







King County's
PLANS FOR SUPPORTING THE PUGET SOUND PARTNERSHIP

FINAL RESPONSE TO ORDINANCE 15869

DECEMBER 2007

King County

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SECTION 1 — INTRODUCTION

Carved by glaciers and fed by 10,000 rivers and streams, Puget Sound is an ecosystem defined by the movement of water. The pace of growth in the region, coupled with associated increases in impervious surface, alteration and loss of habitat, and pollutants in the air and water, is imperiling the health of the Sound. Human activities have introduced a variety of chemicals into the environment at levels that can be toxic to fish, wildlife, and humans. Persistent toxic contaminants continue to enter Puget Sound from a variety of sources. Some of these contaminants can cycle through the ecosystem for years. They become concentrated in sediments and the bottom-dwelling organisms that live there and then move through the food chain and accumulate to harmful levels in fish and wildlife.

Puget Sound is also vulnerable to nutrient and pathogen pollution from a variety of human and animal waste sources. Nutrient pollution is contributing to low dissolved oxygen conditions and sporadic fish kills in Hood Canal. Other parts of the Sound are likely to be vulnerable to oxygen depletion as well. Pathogen and bacterial pollution have restricted harvest at nearly one-third of the Sound's commercial shellfish growing areas, and the number of shellfish beds threatened with closure continues to grow. This pollution has also restricted recreational activities such as swimming (*State of the Sound*, Puget Sound Partnership, 2007).

In 2007, the Washington State Legislature established the Puget Sound Partnership (PSP) to lead efforts to protect and restore Puget Sound and its spectacular diversity of life, now and for future generations. PSP identified six goals as essential for creating a healthy Puget Sound:

- A healthy and prosperous human population supported by a healthy Puget Sound that is not threatened by changes in the ecosystem
- A quality of life that is sustained by a functioning ecosystem
- Healthy and sustaining populations of native species in Puget Sound, including a robust food web
- A healthy Puget Sound where freshwater, estuary, nearshore, marine, and upland habitats are protected, restored, and maintained
- An ecosystem that is supported by groundwater levels as well as river and streamflow levels sufficient to sustain people, fish, and wildlife, and the natural functions of the environment
- Fresh and marine waters and sediments of sufficient quality so that the waters of the region are safe for drinking, swimming, shellfish harvest and consumption, and other human uses and are not harmful to the native marine mammals, fish, birds, and shellfish of the region

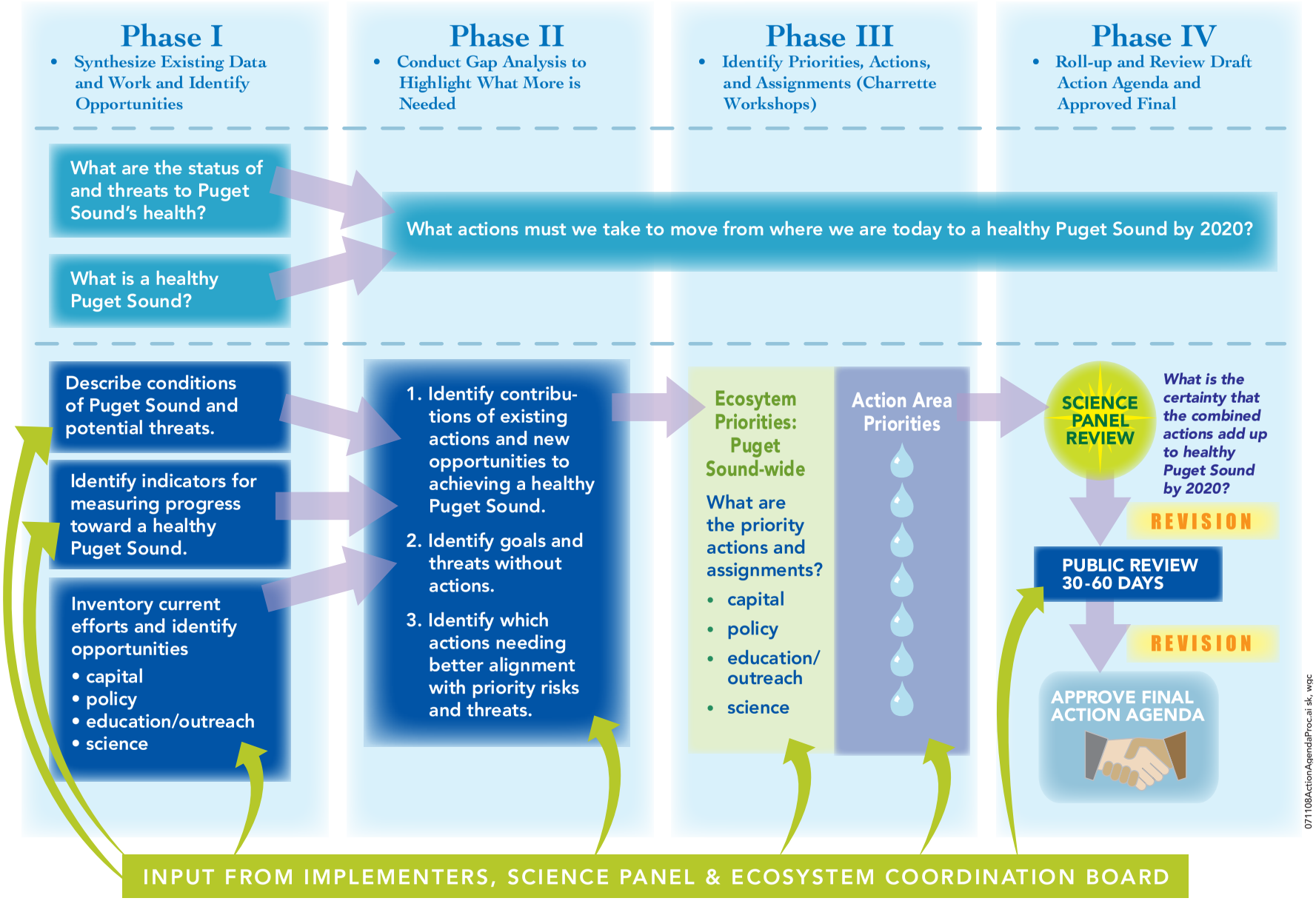
PSP will create a long-term action plan by September 2008. This plan, called the 2020 Action Agenda, will identify and prioritize actions, name those responsible for implementing the actions, identify funding, track progress, and publicly report the results. The plan will be developed in four phases: (1) synthesize existing data and information, (2) conduct a gap analysis to highlight what additional information and data are needed, (3) identify priorities, actions, and assignments, and (4) roll up, review, and approve the draft Action Agenda.

