also focuses on encouraging voluntary enhancement and restoration efforts in areas where projects would have significant benefits for salmon. Grant funding for these activities will be pursued through the Salmon Recovery Funding Board and other grant programs.

It is important to pursue these activities because the benefits salmon bring to WRIA 6 are wide ranging. Salmon are a part of an interdependent web of organisms that provide nutritional, cultural, environmental and economic benefits. Salmon play an integral role in supporting the quality of life and island character of Whidbey and Camano islands. Restoration of salmon to sufficient, sustainable levels could foster increased ecotourism opportunities as well as the eventual reestablishment of a wide range of fishing opportunities that have been curtailed in recent years. Part of our vision is to recover salmon to a point that allows the reestablishment of a small-boat recreational fishery comparable to the boom that drew thousands of vacationers to Whidbey and Camano during the 1930s-50s.

Goal 2: Develop understanding of habitat functions and the distribution of forage fish species, salmonids, and marine mammals in WRIA 6.

Objectives:

1. Fill key ecosystem science data gaps.
2. Assess and regularly update aquatic habitat attributes.
3. Quantify and evaluate impacts of predation by marine mammals and other wildlife on salmonid and forage fish populations

A sound scientific understanding of natural processes and salmon biology is essential to making the best use of resources and achieving the greatest possible return for our effort. Significant advances have been made in filling the data gaps listed in the *Salmon Habitat Limiting Factors Report* (Washington State Conservation Commission 2000) in the last several years, and we will work diligently to fill the remaining key data gaps in the future. Identifying quantifiable connections between nearshore habitats and salmon recovery goals is necessary to establish quantifiable habitat goals in the future.

The significant rebound in harbor seal and seal lion numbers in Washington waters since the 1970s and the concurrent depletion in salmon populations leads to questions about the impacts of marine mammal predation on salmon recovery efforts. Where salmonid populations are at low levels pinniped predation may affect depleted salmonid stocks. Evaluating the risk posed by predators to salmon moving through WRIA 6 waters is another step towards understanding local habitat utilization and ecosystem processes.

Goal 3: Engage an informed community in identifying, protecting, enhancing, and restoring salmon-supporting ecosystem processes and habitats.

Objectives:

1. Educate the community about juvenile and adult salmon distribution, ecosystem processes, habitats, and challenges through information, education, and communication activities.
2. Develop and implement a comprehensive communication strategy for internal and external communication.
3. Increase community participation in, and commitment to, salmon recovery activities.

Meaningful increases in habitat protection and restoration will be possible only with broad public support, engagement, and participation. Developing meaningful education and outreach programs will include the following components: advocacy, community mobilization, promoting stewardship and sustainable behaviors, and providing clear responses when community concerns are raised. Donors, program sponsors, program managers, and community representatives can advocate for improved salmon recovery practices and interventions to governmental and non-governmental stakeholders. Curriculum programs that outreach to schools and school children are good entry points for salmon recovery. Community mobilization and participation are essential components of the salmon recovery process. These actions involve identifying the social, political and economic context of salmon recovery; the gaps in our understanding of these components; and researching community opinions about these issues.

Encouraging community participation requires an examination of the barriers to salmon recovery in the community, designing activities to improve salmon recovery practices, and community-based monitoring of these improved practices and behavioral changes. The outreach and education programs will promote stewardship and sustainable behaviors at the community level. A number of strategies will be used to meet this objective including the development of messages and materials, the identification of a variety of communication channels for information dissemination, and the adoption of an approach that outreaches to all audiences in the community. In order to attain support for salmon recovery in the community, it is necessary that technical advisors and project sponsors show sensitivity to landowner and community concerns. This process includes recognizing and addressing any risks inherent in habitat enhancement/ restoration projects.

Goal 4: Cultivate a supportive environment for salmon recovery by supporting policies that protect salmon habitats; advocating for adequate program staffing; encouraging cross-sector and public-private partnerships; pursuing adequate, reliable funding; and implementing effective project and program evaluations.

Objectives:

1. Establish salmon recovery program policies that will cultivate public support for salmon recovery and adequate program staffing.
2. Obtain adequate, reliable funding through a variety of public and private sources and use these resources cost-effectively.
3. Develop and implement a salmon recovery adaptive management program.

Successful salmon recovery efforts have the best chance of success if implementation is carried out on a watershed level in an integrated manner. This approach needs to build and maintain linkages between all stakeholders; integrate salmon issues as an integrated component of water resource issues; encourage and nurture local, regional, and state partnerships; and advocate implementation of policies that support salmon recovery. The nonpoint pollution prevention planning and implementation programs on Whidbey and Camano are an example of the integration of salmon and other water resources issues.
Salmon recovery efforts should be designed to support one another and all secondary activities should support the core efforts. In addition, all stakeholders need to clearly see the linkages between activities

and understand how they fit into the process. Collaborative partnerships should be encouraged and nurtured at all levels. This means cooperating with groups and organizations from local, state, and regional levels as well as maintaining critical ties to recovery projects through completion. Policy improvement includes assessing the adequacy of local, state and regional policies for salmon recovery, determining where the gaps are, facilitating a process to reach consensus on a policy agenda, and developing more effective policies. The existence of good policies is not sufficient unless the political will, resources, and capacity exist to implement them. Participants in our local salmon recovery program are best able to address local habitat issues. While focused locally, participants will also need to understand regional issues and interact with regional partners to address broader impacts such as harvest and marine mammal predation on salmon in WRIA 6 waters.

Habitat acquisition and restoration are expensive. Our long-term success will depend on both the generosity of private benefactors and a substantial commitment by the federal and state governments to providing public funding. We will identify funding sources and evaluate the options, which include, but are not limited to, the Salmon Recovery Funding Board. Others include government grants, community and civic organizations, private industry and conservation groups.

Continued state and federal funding to provide local organizational capacity will also be necessary to achieve the regional salmon recovery goals. Current funding provides for basic coordination and support of the program. Additional funding to provide support for project sponsors and partnerships will be necessary to accomplish the goals set out in this strategy.

VI. IMPLEMENTATION PLAN

A. Current Salmon Recovery Environment

Initially the WRIA 6 Salmon TAG was formed to provide local technical input in the development of the Salmon Habitats Limiting Factors Report (RCW 77.85.070). Following the completion of the report in 2000, the committee shifted focus to providing technical advice on salmon issues to the WRAC (the WRIA 6 citizen committee), acting as the primary planning committee for salmon strategy development for the SRFB and Shared Strategy processes, and soliciting and ranking SRFB project applications for each SRFB round. Appendix A lists the projects that have been rewarded funding in first 5 SRFB rounds. The current Salmon TAG voting members include: four citizens from the Water Resources Advisory Committee, two representatives of state agencies, two tribal representatives, two conservation district representatives, a representative from the Stilly-Snohomish Fisheries Enhancement Task Force, and a representative from the lead entity agency (Island County Public Works).

In order to accomplish the activities listed in this ten year action plan, efforts will be made to expand the Salmon TAG membership to include representatives from key groups that are actively pursuing education, outreach, protection and restoration activities in WRIA 6. Efforts will also be made to broaden stakeholder participation through the Whidbey and Camano Working Teams and the Water Resources Advisory Committee.

In developing a salmon recovery plan, it's important to understand the context in which it will be implemented. The following sections describe the conditions that limit/support the salmon recovery in WRIA 6 and the ways in which the WRIA 6 lead entity will address the limiting conditions.

1. Supporting Conditions

- **Local Land Use Regulations:** Current land use regulations in WRIA 6 provide significant protection for habitats that have not been altered. During the growth management act planning process, the county down-zoned large areas, so that 93% of Island County now has a low density rural zoning. This includes down-zoning 90% of Island County's shorelines to a density of 1 dwelling per 5 acres. Population growth will likely lead to a higher percentage of full time residency and subdivision of large lots to the minimum lot size allowable for single family residences. Land conversion from agriculture and forestry to other land uses will likely occur where allowed under existing zoning and development regulations. The county adopted agricultural, residential, shoreline and stormwater best management practices in 1998, as well as an optional low impact development ordinance. Critical Drainage Areas (CDAs) are designated to limit or minimize development-related surface water and stormwater impacts in areas that are sensitive to such impacts. Flow control is addressed through site specific analysis and additional water quality standards to address the specific water quality problems shall be applied to development within these CDAs. These recommendations and regulations should help to mitigate the cumulative impacts of development and land use conversions. The Critical Areas Ordinance, adopted in 1998 and undergoing update in 2005, protects wetlands, streams, kelp and eelgrass beds, surf smelt and Pacific herring spawning grounds, eagles, ospreys, and habitats of local importance. Five of the eight habitats of local importance are shoreline wetland areas (Swantown Lake, Crockett Lake, Deer Lagoon, Cultus Bay, and Grasser Lagoon). The Shoreline Master Program (SMP) was updated in 2001, providing additional regulatory protection for all parcels that are located within 200 feet of the ordinary high water mark (OHWM). The SMP identified shoreline environment designations for all Island County shorelines and places strict limitations on the ability to construct new bulkheads, over water structures and subdivide

waterfront parcels. Appendix J a summary of the current critical areas ordinance, the SMP, and provides a map and summary of the SMP shoreline designations.

- **Ongoing Fish Distribution and Habitat Research:** Several of the key data gaps identified in the 2000 Limiting Factors Report have been or are being filled. Marine and nearshore data is being collected in the Whidbey Basin by the Skagit River System Cooperative (SRSC), Stillaguamish Tribe, Tulalip Tribe and NOAA Fisheries. An assessment of fish distribution in west Whidbey habitats will begin in 2005 under a grant from the SRFB awarded to WA Trout. In conjunction with the fish distribution sampling, researchers at SRSC are doing an assessment of pocket estuaries in the Whidbey Basin. Surveys of eelgrass, forage fish spawning beaches, shoreline hardening, and feeder bluffs have been completed by contractors hired by the Island County – Marine Resources Committee (IC-MRC) through funding from the SRFB and other organizations. In addition, Washington Trout completed physical and biological surveys for portions of Maxwelton Creek and Chapman Creek in early 2004. Once the data sets from these surveys are finalized, they will be used to evaluate project sites and eventually will be an integral part of developing quantitative habitat goals.

- **Assessment of Nearshore Habitat Function for Juvenile Salmon and Forage Fish:** The Northwest Straits Nearshore Habitat Evaluation (Anchor Environmental 2002) provides an initial assessment of habitat functions for juvenile salmon and forage fish. This assessment highlights the importance of Whidbey Basin habitats, particularly those in Skagit Bay and Port Susan. In addition to this assessment, the reports listed in chapter IV provide useful site-specific evaluations and recommendations that can be used by project sponsors as initial project ideas.

- **Acquisitions and Conservation Easements:** In addition to the protection provided by land use regulations, shoreline and open space acquisition efforts have been under way on a limited, opportunistic basis for decades. WA State Parks and the WA Department of Natural Resources own significant areas of shoreline and tidelands on Whidbey and Camano Islands, and a significant amount of the shorelines owned by the Navy have been maintained as natural habitat. More recent habitat protection acquisitions and conservation easements have been pursued by Island County, WDFW, Friends of Camano Island Parks, Whidbey Camano Land Trust, and other organizations. Shoreline acquisitions and conservation easements include
  - Iverson Marsh (County, 1999 – 300 acres, shoreline, diked marsh habitat, and farmland),
  - Swantown Lake (County, 1999 – 100 acres, diked wetland),
  - Deer Lagoon (County, 2003 – 379 acres, tidelands, shoreline, diked marsh habitat, and uplands), and
  - Libby Beach (Whidbey Camano Land Trust, 2004 – 1,200 feet tidelands adjacent to county park).

  A variety of upland parcels, many including stream, wetland or lake habitats, have also been protected in this manner, and since Whidbey and Camano streams have such a close connection to the shoreline, these parcels have a key role in protecting nearshore water quality and preserving natural runoff patterns.

- **Stewardship Programs:** Stewardship programs have also been established to encourage residential landowners to protect the habitats on their property. These programs include
  - WSU-Beach Watchers (responsible for local beach monitoring and a wide range of educational programs);
  - Shore Stewards (shoreline residential educational pledge program); and
  - Admiralty Inlet Marine Stewardship Area and Saratoga Passage Marine Stewardship Area (educational designation, County 2003).

- **Enhancement and Restoration Projects:** While a few restoration projects have gotten bogged down in the last few years, there are a number of others that have been successful or are on-going.
  - Clinton Ferry Dock Eelgrass Protection and Restoration: In conjunction with the expansion of the Clinton ferry dock, the Washington State Ferry and Battelle Laboratories completed an eelgrass restoration and research project at the project site.
  - Spartina Control and Removal: *Spartina anglica* control is one of the most active enhancement activity going on in WRIA 6. Several large Spartina infestations on Camano are close to being eradicated. Additional work parties have been sponsored by the Island County Weed Control Board and People for Puget Sound.
  - Stormwater Infrastructure: Phase 1 of the Freeland Water Quality Improvement Project was completed during 2004.
  - Marine Debris Removal: Regular beach clean-up activities are coordinated by the Lighthouse Environmental Programs. Efforts to clean-up beached creosote logs are being funded by the WA Dept of Ecology and Dept of Natural Resources at Double Bluff Park and Fort Casey. Clean-up of derelict fishing gear is being coordinated through the NW Straits Commission and to-date Port Susan has been the focus of these efforts in WRIA 6. Derelict crab pots have been identified and clean-up has been started along the east coast of Camano.
  - Marsh Restoration: Restoration of full tidal connectivity at Crescent Marsh was funded by the SRFB in 2000 and the Navy is planning to complete this project in 2005. The Arrowhead Marsh restoration project was funded by the SRFB in 2004.This project is a collaboration with the landowners, a homeowners association, and the Skagit River System Cooperative.
  - Streamside riparian plantings: Maxwelton Salmon Adventure is leading riparian planting efforts along several sections of Maxwelton Creek.

- **Community – Rural Character and Tourist Economy:** A number of residents in WRIA 6 are dependent on a healthy tourism industry and benefit from the visitors drawn to the area by good sport fishing and other outdoor recreation activities. Beaches and the species that live there are valued and respected by many of the citizens who choose to live Whidbey and Camano. Many residents have chosen to live in Island County because of the rural character, outdoor lifestyle, healthy environment, and abundance of natural beauty.

- **Volunteers:** A talent pool for community volunteers exists in WRIA 6 because of its attractiveness as a place to live and retire. Many who make their homes on Whidbey and Camano islands are retired from careers in science, government, business, and education. Many of these retires devote their time, talent, and financial resources to giving something back to the community. These volunteers are often involved with one or more of the nonprofit organizations in WRIA 6, such as Au Sable Institute, Whidbey Institute, Whidbey Audubon Society, Whidbey-Camano Land Trust, the Lighthouse Environmental Program, Maxwelton Salmon Adventure, Friends of Camano Island Parks, and/or one of the local fishing clubs. Washington State University's (WSU) extension service sponsors a number of successful environmental education initiatives such as the Beach Watchers & Waste Wise training and volunteer programs. The Beach Watcher program generates 14,000 hours of water resources volunteer service annually. WSU sponsors educational programs such as Sound Waters (an annual, one day water "college"), Wonders of the Islands tours, on-site septic workshops, and a new program for shoreline landowners (Shore Stewards) that is being piloted on Camano Island. Community festivals such as the Coupeville Mussel Festival and the Penn Cove Water Festival focus additional attention on the marine environment in WRIA 6. In addition, the county relies on volunteers appointed by the BICC to guide water resources planning and implementation processes. The Island County Water Resources Advisory Committee (12 voting members) was created in 1999 to review, implement and revise Island County water resource plans and oversee the planning and implementation of the Watershed Planning and Salmon Recovery processes. The resolutions that formed this

committee do not contain a sunset date for these activities. The Island County Marine Resources Committee (13 voting members) was formed in 1999 to involve citizens and leaders of the community directly in discussions, decisions, and restoration commitments for our marine waters and species. This committee is federally funded through the Northwest Straits Initiative. The Camano Watershed Advisory Committee was formed in 2004 to develop the Camano Nonpoint Pollution Prevention Plan by 2006. This committee will sunset once the plan is completed, and implementation of the plan will be overseen by the WRAC.

- **Watershed Groups:** Two watershed groups, Maxwelton Salmon Adventure and the Friends of Glendale, are providing leadership and educational opportunities for citizens on the south end of Whidbey Island. The nonprofit Maxwelton Salmon Adventure (MSA) works with the community and schools (K-12) to promote watershed stewardship and to preserve and protect salmon, wildlife, habitat and water quality through outreach and education. K-5 science classes are held at the Maxwelton Outdoor Classroom. Maxwelton creek supports cutthroat trout and coho. Friends of Glendale (FOG) is a recently-formed (2003) watershed council working to preserve Glendale Creek and the upland marshes of the Glendale Watershed. Glendale Creek supports cutthroat trout in its upper reach and coho salmon in the lower reach. The county restored the lower reach in 2000 after a concrete culvert had been catastrophically daylighted by a series of storms in 1997. On Camano, there is a group of interested citizens working informally on issues that relate to Kristoferson Creek.

2. Limiting Conditions

- **Shoreline and Watershed Development:** Island County population growth was rapid between 1970 and 1990, increasing from 27,000 residents to 60,000. By 2000, the county's population had increased to 71,500. It is estimated that the county's population will increase by another 14,000 between 2000 and 2015. Some of the potential growth impacts, if not addressed, include increased stormwater intensity and runoff, nearshore and freshwater sedimentation, non-point pollution from overland flow, stormwater, and failing septic systems. These impacts can lead singly or cumulatively to adverse impact on riparian and nearshore habitat (spawning grounds, nearshore refuges and migration corridors) critical to the salmon life cycle.
  Shoreline property in Island County is a desirable place to live and certain stretches of the shoreline have experienced high levels of development pressure. Many of these communities are beachfront communities on sand and gravel beaches or along spits; overlapping with historical and current habitats for salmon and forage fish. This development has been primarily residential; since commercial and industrial development have been limited to less than 1% of the shoreline. Many beach communities in Island County were platted years ago, prior to the development of shoreline regulations. These communities are generally the areas of highest residential impact to the shoreline, and in many cases they are currently the focus of development or redevelopment activities. Shoreline property owners often seek to protect their investment by armoring and to enhance the use of their waterfront by such measures as building docks, removing vegetation to improve views, and arresting natural erosion processes that contribute to beach sediments used by forage fish for spawning.
  Ways in which the WRIA 6 lead entity will address this issue:
  - encourage landowners to participate in the Shore Stewards program and forest stewardship programs
  - educate landowners about the habitats along their shoreline and within their watersheds
  - encourage landowners to maintain natural nearshore and riparian vegetation and shoreline structure when possible
  - pursue shoreline and watershed property acquisitions in key locations

- **Increased populations of salmon predators:** The rapid increase in numbers of sea lions and seals feeding in Puget Sound has occurred coincident with a significant decrease in Puget Sound salmon populations. Where salmon populations are at low levels, pinniped predation may affect salmon stocks.
  Ways in which the WRIA 6 lead entity will address this issue:
  - keep up with information about these marine mammal populations,
  - encourage the state and federal agencies to determine if it would be appropriate for NOAA Fisheries to transfer management oversight of pinnipeds to the WA Department of Fish and Wildlife, and
  - assist with studies of predator impacts on salmon in WRIA 6 waters

- **A lack of understanding within the community regarding the importance of nearshore habitats for salmon and forage fish populations:** The linkages between salmon population characteristics and habitat conditions and functions are still being developed and are not widely understood.
  Ways in which the WRIA 6 lead entity will address this issue:
  - encourage community participation in fish distribution research and publicize the results of these studies
  - educate the community about the functions that nearshore habitat provide to salmon and forage fish through adult and youth education programs, presentations at public meetings, and field trips
  - work with regional groups to develop quantitative goals for nearshore habitats based on salmon population dynamics

- **Community Concerns:** Regulatory protection through county and state environmental codes raises community concerns about property rights and undue economic hardship. Enhancement and restoration projects raise a variety of questions for the landowner, neighboring landowners, and community members. Landowners and neighbors want to know what risks may be involved in pursuing a project. Concerns about risks to the landowner, neighboring landowners, and community, that have been raised in WRIA 6 include possible impacts on:
  - the integrity of a property or structure (including impacts to septic systems or increase risk of flooding),
  - the value of the property,
  - groundwater resources (salt-water intrusion),
  - community health (increased mosquito populations),
  - the current land use (particularly agricultural lands), and
  - Naval operations.