The legislation that created PSP calls for the establishment of seven geographic Action Areas. These areas collectively encompass the entire Puget Sound basin and include the uplands that drain to marine waters. In August and September 2007, PSP set the boundaries for the areas. King County is part of the South Central Puget Sound Action Area and the Whidbey Island Action Area.

Proposed 2020 Action Agenda Process

November 2, 2007

DRAFT



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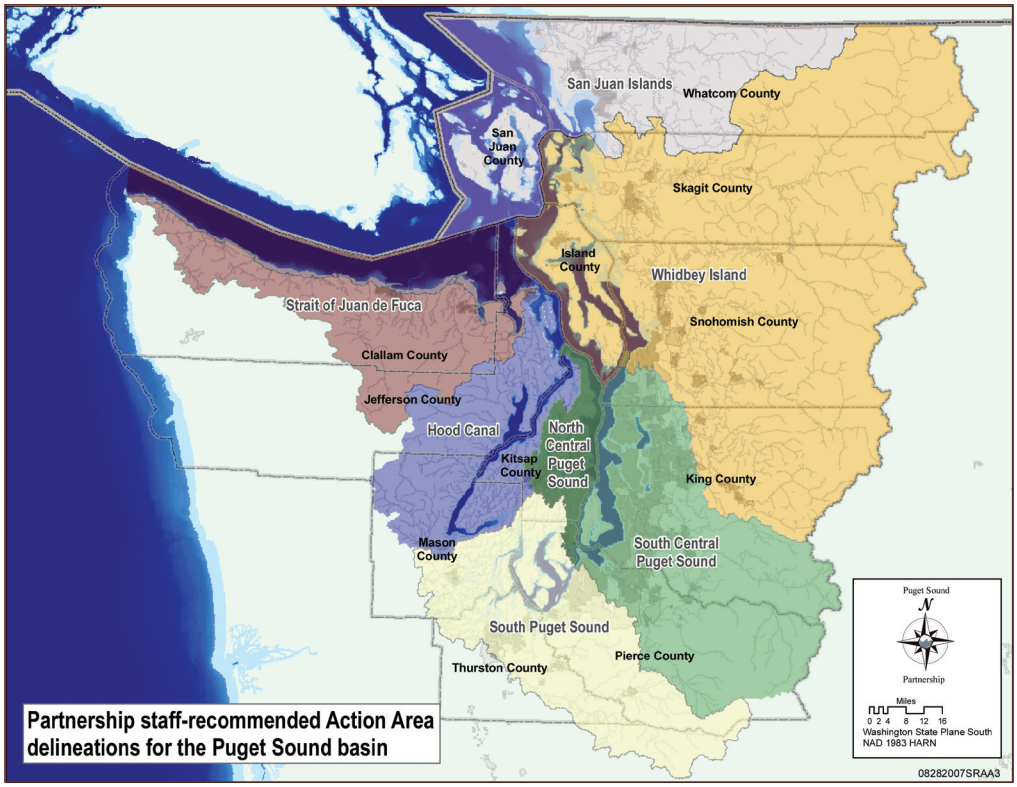


Just as King County played an active role in the development of PSP, it expects to play an integral role in development and implementation of the Action Agenda. On July 26, 2007, the King County Council approved Ordinance 15869. The ordinance calls for the development of a preliminary work program, expansion of water quality monitoring programs and scientific studies, and analysis of reorganization options to allow King County to support the work of the partnership. On September 16, 2007, the preliminary response to Ordinance 15869 was submitted to Council. The response reported on what had been done to-date and how King County would work through the end of 2007 with PSP to identify and prioritize actions that will move Puget Sound recovery forward.

Since the preliminary work plan was submitted to Council, PSP has made strides in several important areas. It appointed members to the Ecosystem Coordination Board and the Science Panel and is preparing to assume responsibility for implementation of the Puget Sound Salmon Recovery Plan, previously overseen by Shared Strategy for Puget Sound (see Section 2).[1] PSP participated in a steering committee that collaborated in preparing a preliminary report, issued by the Washington State Department of Ecology (Ecology) in November 2007, that estimates the amounts and sources of toxic chemicals that are getting into Puget Sound. In addition to representatives from PSP, the steering committee included representatives from several Ecology programs, the U.S. Environmental Protection Agency (EPA), and King County.

King County departments have also made strides since completion of the preliminary work plan and are looking to the future to consider how our programs can address Puget Sound recovery. King County has formed a Puget Sound Team with representative staff from the various departments and divisions working on Puget Sound Recovery. This final response to Ordinance 15869 replaces the initial response and offers a more in-depth work program that is informed by King County Puget Sound Team meetings, by comments from Council, and by discussions with PSP staff. This response is both a report to the King County Council and a description of how King County, a large local and regional government, is responding to PSP's mission.

[1] On October 1, 2007, Executive Sims was appointed to the Ecosystem Coordination Board as the representative of the South Central Puget Sound Action Area.

This response is organized as follows:

- Section 1—Introduction
- Section 2—PSP's approach and organization
- Section 3—King County's proposed organization for working with PSP
- Section 4—Programs and activities for responding to the five PSP-identified areas for immediate action
- Section 5—Existing monitoring efforts and proposed expansions to these efforts
- Section 6—Strategies for communicating with the public and coordinating with other entities, including collaborating with PSP and the state Legislature to encourage the formation of a task force to research science and policy issues related to the establishment of marine reserve areas in Puget Sound
- Section 7—A proposed work plan and schedule for 2008

SECTION 2 — THE PARTNERSHIP'S COLLABORATIVE APPROACH TO MEET ITS GOALS

PSP recognizes that the 2020 Action Agenda must be scientifically based and widely supported by the public. It therefore has developed a collaborative strategy and organizational structure for its development and implementation. The following principles will guide development of the Action Agenda:

- Interested parties are essential participants in the process.
- Collaboration and cooperation across sectors and interests is vital.
- The Action Agenda creation process should be clear and transparent from the beginning.
- Public engagement is critical and should be tied to the Partnership's broader public campaign.
- The process should include a scientific review of proposed actions.
- In the action areas, the focus will be on working with implementers rather than creating new organizing structures at the action area level.

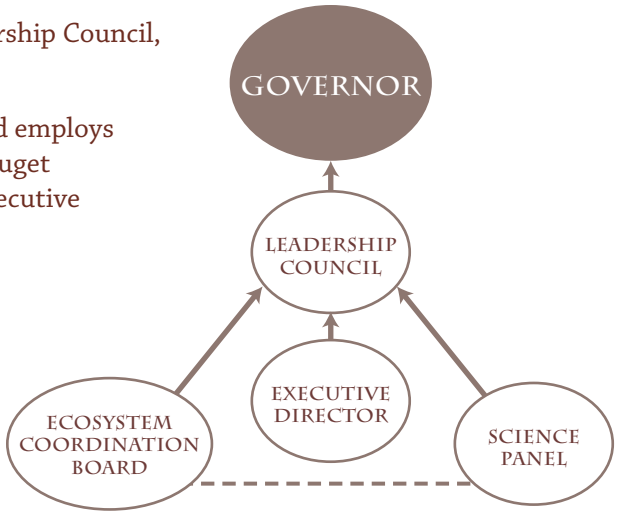
In keeping with these principles, PSP will work with local watershed groups, tribes, cities, counties, special purpose districts, and the private sector in the seven action areas to do the following:

- Consider scientific information on the ecosystem risks in their area.
- Identify key actions to address these risks.
- Evaluate existing programs and plans.
- Recommend area-specific actions, programs, and strategies for adoption in the Action Agenda.

PSP will assume the functions of regional salmon recovery. Shared Strategy for Puget Sound will relinquish its responsibilities on January 1, 2008. PSP will support the Puget Sound Recovery Council, a forum of 29 members responsible for overseeing the implementation of the Salmon Recovery Plan adopted by NOAA Fisheries in 2007. The Salmon Recovery Plan will also serve as a model for the Action Agenda because it uses measurable goals, prioritizes actions based on best available science, and addresses ecosystem processes and biodiversity.

PSP has been given the authority to adopt measures, including performance agreements with entities receiving money to ensure that state funds allocated to the Action Agenda are achieving the intended results. Entities receiving state funds are required to report publicly on their progress to PSP every two years. PSP is then required to report publicly to the governor every two years on progress made toward the Action Agenda. If PSP determines that an entity is in "substantial noncompliance" with implementing the applicable provisions of the Action Agenda, it will work with that entity to remedy the problem. If the problem persists, PSP can recommend to the governor that appropriate state funds be withheld until the situation is fixed.

PSP is organized around an Executive Director, Leadership Council, Ecosystem Coordination Board, and Science Panel.



An Executive Director leads day-to-day operations and employs a professional staff including the former staff of the Puget Sound Action Team. David Dicks was appointed as Executive Director by Governor Gregoire in August 2007.

The Leadership Council is the governing body of the Puget Sound Partnership. Its seven members are leading citizens chosen from around the Sound and appointed by the governor. Governor Chris Gregoire named Bill Ruckelshaus the first chair.

The Ecosystem Coordination Board advises PSP's Leadership Council on carrying out its responsibilities. In addition, it will fulfill the following functions:

- Compile and assess ecosystem-scale management projects and programs for inclusion in the Action Agenda.
- Assist participating entities in compiling local programs for inclusion in the Action Agenda.
- Seek public and private funding.
- Assist the Leadershup Council in conducting public education activities.
- Identify conflicts and disputes among projects and programs

The board is made up of 27 individuals representing specific interests around the Sound:

- One member from each of the seven Puget Sound Action Areas
- One member from each of the following: a county, a city, and a port district
- Two members from each of the following: general business interests and environmental interests
- Three members from each of the following: state government, tribes, and federal government
- Four state legislators (one representing each caucus in each chamber)

The Leadership Council appointed 14 members to the Ecosystem Coordination Board; other groups and interests appointed 7 members representing state legislative caucuses and agencies; and the governor invited the remaining 6 members (3 representatives of tribal governments and 3 representatives of federal agencies). Executive Sims has been appointed to the board, representing the South Central Puget Sound Action Area, and is serving as chair of the board.

PUGET SOUND PARTNERSHIP APPOINTEES

ECOSYSTEM COORDINATION BOARD MEMBERS

Representing the Actions Areas:

Strait of Juan de Fuca
Steve Tharinger, *Clallam County Commissioner*

San Juan Islands
Bob Kelly, *Nooksack Indian Tribe*

Whidbey Island
Gary Rowe, *Skagit County Administrator*

North Central Puget Sound
Steve Bauer, *Kitsap County Board of Commissioners*

South Central Puget Sound
Ron Sims, *King County Executive*

South Puget Sound
Dan Wrye, *Pierce County*

Hood Canal
Teri King, *Washington Sea Grant*

Representing business interests:

Samuel Anderson, *Master Builders Association of King and Snohomish Counties*

Representing small business interests:

Bill Dewey, *Taylor Shellfish*

Representing cities:

Jeanne Burbidge, *Council member, Federal Way*

Representing counties:

Kevin Ranker, *San Juan County Councilman*

Representing environmental interests:

Kathy Fletcher, *Puget Sound Environmental Caucus, People for Puget Sound*

Jacques White, *Puget Sound Environmental Caucus, The Nature Conservancy*

Representing federal agencies:

Robert Lohn, *National Oceanic and Atmospheric Administration*

Tom Eaton, *Environmental Protection Agency*

Ken Berg, *U.S. Fish and Wildlife Service*

Legislative caucuses:

Dale Brandland, R, *42nd District / Whatcom County Washington State Senate*

Phil Rockefeller, D, *23rd District / Kitsap Washington State Senate*

Christine Rolfes, D, *23rd District / Kitsap Washington State House of Representatives*

Bob Sump, R, *7th District Washington State House of Representatives*

Representing port districts:

John Calhoun, *Port Commissioner, Port Angeles*

Representing tribal governments:

David Troutt, *Nisqually Tribe*

Randy Kinley, *Lummi Tribe*

Dave Herrera, *Skokomish Tribe*

Representing Washington state agencies:

Jeff Koenings, *Director, Washington Department of Fish and Wildlife*

Jay Manning, *Director, Washington State Department of Ecology*

Doug Sutherland, *Commissioner of Public Lands, Washington Department of Natural Resources*

LEADERSHIP COUNCIL MEMBERS

Bill Ruckelshaus (chair)
Billy Frank, Jr.
Diana Gale
Martha Kongsgaard
Dan O'Neal
Steve Sakuma
Bill Wilkerson

Biographies for these members can be found in Appendix D.