  Community concerns have also been raised about whether or not projects will provide significant benefit for salmon in cost-effective ways.
  Ways in which the WRIA 6 lead entity will address this issue:
  - educate landowners about shoreline regulations and potential development impacts on nearshore habitats
  - evaluate potential projects on a site-by-site basis using the feasibility criteria in Appendix G
  - encourage project sponsors to address key concerns at an early stage in project development
  - develop a Salmon TAG project mentor program to help project sponsors address community concerns
  - encourage and publicize projects in areas where community support is available
  - promote demonstration projects on public lands

- **Resource Limitations:** Funding and staff time are two key resources necessary to accomplish the WRIA 6 salmon recovery goals. Grants provide the majority of the funding, for governmental

and non-governmental organizations engaged in salmon recovery activities. These grants support the planning, coordination, habitat, research, and education activities in the salmon recovery process. It is critical to at least maintain the availability of grant funds, but in order to fully realize salmon recovery goals additional funds and/or funding sources need to be identified. While WRIA 6 has a strong volunteer base, expanding volunteer involvement in salmon recovery activities will require additional funding for the organizations that coordinate these efforts for both staff and expenses. Staff capacity is a key issue for most of the organizations that are interested in salmon recovery efforts in WRIA 6.

Ways in which the WRIA 6 lead entity will address this issue:

- encourage collaborative, cost-effective approaches
- pursue a wide variety of grant opportunities
- pursue non-grant funding opportunities
- engage private sector partners in salmon recovery activities
- monitor and evaluate efforts to make sure activities are achieving goals

B. Ten Year Implementation Plan

The following list outlines the goals, objectives, and proposed activities for salmon recovery in WRIA 6 for the period 2005-2015. These actions reflect and support the conceptual framework described in the strategy section of this document. Progress towards meeting these goals, objectives, and activities will be monitored and evaluated on a regular basis. Based on the findings and recommendations of these assessments, modifications will be made as necessary over the life of the program. Tentative information about the timeframe in which these actions will be accomplished and the groups responsible are included as an initial guide. The Salmon TAG will seek to engage these groups as opportunities arise. Biennial workplans will be developed by the Salmon TAG to develop more specific tasks and budgets. Access to adequate staff and other resources will greatly determine the pace at which this program will be implemented. In the actions listed below, Lead Entity Staff refers to the Island County Public Works salmon recovery coordinator.

1. Protecting, Enhancing, and Restoring Ecosystem Processes and Salmon Habitats

Goal 1: Over the long term, achieve a net increase in salmon habitat through protection, enhancement, and restoration of naturally-functioning ecosystems that support self-sustaining salmon populations and the species that depend on salmon.

Objective 1: Inventory and prioritize WRIA 6 nearshore and fresh-water habitats for protection and restoration activities.

Actions:

- Use the NW Straits Nearshore Habitat Evaluation *(Anchor Environmental 2002)* to create and prioritize an initial ecosystem processes and habitats priority list
  2005; Lead Entity Staff
- Develop an historical (pre-1870) shoreline inventory to determine the distribution of salmon habitats in WRIA 6
  2005-2007; Regional Scientists or Consultant (with input from Island County Staff and Community Members)
- Utilize data collected by the MRC to update the ecosystem processes and habitats priority list
  2005-2007; Lead Entity Staff or Consultant (with input from the MRC and Community Members)
- Inventory freshwater habitats that have been identified as being important for nearshore processes, nearshore water quality, potential fish habitat, and/or riparian condition
  By 2010; Consultant or volunteers
- Develop project feasibility criteria addressing community issues and cost-benefit analysis
  2005; Lead Entity Staff and Salmon TAG
- Evaluate habitat inventory and fish distribution to set quantitative protection and restoration goals and link actions to Viable Salmonid Population parameters
  By 2010; Lead Entity Staff and Salmon TAG

Objective 2: Protect existing high-quality nearshore and stream habitats

Actions:

- Assess potential for additional process/habitat degradation (inventory areas where open space and natural habitats may be subject to landuse conversion and assess protection opportunities)
  2005-2006; Island County Staff
- Develop and promote a private lands salmon habitats protection strategy ensuring protection of naturally functioning nearshore processes by 2015 (integrate stewardship

and conservation programs such as: Shore Stewards, Public Benefits Rating System, and conservation easements)
Develop: 2005-2007; Salmon TAG
Promote: on-going; Salmon TAG and Community Organizations (Island County, Conservation Districts, WSU extension, Whidbey-Camano Land Trust)

- Develop and promote a public lands salmon habitats protection strategy ensuring protection of naturally functioning nearshore processes by 2015
  Develop: 2005-2007; Salmon TAG
  Promote: on-going; Salmon TAG and Community Organizations (Island County, Conservation Districts, WSU extension, State Agencies, etc.)
- Promote pollution prevention strategies that will help maintain freshwater and marine water quality (update as new methodologies and technologies are developed)
  On-going; Salmon TAG, Conservation Districts, Local and State Agencies
- Provide technical comments to Island County Planning during review of Critical Areas Ordinance and Shoreline Masters Program updates
  2005-CAO/2012-SMP; Salmon TAG
- Support successful enforcement strategies for regulations that protect salmon habitats
  On-going; Island County, Salmon TAG, Community Organizations

Objective 3: Restore/enhance critical rearing habitats for forage fish and juvenile salmon

Actions:

- Work with willing landowners to achieve enhancement and restoration projects in priority geographic areas (minimum of 5 by 2015)
  2005-2015; Salmon TAG and Regional/Local Organizations
- Support *Spartina anglica* control programs
  On-going; Island County, Salmon TAG, State Agencies, Community Organizations
- Promote best management practices that will help to decrease pollution impacts on freshwater and marine water quality
  On-going; Salmon TAG, Conservation Districts, Local and State Agencies

Estimated Costs: Protection, enhancement, and restoration costs for specific projects will vary greatly. The estimates provided here were developed using the guidance in "A Primer on Habitat Project Costs" (Shared Strategy 2003), and are provided to give a rough estimate for cost evaluation of habitat projects. Since quantitative goals for protection, enhancement, and restoration have not been established, this section does not attempt to estimate the amount of funding that will be required for these projects. Ecosystem process and habitat protection, enhancement, and restoration will require a combination of the following.

- Nearshore Land Acquisition and Conservation Easements: The cost of shoreline parcels varies widely on Whidbey and Camano Islands. In June of 2004, real estate listings for 5-10 acres of shoreline property varied between $100,000 and $600,000. While the relative lack of urban development in WRIA 6 acts as a mitigating influence on prices for waterfront, these parcels are highly desirable. While larger parcels tend to be more cost-effective to acquire than smaller parcels, identifying funding to protect undeveloped, small, platted lots may be important in some areas.

- Nearshore Restoration:
  - Beach restoration – These projects may include removal of bulkheads, reconfiguration of beaches and the addition of natural sediments, wood and plants to recreate earlier nearshore characteristics. These projects typically cost $100 to $1,300 per linear foot; completed projects range between $150,000 and $500,000.
  - Saltwater marsh restoration – These projects may include the replacement or removal of tidegates, breaching or removal of dikes, removal of fill, and construction of protective dikes if the project is close to a shoreline community. In most areas, these projects will require detailed risk assessment studies to ensure the safety of adjacent properties and community resources. These projects range between $200,000 and $600,000 or more.
- Stream Protection: The cost for upland parcels is generally geared to the potential use of the land. Residential lots on Whidbey and Camano may be as low as $20,000, but are more likely to cost $35,000-$65,000, and may be cost more than $100,000.
- Stream Restoration:
  - Riparian Planting – These projects may cost $5,000 to $135,000 per acre depending on the complexity of the design, permitting, maintenance, watering, and monitoring.
  - Riparian Fencing – Fencing costs $3-$12 per linear foot.
  - Culvert Replacement - Given the rural nature of WRIA 6, most single culvert replacement projects will range from $15,000 to $150,000.
  - Channel and Bank Restoration – The typical cost is between $30 and $1,000 per linear foot of stream.

2. Understanding Habitat Functions

Goal 2: Develop understanding of habitat functions and the distribution of forage fish species, salmonids, and marine mammals in WRIA 6

Objective 1: Fill key ecosystem science data gaps

Actions:

- Assess marine salmonid distribution (species/stocks/life history stages) to identify habitat utilization throughout Island County
  On-going; Tribes, NOAA Fisheries, and WA Trout
- Assess freshwater salmonid distribution
  By 2015; Island County Staff, State Agencies, Tribes, and Contractors
- Collaborate with neighboring watershed groups (particularly Skagit, Stillaguamish, and Snohomish) to determine which habitats are most important for their populations
  By 2010; Lead Entity Staff, Salmon TAG, Neighboring Watershed Groups
- Cooperate with state and federal agencies to develop tools that relate nearshore habitat conditions to Viable Salmon Population characteristics
  By 2015; Lead Entity Staff, Salmon TAG, State and Federal Agencies

Objective 2: Assess and regularly update aquatic habitat attributes

Marine Actions (Throughout WRIA 6):

- Assessment of feeder bluff connectivity (longshore drift functionality)
  Assessment completed 2004, Report and data pending (spring 2005); Coastal Geologic Services (contracted by IC-MRC)
- Eelgrass survey
  Survey completed 2004, Report and data pending (spring 2005); Marine Resource Consultants (contracted by IC-MRC)
- Forage fish spawning beaches survey
  Survey completed 2004; WA Dept of Fish and Wildlife (contracted by IC-MRC)
- Shoreline hardening survey

Survey completed 2004, Report and pending (spring 2005); Clyde Johnson and Beach Watchers (contracted by IC-MRC)

- Pocket estuary survey and habitat evaluation
  2003-2007; Tribes, NOAA Fisheries, and WA Trout
- Mapping of tidegates and stormwater outfalls
  2005-2007; Island County Staff
- Survey of private outfalls
  2005-2007; WSU-Beach Watchers
- Survey of marine debris hotspots and develop clean-up plan
  By 2010; Contractor
- Survey interactions between commercial shellfish operations and nearshore habitat forming and productivity processes
  By 2010; Contractor
- Develop and implement a shoreline community water quality monitoring program to assess basic water quality parameters and aquatic invertebrate communities in areas of concentrated salmon utilization
  Develop by 2008, Implementation on-going; Island County Staff, Conservation Districts, WSU-Beach Watchers

Freshwater Actions (In known and potential salmonid bearing streams):

- Develop and implement a water quality monitoring program to assess basic water quality parameters and aquatic invertebrate communities
  Develop by 2010, Implementation on-going; Island County Staff, Conservation Districts, Community Groups
- Implement streamflow monitoring program
  2003-ongoing; Island County Staff, Conservation Districts, Community Groups
- County culvert inventory
  2004-2006; Island County Staff
- Physical and biological habitat surveys – in-stream habitat inventory, riparian assessment, and culvert passage assessments
  By 2015; Contractor (2003-4, Maxwelton Creek and Chapman Creek surveyed, WA Trout)

Objective 3: Quantify and evaluate impacts of predation by marine mammals and other wildlife on salmonid and forage fish populations (e.g. Orca, Sea Lion, Harbor Seal, Heron, Cormorants, Mergansers, Humans, etc.)

Actions:

- Encourage the state and federal agencies to determine if it would be appropriate for NOAA Fisheries to transfer management oversight of pinnipeds to the WA Department of Fish and Wildlife
  2005; Salmon TAG
- Assist a study of predation (seals, sea lions, and other wildlife) in WRIA 6 on salmonids and forage fish (by species/stock) and collaborate with neighboring watershed groups on projects specific to their stocks
  2005-2008; Island County Staff, WDFW, neighboring watershed groups
- Assist with WDFW to identify realistic levels of predation on salmon and forage fish
  2005-2008; Salmon TAG, WDFW
- Collaborate with WDFW to identify sustainable predator population levels and methods to achieve these levels
  2006-2010; Salmon TAG, WDFW
- Compare the impacts on salmon caused by predation versus the impacts caused by habitat loss/degradation

By 2010; Salmon TAG, WDFW, Regional Scientists

Estimated Costs: Assessments of fish distribution are a multi-year, multi-agency process. For WRIA 6 shorelines, data is currently being collected by three tribal organizations, by a non-profit funded for one year through a SRFB grant, and by NOAA Fisheries. Continuing these sampling programs is critical to eventually establishing relationships between nearshore habitat conditions and Viable Salmon Population characteristics. No assessment of the cost for sampling has been calculated.

3. Engage An Informed Community

Goal 3: Engage an informed community in identifying, protecting, enhancing, and restoring salmon supporting ecosystem processes and habitats

Objective 1: Educate the community about juvenile and adult salmon distribution, ecosystem processes, habitats, and challenges through information, education, and communication activities

Actions:

- Develop and implement a public involvement/outreach strategy and action plan
  By 2007; Lead Entity Staff, Salmon TAG, and Contractor
- Develop and present watershed/salmon recovery lessons for school groups in WRIA 6
  2006-ongoing; Salmon TAG, Community Groups, and Contractor
- Coordinate educational nearshore tours/cruises (minimum 1/year)
  2006-2015; Salmon TAG, IC-MRC; Community Groups
- Coordinate and facilitate stakeholder focus groups to encourage participation in the development of problem definitions and solutions
  2006-2010; Salmon TAG and Community Groups
- Coordinate and facilitate community forums for in-depth discussions of salmon recovery issues (sharing of experiences and lessons learned)
  2006-2015; Lead Entity Staff and Salmon TAG
- Coordinate landowner education programs
  2005-2015; Salmon TAG and Community Groups
- Survey the views of Whidbey and Camano residents regarding salmon recovery practices and track changes in thinking
  Develop survey 2005, survey every other year; Lead Entity Staff, Salmon TAG and Contractor

Objective 2: Develop and implement a comprehensive communication strategy for internal and external communication

Actions:

- Partner with local organizations to disseminate information through established programs
  On-going; Salmon TAG, WSU Programs; IC-MRC, Community Groups, Conservation Districts, Fisheries Enhancement Groups
- Expand network of salmon recovery partners and coordinate regular exchange of information (email/newsletter/list-serve)
  On-going; Lead Entity Staff, Salmon TAG, Community Groups
- Develop a standard reporting format for salmon recovery projects
  2005-06; Lead Entity Staff and Salmon TAG

Objective 3: Increase community participation in, and commitment to, salmon recovery activities

Actions:

- Research, identify and encourage behavioral changes that WRIA 6 residents and visitors can make to support salmon recovery
  2006-2015; Salmon TAG and Contractor
- Develop targeted messages about salmon needs, ecosystem processes and habitat goals for key stakeholder audiences

2006-2015; Salmon TAG

- Encourage community participation in salmon and habitat assessments and protection, enhancement, and restoration activities
  On-going; Salmon TAG and Community Groups
- Participate on key local and regional watershed/water resources committees as advocates for salmon recovery
  On-going; Salmon TAG
- Promote integration of salmon recovery in WRIA 6 water resources discussions and encourage integrated planning, resource sharing, and collaborative activities within local and regional organizations
  On-going; Salmon TAG
- Compile research data, survey results, community information, and project implementation progress in a standardized database
  2007-on-going; Lead Entity Staff and Contractor

Estimated Costs: Many of the outreach and education actions listed here can easily be included as part of lead entity staff day to day activities. Accomplishing these tasks requires that state funding for the lead entity position continue to be available to the county. Other tasks, such as developing a public involvement and education plan (~$5,000), a communication strategy (~$5,000), preparing and presenting school programs (~$10,000/year), developing and delivering a community values survey (~$5,000 development and ~$10,000 every two years for survey work), researching and developing a salmon recovery social marketing strategy (~$20,000), and developing a central database (~$15,000), will require additional funding (a minimum $200,000 total) and committed participation of members of the Salmon TAG. In order for the Salmon TAG to have the capacity to accomplish these tasks, the affiliated organizations need to have staff that can be dedicated to these activities, more staff time than is currently available. These staffing needs have not been evaluated for this strategy.

4. Cultivate a Supportive Environment

Goal 4: Cultivate a supportive environment for salmon recovery by supporting policies that protect salmon habitats; advocating for adequate program staffing; encouraging cross-sector and public-private partnerships; pursuing adequate, reliable funding; and implementing effective project and program evaluations

Objective 1: Establish salmon recovery program policies that will cultivate public support for salmon recovery and adequate program staffing

Actions:

- Organize semi-annual discussions with the Board of Island County Commissioners and other elected officials
  2005-2015; Salmon TAG
- Encourage interdisciplinary and interdepartmental participation in salmon recovery efforts
  2005-2015; Island County and Salmon TAG
- Mentor community sponsored projects by providing technical assistance and networking support
  On-going; Lead Entity Staff and Salmon TAG
- Encourage local projects that are cost-effective and include volunteer opportunities
  On-going; Lead Entity Staff and Salmon TAG
- Conduct roundtables with all Salmon TAG affiliated organizations to identify ways in which each group's programs support salmon recovery and request commitments to salmon recovery activities
  2005-2015; Lead Entity Staff and Salmon TAG

Objective 2: Obtain adequate, reliable funding through a variety of public and private sources and use these resources cost-effectively

Actions:

- Develop and implement a biannual salmon recovery workplan and budget
  2005-2015; Lead Entity Staff and Salmon TAG
- Identify and promote applications to a variety of grant organizations, including the Salmon Recovery Funding Board
  On-going; Lead Entity Staff and Salmon TAG
- Identify and pursue non-grant funding opportunities
  On-going; Lead Entity Staff and Salmon TAG
- Engage private sector partners in WRIA 6 salmon recovery efforts
  2005-2015; Salmon TAG and Community Groups
- Promote regional actions that help to avoid duplication, maximizing limited resources
  2005-2015; Salmon TAG and Community Groups

Objective 3: Develop and implement a salmon recovery adaptive management program

Actions:

- Identify a set of ecosystem process and habitat indicators
  2005; Lead Entity Staff and Salmon TAG
- Develop and implement a local monitoring program that evaluates ecosystem process and habitat indicator trends
  2005-06; Lead Entity Staff and Salmon TAG
- Encourage project sponsors to include an adequate monitoring and evaluation component in their project
  On-going; Salmon TAG
- Produce an annual program summary
  2005-2015; Lead Entity Staff and Salmon TAG
- Review project and program progress on a biennial basis and make adjustments to work-plan where needed
  2005-2015; Lead Entity Staff and Salmon TAG

Estimated Costs: As in the goal above, many of the actions in goal 4 can easily be included as part of lead entity staff day to day activities. Accomplishing these tasks requires that state funding for the lead entity position continue to be available to the county. Other tasks will require additional committed

participation of members of the Salmon TAG. In order for the Salmon TAG to have the capacity to accomplish these tasks, the affiliated organizations need to have staff that can be dedicated to these activities, more staff time than is currently available. These staffing needs have not been evaluated for this strategy.

C. Recommended Commitments and Conditions Needed for Salmon Recovery

Recovery means that more Chinook, hood canal summer chum, and bull trout will be using the estuaries, shoreline and marine waters of Puget Sound. Achieving the Salmon Recovery Plan's vision and goals will require a *sustained*, *coordinated, focused, community* commitment. This must include county government leaders and citizen committees, scientific entities, community organizations, volunteers and private landowners working in concert to pursue priorities, make specific plans and develop budgets to achieve them. The commitments needed include: local regulatory efforts (particularly enforcement), increased state support of local regulatory process, state policy enforcement, voluntary actions, state, federal and local protection of major migratory pathways, and increased protection of water quality sensitive areas

For years, groups and individuals have worked independently toward the general goal of preserving the natural quality and character of specific sites in WRIA 6. In the face of relentless population growth and development, these groups have scored isolated successes but have not stemmed the overall decline of naturally-functioning nearshore habitat. An uncoordinated, opportunistic approach will not be sufficient to bring about a net increase of naturally-functioning ecosystems.