SCIENCE PANEL MEMBERS

Joel Baker, *University of Washington Tacoma*
Guy Gelfenbaum, *U.S. Geological Survey*
Robert Johnston, *U.S. Navy*
Jan Newton, *University of Washington*
Timothy Quinn, *Washington Department of Wildlife*
Frank Shipley, *U.S. Geological Survey*
John Stark, *Washington State University*
Usha Varanasi, *National Oceanographic and Atmospheric Administration*
Katharine Wellman, *Northwest Economics, Inc.*

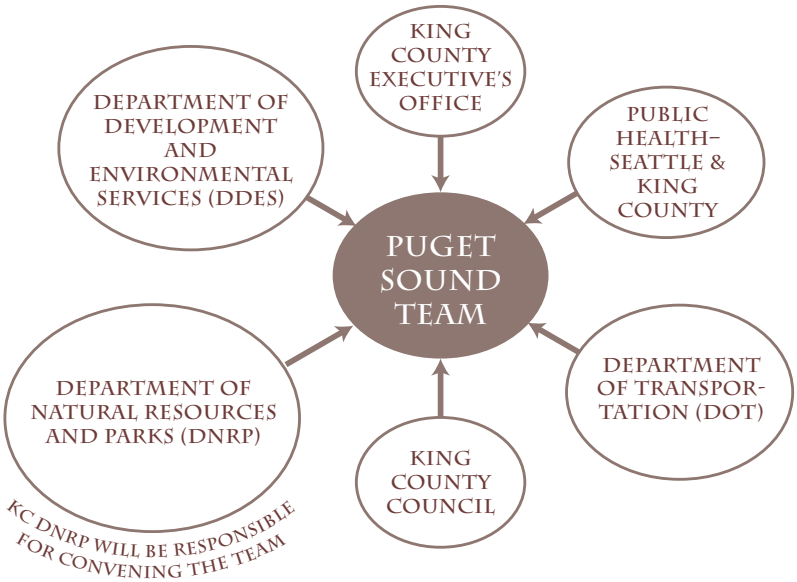
Source: PSP Web site, December 2007

The Science Panel provides independent scientific advice to the Leadership Council. Its nine members were appointed by the Leadership Council to two-, three-, and four-year terms from a list of 15 nominees submitted by the Washington Academy of Sciences. The PSP's Executive Director will designate a lead staff scientist to coordinate Science Panel actions and staff. The Science Panel will have a role in verifying the validity of the Action Agenda.

SECTION 3 — KING COUNTY ORGANIZATION FOR PUGET SOUND RECOVERY

It is critical that King County build stronger coordination among existing operations rather than creating a new organization, division, or unit to fulfill its responsibilities in Puget Sound recovery. Because the Action Agenda has not yet been drafted and because PSP is still establishing its own organization, a reorganization of King County offices would be premature. Affected branches of King County have agreed that it is better to simply strengthen coordination and communication between existing programs at this time.

During fall 2007, King County formalized the Puget Sound Team, an interdepartmental and interdisciplinary workgroup similar to the King County Climate Change Implementation Team. Most of the members of the Puget Sound Team have been meeting since 2005 to participate in the development of PSP. The team is charged with aligning and coordinating all of King County's work that affects the health and recovery of Puget Sound, including policy, operational, technical, and intergovernmental relations efforts. In addition, the team includes a strong communications and outreach component that will be closely coordinated with the public awareness campaign launched by PSP.



Puget Sound Team members will serve as points of contact for their divisions. They will work together to address tasks, take on assignments, and ask for assistance from other staff in their divisions to help with Puget Sound recovery. The Puget Sound Team includes staff from King County's Department of Natural Resources and Parks (Wastewater Treatment Division, Water and Land Resources Division, and Director's Office), Department of Transportation (Roads Division), Department of Development and Environmental Services, Public Health–Seattle & King County, King County Council, and the Executive's Office. Other departments and divisions will be included as needed. The Department of Natural Resources and Parks (KCDNRP) is responsible for convening and overseeing the team. One of the team members, David St. John, Water Resources Special Projects Manager in the KCDNRP Director's Office, is assigned to PSP for 50 percent of his time during development of the 2020 Action Agenda. This staff time is funded in part by PSP.

Similar to the county's efforts to address the impacts of climate change, many of King County's operations have a role in recovering and protecting Puget Sound. The individuals who will serve on the team will all have direct responsibilities related to the protection of Puget Sound in addition to the other duties they perform for their departments. The extent and diversity of their knowledge and responsibilities will enable them to lead and understand the complexity of actions and strategies needed to protect and recover Puget Sound. This organizational structure will have no impact on the 2008 budget. Future budgetary impacts will be evaluated and, as appropriate, included in executive proposals for 2009 and beyond.

The Puget Sound Team will provide expertise, as requested, to PSP as it moves forward with development of the Puget Sound–wide Action Agenda, including helping to define a timeline and to develop implementation and funding strategies to achieve the outcomes. The team will coordinate with a number of entities:

- It will work to provide the Ecosystem Coordination Board with King County's understanding of the regulatory, operational, technical, and funding roles and responsibilities of local jurisdictions in Puget Sound's recovery and protection.
- It will coordinate closely with and participate in the Washington Association of Counties (WSAC) Coastal Counties Caucus. This coordination will continue the successful coordination undertaken by King County staff during the past two years. The Coastal Counties Caucus is expected to serve in a coordinating role for counties, and the Association of Washington Cities (AWC) is expected to play a similar role for cities in the Puget Sound area. Both WSAC and AWC nominated one member each to the Ecosystem Coordination Board.
- It will coordinate closely with the WRIA salmon recovery efforts. It is anticipated that because of their existing successful multi-jurisdictional forums, the WRIA groups will be the primary venues for coordinating efforts with cities in King County. As a first step in this coordination, Puget Sound Team members attended the December 12, 2007, multi-watershed assembly.

MEMBERS OF KING COUNTY'S PUGET SOUND TEAM

Maura Brueger, *Senior Advisor for Federal Relations, Intergovernmental Relations Section, King County Office of the Executive*

Theresa Jennings, *Director, KCDNRP*

Greg Bush, *Manager, Planning and Compliance Section, Wastewater Treatment Division, KCDNRP*

Linda Dougherty, *Division Director, Roads Services Division, Department of Transportation*

Larry Fay, *Manager, Environmental Health, Public Health–Seattle & King County*

Jennifer Giambattista, *Senior Legislative Analyst, General Government and Labor Relations Committee, King County Council*

Mark Isaacson, *Division Director, Water and Land Resources Division, KCDNRP*

Sandra Kilroy, *Manager, Regional Services Section, Water and Land Resources Division, KCDNRP*

Jane Lamensdorf-Bucher, *Regional Water Planning Manager, Water Policy Unit, KCDNRP*

Shirley Marroquin, *Supervisor, Environmental Planning & Community Relations, Wastewater Treatment Division, KCDNRP*

Dave Monthie, *Regional Water Policy Analyst, Water Policy Unit, KCDNRP*

Sarah Ogier, *Supervisor, Regional Partnerships Unit, Regional Services Section, Water and Land Resources Division, KCDNRP*

Mike Reed, *Legislative Lead Analyst, King County Council*

Harry Reinert, *Special Projects Manager, Department of Development and Environmental Services*

Joanna Richey, *Assistant Division Director, Water and Land Resources Division, KCDNRP*

David St. John, *Water Resources Special Projects Manager, Water Policy Unit, KCDNRP*

Randy Shuman, *Manager, Science, Monitoring and Data Management Section, Water and Land Resources Division, KCDNRP*

Christie True, *Division Director, Wastewater Treatment Division, KCDNRP*

In 2008, the team will work with PSP and with other jurisdictions to ensure that King County's expertise and knowledge of Puget Sound are used to do the following:

- Assist in development of draft 2020 Action Agenda priorities
- Set priorities for countywide projects and technical studies that will help obtain state and federal funding via PSP in the 2020 Action Agenda
- Assess the county's readiness and resources to contribute to the necessary environmental monitoring and studies that are required to support PSP
- Coordinate communications and meetings with PSP and local jurisdictions in King County
- Coordinate all county programs related to the restoration and protection of Puget Sound
- Collaborate strategically with PSP to evaluate new and expanded funding options and opportunities for establishing partnerships with diverse stakeholders

During the next 12 months, the team will also work in collaboration with PSP's Executive Director and staff to evaluate effective policy and regulatory options that promote protection and recovery of Puget Sound. The team will then evaluate the extent to which such options will require policy, regulatory, or organizational changes for King County.

The Puget Sound Team will assess the King County organizational structure upon completion of the 2020 Action Agenda and as PSP moves to implement the agenda. At that time, the Puget Sound Team may recommend that a different organizational structure is needed to ensure that King County aggressively implements its responsibilities under the Action Agenda.

SECTION 4 — PLAN FOR ADDRESSING AREAS OF IMMEDIATE ACTION

King County is already a leader in environmental protection and will work with the region to further improve our stewardship of Puget Sound. The King County Department of Natural Resources and Parks (KCDNRP) and other county agencies administer numerous programs that support the PSP's vision and goals. Many of these programs offer award-winning and innovative approaches to managing natural resources and public infrastructure. KCDNRP proposes to coordinate and identify countywide priorities for Puget Sound actions and funding through these existing and successful collaborative programs.

In order to identify critical components of King County's work plan for Puget Sound recovery, we have assessed our ability to address the five immediate actions requested by the Governor (*Sound Health, Sound Future, Puget Sound Partnership Recommendations*, December 2006). The immediate actions are as follows:

1. Identify and address areas with immediate septic problems
2. Protect Puget Sound habitat
3. Implement priority projects to restore damaged forests, rivers, shorelines, and marine waters
4. Accelerate control and cleanup of toxic pollution
5. Significantly reduce polluted stormwater runoff

The following subsections briefly describe the issues—both regionally and in King County—that are prompting immediate action in each area. Each subsection then outlines what the county is currently doing in each area; what the county intends to do in coming years; and what technical, data, and regulatory gaps must be addressed to help implement these immediate actions. (All King County environmental monitoring related to these actions and to Puget Sound in general is described in Section 5 – Environmental Monitoring.) This compilation is an important step in meeting King County's goal of Puget Sound recovery and it may also serve as a model for other counties and cities for supporting PSP.

More detailed descriptions of existing programs and activities that support PSP goals are included in Appendix A.

IMMEDIATE ACTION 1—Identify and Address Areas with Immediate Septic Problems

Human waste contains high levels of nutrients (such as nitrogen and phosphorous) and pathogens (such as harmful bacteria and viruses). These pollutants can enter Puget Sound waters from a variety of sources including septic systems. Faulty septic systems are a significant problem throughout Puget Sound and especially in areas like Hood Canal and much of the South Sound. Permitting for septic tanks has been inconsistent over the years and repairing failing septic tanks can be quite expensive.

An immediate area of concern for King County are the systems on Vashon and Maury Island. Much of the shoreline has been developed for many years. A number of properties have onsite systems that pre-date any regulatory oversight and most are undocumented. Washington State Department of Health surveys have indicated that suspect and failing systems are a significant problem along the west shore of Quartermaster Harbor, in some areas along East Passage, and in pockets along Colvos Passage.

Efforts to address septic problems in Quartermaster Harbor have included extensive outreach and meetings with community groups and individuals to open constructive dialog between property owners and Public Health–Seattle & King County (PHSKC) to characterize the problem and, in a broad way, identify the range of solutions. These efforts have resulted in replacement of a number of shoreline septic systems over the past year, not only in Quartermaster Harbor but also across the island. PHSKC is receiving an increasing number of inquiries from property owners asking what they can do to replace their existing systems, bring their properties closer to compliance, and reduce their impact on Puget Sound. In the past, PHSKC rarely received such inquiries. Despite these accomplishments, the majority of systems remain undocumented.

While most of the onsite sewage concerns are in unincorporated King County, significant numbers of shoreline septic systems are located in the suburban cities south of Seattle. In cities south of Seattle where PHSKC has authority over onsite sewage systems, the implementation of onsite strategies is complicated by the overlay of the municipal land use authority and the service area boundaries of the sewer utilities.

What King County Is Doing to Address Septic Problems

Public Health–Seattle & King County (PHSKC) is responsible for assuring that installed, modified, or repaired onsite sewage systems (septic tank systems) in King County meet state and local regulations. In addition, PHSKC is required to identify areas where marine water quality is threatened or impaired as a result of contamination from onsite sewage systems, to designate these areas as Marine Recovery Areas (MRAs), and to develop a plan to identify failed septic systems within the

MRAs and assure that the systems are repaired and maintained. Future state funding commitments allow for about 0.35 FTE, which PHSKC anticipates will be used primarily to help build systems or processes to assure that septic systems are monitored in MRAs.

PHSKC is fee funded and staffing, therefore, is geared primarily toward processing permit applications. There is little funding available to properly find and correct failing septic systems throughout the county.

The **Wastewater Treatment Division (WTD) of KCDNRP**, in keeping with policy in the Regional Wastewater Services Plan, considers development and operation of community wastewater treatment systems if specific circumstances are met, such as documented public health hazards or water quality impairment. Recent examples include construction of two community systems to replace failing septic systems on Vashon Island and a new treatment plant in the City of Carnation to replace inadequate and, in some cases, failing septic systems. The **Water and Land Resources Division (WLRD) of KCDNRP** conducts monthly monitoring for fecal coliform indicator bacteria at various sites throughout King County.