Commitments from the following groups will be important to accomplishing the goals set out in this plan. We look to these groups for a commitment to implement the ten year action plan.

- **Board of Island County Commissioners:** continued support for programs that protect nearshore processes and habitats; continued support for education and stewardship programs; support for nearshore enhancement and restoration where there would be significant benefits to salmon; continued commitment to participate in regional salmon recovery process Enhancement and restoration projects will gain the support of the Island County Commissioners under the following conditions:
    - Neighboring private and public uses and surrounding environment are protected,
    - There are willing landowners,
    - There is no adverse impact to Naval operations, and
    - There is a significant benefit for salmon.

- **Island County Public Works:** continued support of salmon recovery program and matching funds for lead entity coordinator position; continued action as lead entity of nonpoint pollution planning and implantation staff and actions for the county; integration of salmon recovery issues in planning and development of stormwater infrastructure; continued integrated pest management (IPM) along county roads
- **Island County Planning and Community Development:** continued promotion of regulations that discourage bulkheads and encourage strong enforcement of regulations that protect salmon and forage fish habitats; systematic updates to CAO maps when new data becomes available
- **Island County Public Health:** integration of salmon recovery issues into watershed planning process; assistance for project sponsors with groundwater/septic questions; continued efforts to maintain and improve fresh and marine water quality

  - **Island County Parks:** integration of salmon recovery issues into planning and implementation of parks projects
  - **Weed Control Board:** continued efforts to control aquatic, invasive species, particularly *Spartina*
  - **Washington State University – Cooperative Extension (Beach Watchers, Waste Wise, and 4-H):** continued support of salmon recovery and watershed education and outreach; continued landowner education programs; continued assistance with volunteer coordination for fish distribution sampling and habitat assessments
- **Island County Water Resources Committees:**
  - **WRAC**: integration of salmon recovery issues into all water resources discussions; advocacy for the Salmon Recovery Plan actions
  - **Marine Resources Committee**: continued support of salmon recovery through research, sponsorship of habitat protection, enhancement and restoration projects, and outreach and education activities; continued landowner education programs

- **City of Oak Harbor, City of Langley, and Town of Coupeville:** support for the goals of the WRIA 6 Salmon Recovery Plan to protect, enhance and restore Whidbey and Camano habitats; support for and participation in habitat and education/outreach activities
- **Navy – NAS Whidbey:** support for the goals of the WRIA 6 Salmon Recovery Plan to protect, enhance and restore Whidbey and Camano habitats; continued participation in habitat and education/outreach activities

- **Washington State Parks:** integration of salmon recovery issues into planning and implementation of parks projects; continued participation in outreach and education activities
- **WA Dept of Fish and Wildlife:** continued support for the salmon recovery lead entity program; continued participation in protection, enhancement, and restoration planning and implementation; training and technical assistance for project sponsors; emphasis on fish distribution and habitat utilization in the nearshore
- **WA Dept of Ecology:** continued support for watershed protection and water quality improvement programs; increased emphasis on spill prevention and control programs
- **WA Dept of Natural Resources:** management of local DNR properties tidelands, shorelines, and uplands) in manner consistent with WRIA 6 salmon recovery plan
- **WA Dept of Health:** continued emphasis on fresh and marine water quality
- **WA Dept of Agriculture:** continued emphasis control of invasive plant species, particularly *Spartina*
- **Puget Sound Action Team:** continued sharing of research results and habitat analyses; continued training and technical assistance; continued participation in planning and implementation activities; continued funding of outreach and education projects

- **Skagit River System Cooperative:** continued sharing of research results and habitat analyses; technical assistance for project sponsors; continued participation in protection, enhancement, and restoration implementation in WRIA 6
- **Stillaguamish Tribe:** continued sharing of research results and habitat analyses; technical assistance for project sponsors; continued participation in protection, enhancement, and restoration implementation on Camano; effective implementation of hatchery and harvest management plans
- **Tulalip Tribe:** continued sharing of research results and habitat analyses; technical assistance for project sponsors; participation in protection, enhancement, and restoration implementation on Camano; effective implementation of hatchery and harvest management plans

- **Whidbey Island Conservation District:** participation in protection, enhancement, and restoration planning and implementation on Whidbey; assistance with outreach and education activities
- **Snohomish Conservation District:** participation in protection, enhancement, and restoration planning and implementation for Camano sites; assistance with outreach and education activities
- **Skagit Regional Fisheries Enhancement Group:** participation in protection, enhancement, and restoration planning and implementation for North Whidbey and Camano sites; assistance with outreach and education activities
- **Stilly-Snohomish Fisheries Enhancement Task Force:** participation in protection, enhancement, and restoration planning and implementation for South Whidbey and Camano sites; assistance with outreach and education activities

- **Lighthouse Environmental Programs:** continued fundraising efforts supporting salmon recovery and watershed education and outreach
- **Watershed Groups (Maxwelton Salmon Adventure & Friends of Glendale):** participation in protection, enhancement and restoration planning and implementation for sites within these watersheds; assistance with outreach and education activities
- **Diking and Drainage Districts:** participation in salmon recovery process; maintenance of infrastructure; address fish and wildlife issues as the opportunities arise
- **South Whidbey Parks:** integration of salmon recovery issues into planning and implementation of parks projects; continued participation in outreach and education activities
- **Friends of Camano Island Parks:** participation in protection, enhancement, and restoration planning and implementation for Camano sites; assistance with outreach and education activities
- **Whidbey Camano Land Trust:** participation in protection planning and implementation activities

For these commitments to be possible several conditions would greatly help, including increased scientific knowledge, reliable funding for projects, reliable funding for community organizations, and strong community leadership. But by far the greatest condition needed is increased public understanding, participation, and enthusiasm for the vision and goals. If this condition is established, then the others will follow.

Success will require a significant public education and outreach effort, in partnership with community groups that share similar goals. It will require leadership at all levels of government from federal through state, county and municipal. It will require compliance with the Shoreline Master Plan and guiding principles of the Growth Management Act. Lastly, success will require a combination of government funding, private support and landowner participation.

D. Adaptive Management of Implementation Plan

Salmon recovery is a long-term process and one that has many uncertain variables. Our limited knowledge about how nearshore habitat conditions will impact salmon populations is one of those areas of uncertainty. This adaptive management section provides the framework within which the implementation plan can be monitored, evaluated, and adapted as we learn more about the positive and negative impacts of our salmon recovery activities. Monitoring, evaluating, and adaptive decision-making are key components in moving forward with systems in which there is a high level of uncertainty. Regular monitoring and evaluation helps to maintain reasonable expectations, allows for flexibility, and helps to make sure funding is directed to cost-effective activities.

This section will provide the framework for development of monitoring and evaluation indicators, as described in Goal 4, Objective 3. The Salmon TAG has set the goal of developing indicator criteria

during 2005 and they will work to start implementing a monitoring strategy by the end of 2006. We plan to evaluate the implementation plan on a biennial basis.

1. Evaluating Actions for Certainty of Success

Before we start monitoring the level of activity resulting from the action items in the plan, we will need to develop hypotheses about the level of certainty for overall success that our actions provide. This evaluation should include information about why particular approaches have been chosen, what the opportunities are for adapting an action, and if possible an estimation of an actions contribution to VSP characteristics.

2. Monitoring

The goals in this strategy focus on four areas: maintaining and improving conditions for salmon, improving our knowledge about salmon in the nearshore in order to better predict conditions for salmon, increasing public participation, and increasing support for and integration of these activities in our community. Our emphasis on communication, education, research, and protection are meant to slow the loss of habitat and preserve options. It is our hope that these actions will provide the habitats necessary of salmon recovery.

In addition to monitoring the overall response to the action plan, monitoring at project sites is crucial, particularly for enhancement and restoration activities. Monitoring the action of the fish in an area, before and after a project occurs, will significantly increase our knowledge of how the nearshore functions for fish. Project sponsors are strongly encouraged to include a monitoring and evaluation section in their project plan.

3. Evaluation

In evaluating the action plan, we will be interested in answering the following questions:

- Are the actions we are implementing making a difference?
- Are the actions that we planned being implemented?
- Are specific actions achieving their individual objectives?
- Are the actions achieving their collective objectives?
- Is there evidence that these actions will lead to salmon recovery?

4. Linking Evaluation Back to Action Plan – Updating Actions

A key component in this process will be to develop the ways in which the monitoring and evaluation information will be communicated and used.

GLOSSARY

ANADROMOUS FISH - Species that are hatched in freshwater, migrate to and mature in saltwater, and return to freshwater to spawn.
BEHAVIORAL CHANGE –Alteration in individual or organizational actions associated with increased knowledge and commitment
BENEFICIAL USE - Use of water for domestic, stock watering, industrial, commercial, agriculture, irrigation, hydroelectric power production, mining, fish and wildlife maintenance and enhancement, recreational and thermal power production, and preservation of environmental and aesthetic values, and all other uses compatible with the enjoyment of the public waters of the state.
BIODIVERSITY - The variety and abundance of species, their genetic composition, and the natural communities, ecosystems, and landscapes in which they occur.
BUFFER – Vegetation strip maintained along a stream or lake to mitigate the impacts of actions on adjacent lands.
CANDIDATE SPECIES - A species for which concerns remain regarding their status, but for which more information is needed before they can be proposed for listing under the ESA as threatened or endangered.
CARRYING CAPACITY - An ecological term for the maximum average number of inhabitants that an environment can support.
CATCH - The act of landing a fish, or the total amount of fish harvested.
CHANNEL - A waterway with obvious banks that contains moving water at least part of the year.
CHAR - Close relatives to trout and salmon. Bull trout are a species of char.
COMMUNITY – the people living in, working in, or visiting Island County
CONSERVATION – the act or process of saving; controlled use and protection of natural resources
CRITICAL HABITAT - Under ESA, the ecosystem elements that must be present and properly functioning to assure the continued existence of the species in question. The critical habitat is described and designated by the lead federal regulatory agency making a status determination for a species. Critical habitat can be designated in areas that are not being used by the species in question at the time the species is listed if the habitat is necessary for the conservation of the species. Critical habitat designations usually accompany final listing decisions, but may be delayed under certain circumstances.
CRITICAL STOCK - Under SaSI, a stock of fish experiencing production levels that are so low that permanent damage to the stock is likely or has already occurred.
DEGRADATION - The process by which habitat is damaged.
DEPRESSED STOCK - Under SaSI, a stock of fish whose production is below expected levels based on available habitat and natural variations in survival levels, but above the level where permanent damage to the stock is likely.
DISCHARGE - The volume of water that flows past a given place during a certain amount of time. Discharge is often referred to in cubic feet per second (cfs).
DISTINCT POPULATION SEGMENT - "Population" or "distinct population segment" are terms with specific meaning under ESA when used for listing, delisting, and reclassification purposes to describe a discrete vertebrate stock that may be added or deleted from the list of threatened and endangered species.
ECOLOGICAL INTERACTION - The sum total of impacts of one species on another species, or on other members of the same species.
ECOSYSTEM - A complex of biological communities and environment that forms a functioning, interrelated unit in nature.
ENABLING ENVIORNMENT - A set of conditions - often inter-related - that impact on the capacity of citizens, organizations, and government agencies to engage in salmon recovery activities in a sustained and effective manner, whether at the policy, program or project level. They include legal, regulatory, and policy frameworks, and political, social, cultural, and economic factors.

ENDANGERED SPECIES - Under ESA, any species that is likely to become extinct within the foreseeable future throughout all or a significant portion of its range.
ENDANGERED STOCK - Under SaSI, a stock of fish that no longer is present in its original range or as a distinct stock elsewhere.
ENDANGERED SPECIES ACT - The Endangered Species Act (ESA) was enacted by Congress in 1973 in response to an alarming decline of many animal and plant species. The ultimate goal of the ESA is to return threatened and endangered species to the point where they no longer need the law's protections.
ENHANCEMENT (Rehabilitation) – Partially re-establishing ecosystem processes
(In WRIA 6 enhancement projects will gain the support of the Island County Commissioners under the following conditions: neighboring private and public uses and surrounding environment are protected, there are willing landowners, there is no adverse impact to Naval operations, and there is a significant benefit for salmon.)
ENVIRONMENTAL DIAGNOSTICS AND TREATMENT MODEL (EDT) - a tool used by subbasin planners to evaluate and compare the effects of watershed protection and restoration strategies in terms of various aquatic species such as bull trout and steelhead. *[Developed by Mobrand Biometrics]*
ESTUARY - The area where fresh and salt water mix at the mouth of a river or stream, used as rearing and feeding habitat by many fish species and other animals.
ESCAPEMENT - Those fish that have survived all fisheries and will make up a spawning population.
ESCAPEMENT GOAL - A predetermined biologically derived number of salmonids that are not harvested and will be the parent spawners for a wild or hatchery stock of fish.
EVOLUTIONARILY SIGNIFICANT UNIT (ESU) - A population or group of populations of salmon that 1) is substantially reproductively isolated from other populations and 2) contributes substantially to the evolutionary legacy of the biological species. (This concept is used by NMFS in its administration of the ESA for anadromous salmon populations.)
EXOTIC SPECIES - A non-native species.
EXTINCTION or EXTINCT SPECIES - A species no longer present in its original range or as a distinct species elsewhere.
FACTORS FOR DECLINE - Specific land management activities, resource management strategies, or environmental conditions that directly or indirectly affect a salmon stock or its habitat in a manner that reduces its population size.
FISHERY - a commercially important stock of fish in a specific area, and the physical, chemical and biological factors affecting that population
FLOOD PLAINS - The low area along a stream or river channel into which water spreads during floods.
4(d) RULE - The protective ESA rule promulgated by the lead federal agency at the time it makes a final decision to list a species as threatened.
FRY - Young salmonids that have emerged from gravel and are up to one month of age, or any cultured salmonid from the time of hatching through fourteen days after being placed in rearing ponds.
GEAR LIMITS - Restrictions placed on sport or commercial fishing gear, to control the take of fish.
GENETIC DIVERSITY - All of the genetic variation within a group. The genetic diversity of a species includes both genetic differences between individuals in a breeding population (within-stock diversity) and genetic differences among different breeding populations (among-stock diversity).
GENETIC RISK - The probability of an action or inaction having a negative impact on the genetic character of a population or species.
HABITAT - The physical, chemical, and biological features of an area that supplies food, water, shelter and space necessary for a particular species existence.
HARM - Defined in regulations implementing the ESA as an act "which actually kills or injures" listed wildlife. Harm may include "significant habitat modifications or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering."
HARVEST - Fish that are caught and retained in a fishery (consumptive harvest).

HARVEST RATE - The proportion of a returning run or total population of salmonids taken by fisheries.
HATCHERY PRODUCTION - The spawning, incubation, hatching or rearing of fish in a hatchery or other artificial production facility (e.g., spawning channels, egg incubation boxes or pens).
HATCHERY STOCK - A stock that depends upon spawning, incubation, hatching, or rearing in a hatchery or other artificial production facility (synonymous with cultured stock).
HAULOUT – An area that seals and sea lions use to rest out of the water (intertidal sand bars and mudflats in estuaries, intertidal rocks and reefs, sandy, cobble, and rocky beaches, islands, logbooms, docks, and floats)
HEALTHY STOCK - Under SaSI, a stock of fish experiencing production levels consistent with its available habitat and within the natural variations in survival for the stock. This does not imply that the habitat itself is necessarily healthy.
HYDRAULIC CONTINUITY - The natural interconnection of ground water and surface water.
INCIDENTAL HARVEST - The harvest and retention of species other than those targeted in specific fisheries.
INCIDENTAL TAKE - Under ESA, take of listed fish or wildlife species that result from, but is not the purpose of, carrying out an otherwise lawful activity.
KEYSTONE – An anchor or central cohesive source of support and stability.
KEYSTONE SPECIES - An organism in the ecosystem that many other species depend upon for continued survival and support.
LARGE WOODY DEBRIS (LWD) - Coniferous or deciduous logs, limbs or root wads twelve inches or larger in diameter that intrudes into a stream channel or nearby.
LIFE CYCLE - The series of changes or stages undergone by an organism from fertilization, birth or hatching to reproduction of the next generation.
LIFE HISTORY STAGE – A distinct time period during the life cycle.
LIFE HISTORY TYPE – A segment of the population that uses a distinct habitat during one or more stages in the life cycle.
LIMITING FACTORS - Defined by the state Salmon Recovery Act (ESHB2496) as conditions that limit the ability of habitat to fully sustain populations of salmon.
LOCALLY ADAPTED POPULATION - A population of fish that has developed specific traits that increase their survival in a particular habitat or environment.
MACROINVERTEBRATES - Animals without backbones that are big enough to see with the naked eye. Examples include most aquatic insects, snails, and crayfish.
MAINSTEM - The principle stream or river of a particular basin.
MANAGEMENT UNIT - A stock or group of stocks that are aggregated for the purposes of achieving a desired spawning escapement objective. (See wild and hatchery management unit definitions.)
MAXIMUM SUSTAINED YIELD (MSY) - The maximum number of fish from a stock or management unit that can be harvested on a sustained basis, measured as the number of fish that would enter freshwater to spawn in the absence of fishing, after accounting for natural mortality.
MINIMUM SIZE LIMIT - A sport fishery regulation that establishes a minimum size (usually length) for the retention of a fish to protect younger individuals in a fish population, or to protect other species of fish.
MINIMUM VIABLE POPULATION (MVP) - The size of a population that, with a given probability, will ensure the persistence of the population for a specified period of time.
MIXED-ORIGIN STOCK - A stock whose individuals originated from commingled native and non-native parents; or a previously native stock that has undergone substantial genetic alteration.
MIXED-STOCK FISHERIES - Any fishery that catches fish from more than one stock.
NATAL – The stream where a salmon was spawned.
NATIVE SPECIES - A species of fish indigenous to Washington State.
NATIVE STOCK - An indigenous stock of fish that has not been substantially affected by genetic interactions with non-native stocks or by other factors, and is still present in all or part of its original range. In limited cases, a native stock may also exist outside of its original habitat.