The **Roads Services Division (RSD) of the Department of Transportation (DOT)** routinely works with property owners to replace septic systems in areas affected by RSD projects.

At the planning level, the **King County Department of Development and Environmental Services (DDES)**, through management of the King County Comprehensive Plan, is working to limit development in rural areas, which are required to rely on septic systems, and is encouraging development in urban areas where sewer systems are more often available.

Planned Activities and Important Challenges

Effective repair and replacement of onsite sewage systems cannot be done without a great deal of community work. More funding at every level of government would allow PHSKC staff to more closely monitor and help fix failing septic systems. It would also allow for greater public education. Without infusion of additional funding or reprioritization of current funding sources other than fees, PHSKC's ability to conduct community based work is severely limited.

Most septic repairs along marine shorelines are very expensive ($25,000 to $40,000). Access to grants and low-interest loans may help some property owners retrofit failing systems. Use of State Revolving Funds for septic repairs is limited by both legal impediments (mainly the financial risk the county assumes in lending money to private property owners) and administration costs. PHSKC lacks the resources to manage loan programs. The county and the state should work together to make loans available to the private sector on a regional basis rather than each county or jurisdiction managing individual programs.

Many existing septic systems are located on small properties with poor soil conditions, making conforming repairs challenging and more costly. Even with state-of-the-art and compact technologies, these properties do not have sufficient space for infiltration systems. Repairs must also comply with other regulations such as the Critical Areas Ordinance (CAO) and Shoreline Master Program.

Access to property for inspection and evaluation can occur only with property owner permission or with a valid search warrant. Except under certain limited circumstances, administrative search warrants have not been authorized. Effectiveness monitoring in receiving waters with adjacent septic systems is expensive, time-consuming, and may lead to inappropriate conclusions without evaluation of individual systems.

With increased funding, PHSKC would promote the following:

- More individualized technical assistance to help property owners evaluate options for replacing existing septic systems
- Technology demonstrations
- More community-based efforts to build local accountability for ongoing septic system performance
- Coordination with WTD to demonstrate small community systems using emerging technologies such as membrane bioreactors managed by a public utility as a cost-effective alternative
- Promote onsite reuse of highly treated effluent, possibly for both indoor and outdoor nonpotable purposes (may require legislative authority)
- Use canine units (like in Pierce County) to find failing septic systems
- Complete the linkage of PHSKC's digitized documents to its database system and provide GIS and Web access to its records
- Make better use of its GIS capability to illustrate current conditions and track progress in an easily understood format

Finally, coordination needs to be improved between King County divisions that monitor receiving waters (WLRD, WTD) and divisions with regulatory authority (PHSKC). Neither RSD nor WTD has comprehensive programs in place to systematically replace or upgrade faulty septic systems. WTD has limited authority and resources to do so. RSD relocates septic systems only in relation to specific road projects. Consequently, the bulk of responsibility to address these issues lies with PHSKC.

Recommendation for the 2008 Work Plan

- In coordination with PSP Sound-wide efforts, develop a strategy for increased funding for PHSKC's monitoring and coordination related to onsite sewer system issues, including looking at reprioritization of existing funds (with PHSKC as the lead)
- Support alternative funding for septic repairs and provide options to landowners with limited land available for traditional systems (with PHSKC as the lead)

IMMEDIATE ACTION 2—Protect Puget Sound Habitat

Remaining critical habitat is disappearing, along with the plants and animals that need threatened and unique ecological conditions to survive. The pace of growth and corresponding changes to our forest and agricultural land base and our shorelines has far outstripped habitat protection and restoration efforts. Another 1.4 million people are expected to live here by 2020. Protecting Puget Sound habitat will require substantially increasing compliance of existing laws that protect habitat, water quality, and streamflows through actions that promote behavioral changes on public and private properties such as public outreach, partnerships, updates to local programs and ordinances, and technical support.

King County has seen a significant loss of forest and agricultural lands because of the region's demands for housing. The county is home to Washington's largest cities and one of the largest container ports in the nation. Much of the county was developed prior to the establishment of current standards that aim to mitigate development's largest impacts on the environment. Development has greatly altered our land and water resources from their natural condition, resulting in loss of habitat. Climate change computer models predict dramatic changes to the hydrologic cycle (snowpack, storm patterns) that could exacerbate current habitat challenges.

In fact, one of the biggest threats facing the region's ecological habitats is climate change. In 2006, the King County Executive issued orders to address climate change, and in 2007, the county published the King County 2007 Climate Plan.[2,3] King County has established a team to implement the climate plan that includes representatives from all affected departments, including DNRP, DDES, DOT, DES, PHSKC and the Executive Office.

What King County Is Doing to Protect Puget Sound Habitat

Regulations

King County protects Puget Sound shorelines, its tributary rivers and streams, and associated wetland habitats through critical area regulations in unincorporated King County and through the Shoreline Master Program. It also protects its watersheds through requirements that between 50 and 65 percent of forest cover be retained on rural area properties. **DDES** manages and enforces land use controls that protect habitat. Its current efforts include working in partnership with WLRD to develop an updated Shoreline Master Program.

Roads and Construction

RSD has implemented a number of programs to protect habitat. The division has developed a guide of best management practices for identifying, designing, and implementing wildlife crossings in King County transportation corridors. It has also broadened its environmental evaluations for capital road projects to include other wildlife not protected by the Endangered Species Act. RSD uses a programmatic mitigation approach to compensate for wetland and stream impacts caused by larger projects.

Reducing Loadings to Puget Sound

WTD plays a key role in protecting Puget Sound Habitat through continuing efforts to reduce wastewater loadings to Puget Sound. Recently, the new Vashon Wastewater Treatment Plant replaced an aging facility that had experienced many water quality permit violations. This project resulted in the reopening of 160 acres of previously closed shellfish beds for commercial harvest. WTD also is working to reduce the volume of discharge to Puget Sound through its reclaimed water program. The division is building reclaimed water pipelines in association with the new Brightwater Treatment Plant that will convey up to 7 million gallons per day of reclaimed water to customers in the region.

Acquiring Land and Development Rights

WLRD protects habitat through a variety of acquisition strategies that create public ownership for sensitive and/or critical habitat. The county's current inventory of protected lands includes 6,200 acres of ecological lands, 3,500 acres of forestry lands, and nearly 100,000 acres of conservation easements. The county also holds or enforces extinguished development rights for a total of 95,934 acres (over 500 acres through the Transfer of Development Rights [TDR] Program). The TDR program allows development rights to be exchanged from areas where resource protection is a priority to areas in the Urban Growth Area where increased densities are consistent with the Growth Management Act.