NATURAL SELECTION - Differential survival and reproduction among members of a population or species in nature, due to variation in the possession of adaptive genetic traits. Natural selection, the major driving force of evolution, is a process leading to greater adaptation of organisms to their environment.
NEARSHORE: the estuarine/delta, marine shoreline and areas of shallow water from the top of the coastal bank or bluffs to the water at a depth of about 10 meters relative to Mean Lower Low Water. This is the average depth limit of light penetration. This zone incorporates those geological and ecological processes, such as sediment movement, freshwater inputs and sub-tidal light penetration, which are key to determining the distribution and condition of aquatic habitats. By this definition, the nearshore extends landward into the tidally influenced freshwater heads of estuaries and coastal streams. (Puget Sound Nearshore Ecosystem Restoration Project 2003)
NET PEN - A fish-rearing enclosure used in lakes and marine areas.
NON-NATIVE STOCK - A native species residing in an area outside its original habitat in Washington State (e.g., Chambers Creek steelhead, Soos Creek Chinook).
OFF-CHANNEL HABITAT - Ponds, channels or wetlands that are connected to the main channel of a stream. For example, juvenile coho salmon often spend at least part of their fresh water lives in off-channel habitat.
ORGANIC - Compounds containing carbon, living or derived from living matter.
OSMOREGULATORY - referring to the means by which water content and salt and mineral concentrations of body fluids are controlled in animals
PINNIPED - marine mammals with flippers, such as seals, walruses and sea lions
POCKET ESTUARY - Non-natal, small lagoons and coastal stream mouths which provide critical habitat for rearing, predator refugia, and physiological transition. These habitats have very low energy regimes, high productivity, and seasonally diluted salinity regimes.
POPULATION - (see stock)
PRESERVATION – the act of maintaining intact or unchanged
PRIMARY MANAGEMENT UNIT - A stock or group of stocks for which a specific spawning escapement goal is established with the intention of managing all impacting fisheries to meet that goal.
PRODUCTIVITY - A measure of the capacity of a biological system. The efficiency with which a biological system converts energy into growth and production. Can be expressed as the number of smolts produced per parent.
PROTECTION – the act or process of guarding from harm or injury
PUBLIC BENEFITS RATING SYSTEM – A county program that provides an incentive to encourage landowners to voluntarily conserve and protect open space and natural resources. Properties enrolled in the program are assessed at a current use value for the protected portion, rather than the highest and best use value.
QUOTA - A number of fish allocated for harvest to a particular fishing group or area.
RECOLONIZATION - The reestablishment of organisms into habitats that they previously occupied.
RECOVERY - The process by which the decline of an endangered or threatened species is arrested or reversed, and threats neutralized so that its survival in the wild can be ensured. The goal of the ESA is for the recovery of listed species to levels where protection under the ESA is no longer necessary.
REGIONAL FISHERIES ENHANCEMENT GROUP – Each of the 14 Regional Fisheries Enhancement Groups are separate, nonprofit organizations partially funded under recreational and commercial salmon license fees. They were established in 1990 by the Washington State Legislature to involve local communities, citizen volunteers, and landowners in the state's salmon recovery efforts. These groups conduct habitat enhancement projects, rear and release salmon into state waters, and organize education and outreach programs.
RELINQUISHMENT - The procedure whereby a right to divert or withdraw water is surrendered to the state. Relinquishment includes the forfeiture or abandonment of a right coupled with recognition by the state that forfeiture or abandonment has occurred.
RESIDENT SALMONID - Those members of the family Salmonidae that spend their entire lives in freshwater.

RESTORATION – Re-establishment of ecological functions and related physical, chemical, and biological characteristics
(In WRIA 6 restoration projects will gain the support of the Island County Commissioners under the following conditions: neighboring private and public uses and surrounding environment are protected, there are willing landowners, there is no adverse impact to Naval operations, and there is a significant benefit for salmon.)
RIPARIAN HABITAT - The aquatic and terrestrial habitat adjacent to streams, lakes, estuaries, or other waterways.
RISK ASSESSMENT - Evaluating the probability of an action having a negative impact that is not within prescribed limits or acceptable bounds.
RIVERINE HABITAT - The aquatic habitat within streams and rivers.
RUN - The sum of stocks of a single salmonid species that migrates to a particular region, river or stream of origin at a particular season.
RUNOFF - The part of rain and snowmelt that runs over the ground and into a stream or other water body.
SALMONID - Any member of the taxonomic family Salmonidae, which includes all species of salmon, trout, char, whitefish and grayling.
SaSI - The name of the original inventory "Salmon and Steelhead Stock Inventory" (SASSI) has been changed to "Salmonid Stock Inventory" (SaSI) to reflect the broadened inventory scope encompassing all wild salmonids.
SECONDARY MANAGEMENT UNIT - A stock or group of stocks for which escapement occurs primarily as a result of not being caught in fisheries directed at commingled primary stocks. A group of fish for which an escapement goal may not be established.
SECONDARY PROTECTION - Management activities that provide protection to stocks or runs of salmon after they have been subjected to harvest in mixed stock areas.
SECTION 4 - The section of the ESA that deals with listing and recovery of species, and designation of critical habitat. Section 4(d) rule - A special regulation developed by the Service under authority of Section 4(d) modifying the normal protective regulations for a particular threatened species when it is determined that such a rule is necessary and advisable to provide for the conservation of that species.
SECTION 7 - The section of the ESA that requires all Federal agencies, in "consultation" with the Service, to insure that their actions are not likely to jeopardize the continued existence of listed species or result in destruction or adverse modification of critical habitat.
SECTION 10 - The section of the ESA that lays out the guidelines under which a permit may be issued to authorize activities prohibited by Section 9, such as take of endangered or threatened species.
SEDIMENT - The silt, clay, sand, rocks, wood and other solid material that gets washed out from some places and deposited in others.
SELECTIVE FISHERY - A fishery that allows the release of non-targeted fish stocks/runs, including unmarked fish of the same species.
SELF-SUSTAINING POPULATION - A population of salmonids that exists in sufficient numbers to replace itself through time without supplementation with hatchery fish. It does not necessarily produce surplus fish for harvest.
SETBACK – The minimum horizontal distance that buildings, structures, or activities are positioned back from a natural or manmade feature, such as a shoreline, bluff line, wetland boundary, road, or property line.
SMOLT - A juvenile salmonid that is undergoing the physiological change to migrate from fresh to salt water.
SOCIAL MARKETING – The application of marketing principles to a social issue in order to affect voluntary behavior of target audiences to improve community welfare.
SOUTHERN RESIDENT ORCAS – pods J, K, and L; summer range extends from Puget Sound up to the middle of Vancouver Island

SPECIES – An interbreeding population of individuals that are reproductively isolated from other groups, and share a common ancestor. For the purpose of this document, this will also include all subspecies, which are regional variants within a species with the potential of becoming evolutionarily distinct.
STAKEHOLDERS – Any organization, governmental entity, or individual that has a stake in or may be impacted by a given approach to salmon recovery. Including, but not limited to, representatives from the county, cities, conservation districts, tribes, environmental groups, business interests, landowners, citizens, volunteer groups, regional fish enhancement groups, and other habitat interests.
STEWARDSHIP – The careful and responsible management of ecosystem resources entrusted to humans in the interest of achieving and protecting ecosystem integrity for its intrinsic value and/or for the benefit of current and future generations.
STOCK - The fish spawning in a particular lake or stream(s) at a particular season, which to a substantial degree do not interbreed with any group spawning in a different place at the same time, or in the same place at a different time.
STOCK ORIGIN - The genetic history of a stock.
STOCK STATUS - The current condition of a stock, which may be based on escapement, run size, survival or fitness level.
STREAMBED - The stream bottom.
STREAMFLOW - The rate at which water passes a given point in a stream or river, usually expressed in cubic feet per second (cfs).
SUBSTITUTION (Creation) – Development of a critical habitat type in a location that was not originally that habitat type
SUPPLEMENTATION - The use of artificial propagation to maintain or increase natural production while maintaining the long-term fitness of the target population, and keeping the ecological and genetic impacts to non-target populations within specified biological limits.
SUSTAINABILITY - Meeting the needs of the present generation without compromising the ability of future generations to meet their own needs.
TARGETED FISHERY - A harvest strategy designed to catch a specific group of fish.
TECHNICAL RECOVERY TEAMS (TRT) - The National Marine Fisheries Service created groups of scientists from inside and outside government with a mix of expertise in salmon biology, population dynamics, conservation biology, ecology, and all other disciplines necessary for setting recovery standards and for measuring recovery efforts.
THREATENED SPECIES - Under ESA, any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
TREATY RIGHTS - Rights of Indian tribes that were reserved by the 1855 Stevens Treaties between Indian tribes and the United States government. These reserved rights include the right of "taking fish at all usual and accustomed grounds and stations" as well as the "privilege of hunting, gathering roots and berries and pasturing horses on open and unclaimed lands." Certain of these rights have been fairly well defined by judicial decisions, such as those pertaining to treaty fishing.
TREATY TRIBES - Any Indian tribe recognized by the United States government, with usual and accustomed fishing grounds, whose fishing rights were reserved under a treaty and have been affirmed by a federal court.
TRIBUTARY - A stream that feeds into a larger stream. Also called a feeder stream.
TRUST LAND TRANSFER PROGRAM – A program of the WA Department of Natural Resources that transfers state trust lands with low timber value and high ecological value to local entities, provides funds for school construction, and purchases lands with higher value to be held in trust. Trust lands were granted to the state from the federal government when Washington joined the union, to be held in trust and managed to benefit specific institutions.
TRUST WATER RIGHT - A water right acquired by the state by purchase, lease or receipt of gift of an existing water right, or by creation of conservation water savings resulting from state conservation expenditures.

UNKNOWN STOCK - Under SaSI, stocks where there is insufficient information to confidently identify stock origin or stock status.
VIABLE POPULATION - A population that is able to maintain its vigor and potential for evolutionary change and adaptation in its ecosystem.
WATER RESOURCE INVENTORY AREA (WRIA) - 62 areas designated by the State of Washington to delineate watershed boundaries within the state for management purposes.
WATER RIGHT - A legal authorization to use a certain amount of public water for specific beneficial use or uses.
WATER RIGHT CLAIM - A written statement made by a person claiming a right to use water. Claims were required to be filed by legislation passed in 1969 for water uses that were not established under permit system in current law. A claim may represent a valid water right but retains uncertainty until affirmed by a water rights adjudication.
WATER RIGHT PERMIT - A document granting permission to an applicant to develop the facilities necessary to use water and initiate beneficial use.
WATERSHED - The area of land that water flows across or under on its way to a river, lake or ocean. Includes all surface water and adjacent estuaries and marine areas. A legal framework for watershed boundaries is provided through Washington's designation of Water Resource Inventory Areas (see Watershed Resource Inventory Area).
WHIDBEY BASIN – The marine waters between the east side of Whidbey Island and the Puget Sound mainland. This area includes Skagit Bay, Port Susan, and Saratoga Passage.
WILD MANAGEMENT UNIT - A management unit where fisheries are managed to achieve wild salmonid escapement objectives.
WILD STOCK - A stock that is sustained by natural spawning and rearing in the natural habitat, regardless of parentage (including native).
WITHIN-STOCK DIVERSITY – The overall genetic variability among individuals of a single population or stock.

REFERENCES

Anchor Environmental, LLC and People for Puget Sound. 2002. Final Report: Northwest Straits Nearshore Habitat Evaluation, prepared for Northwest Straits Commission.

Beamer, E., A. McBride, R. Henderson, K. Wolf. 2003. The Importance of Pocket Estuaries in Skagit Bay to Wild Chinook Salmon. Skagit River System Cooperative.

Beamer, E., A. McBride, R. Barsh, K. Fresh, J. Griffith, R. Henderson, M. Rowse, T. Zackey. 2004. Pocket Estuary Research in the Whidbey Basin and North Skagit County Bays. Skagit River System Cooperative.

Beauchamp, D., D. Pflug, and G. Lucchetti. 1987. Snohomish River juvenile salmon outmigration study 1987. Prepared by Northwest Enviro-Metric Services. Submitted by The Tulalip Tribes for the United States Department of the Navy. Contract No. N62474-86-C-0991. Everett, Wash.

Chapman W. 1936. The pilchard fishery of the state of Washington in 1936 with notes on the food of the silver and Chinook salmon off the Washington coast. Washington Department of Fisheries. Biological Report No. 36C..

Cederholm, C.J., D.H. Johnson, R.E. Bilby, L.G. Dominguez, A.M. Garrett, W.H. Graeber, E.L. Greda, M.D. Kunze, B.G. Marcot, J.F. Palmisano, R.W. Plotnikoff, W.G. Pearcy, C.A. Simenstad, and P.C. Trotter, 2000. Pacific Salmon and Wildlife – Ecological Contexts, Relationships, and Implications for Management. Special Edition Technical Report, Prepared for D.H. Johnson and T.A. O'Neil (Managing directors), Wildlife-Habitat Relationships in Oregon and Washington. Washington Department of Fish and Wildlife, Olympia, WA.

Duxbury, A. C. 1987. The physical processes in estuaries: An introduction. *The Northwest Environmental Journal, 3*(1), 1-19.

Environment Canada 1994. Sustaining marine resources, Pacific herring stocks. Technical Supplement 94-5.

Environmental Health Project (EHP), UNICEF, USAID, World Bank, Water Supply and Sanitation Collaborative Council (WSSCC). 2004. Joint Publication 8: The Hygiene Improvement Framework. EHP, Arlington, VA.

Fresh, K. 2003. Navigating the Nearshore – Developing Salmon Recovery Strategies for the Puget Sound Nearshore Presentation (December 16). Shared Strategy for Puget Sound Nearshore Workshop, Edmonds, WA.

Goetz, Fred, E. Jeanes, G. Hart, C. Ebel, J. Starkes and E. Conner. 2003. "Behavior of Anadromous Bull Trout in the Puget Sound and Pacific Coast of Washington." Slideshow presented at the Estuarine Research Federation Conference, Seattle, Wash., September 2003.

Goetz, Fred, E. Jeanes, and E. Beamer. 2004. Preliminary Draft – Bull Trout in the Nearshore. U. S. Army Corps of Engineers, Seattle District.

Graber, B. 2003. Navigating the Nearshore – Developing Salmon Recovery Strategies for the Puget Sound Nearshore Presentation (December 16). Shared Strategy for Puget Sound Nearshore Workshop, Edmonds, WA.

Jeffries, S.J., P.J. Gearin, H.R. Huber, D.L. Saul, and D.A. Pruett. 2000. Atlas of Seal and Sea Lion Haulout Sites in Washington. Washington Department of Fish and Wildlife, Wildlife Science Division, 600 Capitol Way North, Olympia WA. pp. 150.

Joint Natural Resources Cabinet. 1999. Extinction is Not an Option: A Statewide Strategy to Recover Salmon. Washington State Governor's Salmon Recovery Office, Olympia, WA.

Long Live The Kings. *Endangered Species Act Handbook for Local Governments in Washington.* http://www.longlivethekings.org/publications.html

Marine Mammal Protection Act of 1972 and Amendments of 1994. 16 U.S.C. § 1361 et seq, 1401-1407, 1538, 4107

McElhany, P., M.H. Rucklelshaus, M.J. Ford, T.C. Wainwright, and E.P. Bjorkstedt. 2000. Viable salmonid populations and the recovery of evolutionarily significant units. NOAA Technical Memorandum NMFS-NWFSC-42.

Myers, J.M., R.G. Kope, G.J. Bryant, D. Teel, L.J. Lierheimer, T.C. Wainwright, W.S. Grand, F.W. Waknitz, K. Neely, S.T. Lindley, and R.S. Waples. 1998. Status review of Chinook salmon from Washington, Idaho, Oregon, and California. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-35, 443 p.

National Marine Fisheries Service (NMFS). 1997. Investigation of scientific information on impacts of California sea lions and Pacific harbor seals on salmonids and on the coastal ecosystems of Washington, Oregon and California. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-28.

Northwest Hydraulic Consultants. July 2003. Maxwelton Lower Reach and Fish Passage Feasibility Study. Northwest Hydraulic Consultants, Inc., Seattle, WA.

Penttila, D. 1999. Documented spawning areas of the Pacific Herring *(Clupea)*, surf smelt *(Hypomesus)*, and Pacific sand lance *(Ammodytes)* in Island County, Washington, WDFW, LaConner, Wash.

Penttila, D. 2000. Impacts of Overhanging Shading Vegetation on Egg Survival for Summer-Spawning Surf Smelt, *Hypomesus*, on Upper Intertidal Beaches in Northern Puget Sound, Washington (draft). Marine Resources Division, Washington Department of Fish and Wildlife, Olympia.

Puget Sound Bull Trout Recovery Unit Team (PSTRUT), Draft Interim Guidance for Protecting and Restoring Bull Trout Habitat in Watershed-based Recovery Planning in the Coastal-Puget Sound Distinct Population Segment, November 2002. The Shared Strategy of Puget Sound.

Puget Sound Indian Tribes and Washington Department of Fish and Wildlife. 2004. Comprehensive Management Plan for Puget Sound Chinook: Harvest Management Component. Northwest Indian Fisheries Commission, Olympia, Washington, USA. March 1, 2004.

Puget Sound Nearshore Ecosystem Restoration Program (PSNERP). 2003. "Guidance for Protection and Restoration of Nearshore Ecosystems of Puget Sound." - Fact Sheet. US Army Corps of Engineers, Seattle.

Puget Sound Salmon Management Plan. 1985. United States v. Washington (1606) F. Supp. 1405.

Sands, N. 2004. personal communication, NOAA Fisheries historic estuary habitat assessment.

Shared Strategy for Puget Sound. "A Primer on Habitat Project Costs." 2003. Prepared by Evergreen Funding Consultants.

Sheldon & Associates. 1999. Data Summary for Island County Estuarine Restoration Program: Six Selected Sites. Sheldon & Associates, Seattle, WA.

Sheldon & Associates. 2001. Island County Estuarine Restoration Program. Sheldon & Associates, Seattle, WA.

Shreffler, D.K., and R.M. Thom. 1993. Restoration of urban estuaries: New approaches for site location and design. Prepared for Washington State Department of Natural Resources Aquatic Lands Division. by Battelle Marine Sciences Laboratory, Sequim, WA.

Spence, B. G., G. A. Lomnicky, R. M. Hughes, and R. P. Novitski. 1996. An ecosystem approach to salmonid conservation. Mantech Environmental, Inc., Corvallis, OR.

Technical Recovery Team (TRT). 2002. Planning Ranges and Preliminary Guidelines for the Delisting and Recovery of the Puget Sound Chinook Salmon Evolutionarily Significant Unit. NOAA Fisheries, Seattle.

Thom, R.M. 1987. The Biological Importance of Pacific Northwest estuaries. The Northwest Environmental Journal 3: 21-42.

Thom, R.M., C.A. Simenstad, J.R. Cordell, and E.O. Salo. 1989. Fish and their Prey in a Marina and Adjacent Mudflats and Eelgrass Meadow in a Small Estuarine Harbor. Fisheries Research Institute, University of Washington, Seattle, Washington; FRI-UW-8091.

US Fish and Wildlife Service. 2002. Delisting a Species: *Section 4 of the Endangered Species Act.* http://endangered.fws.gov/recovery

Washington Department of Fish and Wildlife (WDFW) and the Point-No-Point Treaty Tribes. "Appendix 1.3 of the Summer Chum Salmon Conservation Initiative." April 2001.

Washington Department of Fish and Wildlife and Western Washington Treaty Indian Tribes. 1994. 1992 Washington State salmon and steelhead stock inventory: Appendix 1: Puget Sound Stocks: North Puget Sound Volume, Olympia, WA.

Washington Department of Fish and Wildlife. 1998. Washington state salmonid stock inventory; bull trout/Dolly Varden. Olympia, WA.

Washington Department of Fish and Wildlife. 2002. 2002 Washington state salmonid stock inventory. Olympia, WA.

Washington Department of Natural Resources Nearshore Habitat Program. 2001a. WA State Shore Zone Inventory, Olympia, WA.

Washington Department of Natural Resources Nearshore Habitat Program. 2001b. WA State Shore Zone Inventory User's Manual, Olympia, WA.

Washington State Conservation Commission. 2000. Salmon Habitat Limiting Factors, Water Resource Inventory Area 6, Island County.

Whidbey Camano Land Trust (WCLT). 2004. "Purchase Protects Nearshore Habitat. Winter newsletter.

Whidbey Camano Land Trust (WCLT). 2004. Website.

Wiles, G. J. 2004. Washington State status report for the killer whale. Washington Department Fish and Wildlife, Olympia. 106 pp.

Williams, G.D., R.M. Thom, J.E. Starkes, J.S. Brennan, J. P. Houghton, D. Woodruff, P.L. Striplin, M. Miller, M. Pedersen, A. Skillman, R. Kropp, A. Borde, C. Freeland, K. McArthur, V. Fagerness, S. Blanton, and L. Blackmore. 2001. Reconnaissance Assessment of the State of the Nearshore Ecosystem: Eastern Shore of Central Puget Sound, Including Vashon and Maury Islands (WRIAs 8 and 9). J.S. Brennan, Editor. Report prepared for King County Department of Natural Resources, Seattle, WA.

Williams, W., R. Laramie, and J. Ames. 1975. A catalog of Washington streams and salmon utilization, Volume 1 – Puget Sound Region. Washington Department of Fisheries, Olympia, WA.

WRIA 6 Project Sponsor Procedural Manual. 2002. Revised April 2003, January 2004. Island County Public Works.