Providing Incentives for Landowner Stewardship

The county, under **WLRD** management, also offers incentives and technical assistance for private landowners who wish to conserve resources on their property. Programs such as the Public Benefit Rating System, the Timber Land Program, and Forest Land and Farm and Agricultural Lands

[2] The executive orders to reduce global warming (PUT 7-5 to 7-8 [AEO]) are available at *http://www.metrokc.gov/recelec/archives/sysindex.htm*

[3] The King County 2007 Climate Plan is available at *http://www.metrokc.gov/exec/news/2007/pdf/ClimatePlan.pdf*

programs provide incentives through lower property taxes. Programs such as the Forest and Rural Stewardship Programs and the Farm Management Program provide technical assistance to landowners regarding stewardship actions, such as best management practices, they can take on their properties.

Planning for Future Water Supplies
In 2005, King County signed a memorandum of understanding with Cascade Water Alliance to work on water resource and water supply planning. King County and the members of Cascade Water Alliance have interests in the fastest growing parts of the county, where it is critical to address the challenge of maintaining adequate water supply for people and adequate streamflows for fish and the environment. As a result of the memorandum, the county convened a multi-stakeholder group that defined technical questions that are being considered. One expected outcome will be for the county and Cascade Water Alliance to undertake a coordinated water system plan that will address demand and supply alternatives such as Lake Tapps and reclaimed water. The county is also incorporating outcomes and recommendations from the regional process into its comprehensive plan.

Planned Activities and Important Challenges

Funding for Land Preservation
Even though the recent parks expansion levy helps a lot, there is still limited local funding for property acquisition, incentive programs, and technical assistance. Property values continue to rise, and many conservation priority parcels are threatened by development pressures. There continue to be increasing costs to purchase and maintain land. Many cities have concerns about accepting the added density created by private-to-private transferred rights through the TDR program. There is limited funding for maintenance of county-owned ecological and other open space lands, or for necessary restoration, noxious weed treatment, resource inventories, and other capital improvements. These limitations necessitate caution when considering whether to acquire new lands. It may be more effective to focus on purchase of conservation easements and development transfers rather than fee simple purchases. Additionally, receiving sites for transfer of development rights are in the Urban Growth Area. When the receiving sites are within cities, funding and other strategies are needed to encourage the cities to accept the greater densities. The funding sources used to pay for TDR staffing are all declining or oversubscribed.

Enhancing Protection Through Road Projects
Opportunities to enhance protection efforts within RSD projects could be expanded with additional financial support for more comprehensive studies, increased cooperative partnerships, and greater flexibility in the regulations for consolidated mitigation approaches and for beneficial project elements required in permit conditions.

Meeting and Setting Effective Standards and Regulations
The updated Shoreline Master Program, drafted to be consistent with Ecology's current Shoreline Guidelines, will carry forward the Critical Area Regulations and include requirements related to protecting King County's shorelines, including the marine shorelines of Vashon-Maury Island. The Shoreline Master Program is based on an updated analysis of shoreline conditions and will include additional shoreline designations that allow better protection of sensitive shoreline areas. The updated program will be fully integrated into King County's Comprehensive Plan to ensure consistency between land use planning and shoreline protection. The program will also incorporate the management recommendations of the Maury Island Aquatic Preserve. King County Council is expected to review an updated Shoreline Master Program in fall 2008 as part of a Comprehensive Plan update.

DDES has been awarded a grant from Ecology to explore whether conducting additional inspections during construction will lead to improved compliance with critical area regulations. In addition to this study, DDES and WLRD are developing a monitoring program that will evaluate the effectiveness of critical area regulations in protecting the functions and values of streams, wetlands, and other environmentally sensitive areas. This information will be valuable in evaluating whether the existing regulations are meeting their intended purpose.

Cumulative Impacts of Existing Development

Regulations to protect habitat are thought to be effective at limiting future harm but cannot address past activities that have already altered or destroyed habitat. The cumulative impacts of activities that either do not require permits or are conducted without required permits often result in significant habitat modification. King County has very limited ability to prevent further cumulative impacts from these activities. Education and incentives as well as interjurisdictional cooperation are tools that can be used to help address some of these cumulative impacts.

Managing Wastewater Discharges to Puget Sound

WTD will soon begin the process to renew its five-year NPDES permit for the West Point plant, which includes all CSO locations and associated treatment facilities. During public review for the NPDES permit, additional issues are often raised by stakeholders such as environmental groups. Issues identified by stakeholders include questions about the appropriateness of mixing zones, which are areas around treated wastewater discharges where the water quality standards may be exceeded. They also include recommendations that WTD review the approach and schedule for addressing sediment quality near CSO outfalls and reduce total discharges to Puget Sound by beneficially using more reclaimed water on land. Substantial reductions of mixing zones, acceleration of the CSO program, or additional effluent quality requirements could have significant budget and rate impacts.

To control the quality of discharges to the wastewater system, the Industrial Waste Program will develop local limits for industrial dischargers to WTD's two new treatment plants (Brightwater and Carnation) and will review and possibly update limits for other WTD facilities. Limits for Brightwater will consider the downstream use of reclaimed water.

Planning for Climate Change

DDES is leading the 2008 update to King County's Comprehensive Plan. The plan will include new provisions directed at addressing climate change, including policies designed to reduce King County's contribution to greenhouse gases and policies intended to respond to effects of global warming.

WTD is developing strategies to deal with possible changes in precipitation and sea level rise through several existing and future programs. Through the King County Climate Planning Implementation Team and the University of Washington's (UW's) Climate Impacts Group, work is under way to develop reasonable sea-level rise scenarios for planning purposes. WTD is conducting a vulnerable facilities inventory to identify low lying facilities that may be affected by sea-level rise and will develop a series of response strategies to protect and/or relocate facilities over time.

WLRD will prepare for the impacts of climate change by enhancing current activities and considering new endeavors in support of climate change preparation efforts. For example, WLRD is contracting with the UW Climate Impacts Group to help predict climate impacts on natural resources (such as changes in river hydrology and sea level rise).Ongoing monitoring and modeling efforts must be updated to reflect the pressures on ecosystems resulting from climate change. With these new data, the county could make better decisions about how to prepare for climate change.

Climate change is predicted to increase flooding risks in river systems. Consequently, WLRD will be looking at opportunities to widen river corridors with levee setbacks, remove frequently flooded homes, and strengthen levees.

In addition, grant dollars have been secured from the federal government to locate and initiate development of a dairy waste digester. Site selection is planned for 2008. If constructed, the digester will convert methane gas produced from manure to electricity, thus reducing carbon emissions into the atmosphere.

Regional Water Resources and Supply Planning
Producing a regional water resource plan continues to present challenges, including finding willing partners interested in collaborating, because the authorities and mandates for such planning are assigned to multiple layers of government.

Reclaimed Water
WTD will initiate a reclaimed water comprehensive planning effort in 2008. The plan will identify alternatives, timeframes, and financing options to provide reclaimed water in the future. The goal of the plan is to enhance the natural environment by offsetting demands on existing water resources and decreasing the volume of treated wastewater discharged to Puget Sound.

Recommendations for the 2008 Work Plan

- Identify opportunities for enhanced protection on RSD projects (with DOT as lead)
- Conduct CSO treatment technology pilot study and submit CSO plan to Ecology (with WTD as lead)
- Initiate the reclaimed water comprehensive plan (with WTD as lead)
- Adopt a new Shoreline Master Program (with KCDNRP and DDES as co-leads and King County Council playing a major role)
- Support land conservation acquisitions and incentives programs (with WLRD as lead)
- Continue efforts to understand and address climate change (with King County Climate Team as lead)
- Continue to educate property owners and to implement the CAO (with DDES as lead)

IMMEDIATE ACTION 3—Implement Priority Projects to Restore Damaged Forests, Rivers, Shorelines, and Marine Waters

PSP describes the need for habitat restoration in its 2006 report:

> **Puget Sound has already lost an astonishing 80 percent of its estuary habitat, and at least one third of shorelines have been armored with riprap, bulkheads or otherwise altered.** Protection of remaining habitat alone will not be enough to attain ecosystem health; restoration of past damage in upland and marine areas is required.

Habitats in King County require restoration because conditions have been degraded by over a century of urban and suburban development. King County's rivers, uplands, and marine environment have been impacted by urban and suburban growth and have lost much of the natural habitat. While all these areas cannot be restored to pre-settlement conditions, there are many opportunities to improve and expand vital habitats.

Significant funding is needed to implement the highest priority projects that are ready to proceed as identified in salmon recovery plans, other species recovery plans, nearshore evaluation programs, and other programs.

What King County Is Doing to Restore Puget Sound Habitat

King County is both the service provider and a participant in three watershed-based salmon recovery forums. King County's WRIA (Water Resources Inventory Area) teams facilitate the work of the forums, advocate for habitat protection and restoration, and help to secure local and state dollars for specific restoration actions.

WRIA teams help their respective watersheds establish priorities for restoration and protection activities. They help local project sponsors secure the technical assistance and funding necessary to successfully complete a project. The WRIA teams also help local governments move forward with programmatic actions, such as stormwater regulation and land use controls, that can serve to protect extant habitat, prevent further degradation, and restore lost or degraded salmon habitat.

King County dedicates significant funds and effort to restoring aquatic habitats, using both local dollars and state and federal grant monies. In 2006, **WLRD** provided $3.1 million for habitat restoration, completing over 15 projects throughout the county. These projects had been identified as high priorities in WRIA salmon conservation or other regional plans.

Other efforts to restore habitat include **WTD's** $38.5 million contribution to habitat restoration, habitat protection, and land conservation in King and Snohomish Counties as a part of the mitigation program for the new Brightwater System. The division also works to restore habitat through its targeted project mitigation program, including a 43-acre salmon habitat and reforestation area on the Brightwater site in the Little Bear Creek basin. Mitigation for the Vashon Treatment Plant outfall funded derelict fishing gear removal from Puget Sound, a direct benefit to marine habitat.

In addition, **RSD's** Short Span Bridge Replacement Program and Drainage and Fish Passage Restoration Program replace road crossing structures such as aged stream-pinching bridges 20 feet or less in length and worn undersized culverts with fish friendly designs to restore access to spawning and rearing habitat. Access to over 70 stream miles has been restored through the program. **WLRD** has partnered with RSD on several culvert projects, helping to restore upstream habitat. Since 2000, WLRD has replaced an additional 19 culverts to restore access to approximately 6 miles of improved stream habitat. In this same period, WLRD has restored several dozen acres of wetland habitat through the Small Projects Program.

Planned Activities and Important Challenges

Funding

The biggest challenge for salmon-related protection and restoration activities is the lack of sufficient funding to implement approved projects. For example, King County is party to multi-jurisdictional interlocal agreements for recovery of three watersheds (WRIAs 7, 8, and 9). Each watershed needs a significant increase in funding to achieve its 10-year salmon recovery goals. Combined, these watersheds would need to nearly triple their total funding from a current amount of $17 million per year to the estimated $50 million per year required to implement the 10-year plans.

King County's own funding for habitat restoration projects is scarce. Funding for restoration (not related to mitigation for other impacts) primarily originates from Surface Water Management funds, which continue to decline because of annexations. State and federal funding is unpredictable, varies considerably from year to year, and typically requires a local match.

King County should work with PSP and other jurisdictions in the region to seek increased funding for Puget Sound habitat restoration projects.

Landowner, Community, and Land Use Issues
Many of the high priority restoration sites are in public ownership, but many others are privately held. Landowners' objectives may differ from the requirements of a large-scale habitat project. Stewardship programs and education can help achieve habitat benefits on private lands.

In addition, because habitat projects are intended to restore dynamic natural processes, they can be inherently unpredictable, resulting in uncertainties and periodic changes in the location of stream and river channels and other site features. It is difficult to implement dynamic projects in a cultural landscape that relies on stable and fixed features, such as roads and homes.

Habitat Restoration Through Bridge Replacements
RSD has identified 22 short span timber bridges that are being replaced between 2007 and 2012. The timber bridges are treated with creosote, which continues to leach toxic residue into nearby areas. Each new bridge will have a wider channel span to improve the upstream and downstream shoreline habitat. These changes will reduce channel scour near the bridge, which will likely increase the bridge service life and decrease maintenance needs. Reduced maintenance needs mean fewer disturbances to fish and wildlife. Protective channel bank plantings, seeding, and mulching will be provided to stabilize stream banks and to improve riparian habitat adjacent to these bridges. Furthermore, some of these bridge replacements will include stream enhancements, such as streambed gravels, boulders, and large woody debris, as appropriate and feasible.

Recommendations for the 2008 Work Plan

- Complete short span bridge replacements scheduled for 2008 (with DOT-RSD as lead)
- Support PSP in seeking increased funding for Puget Sound habitat restoration projects (with WLRD as lead and coordination with King County Council)

IMMEDIATE ACTION 4—Accelerate Control and Cleanup of Toxic Pollution

For the past 100 years, people have introduced a wide array of chemicals into the Puget Sound environment. Many of these chemicals are poisonous and cause health problems for people, plants and animals. The more persistent chemicals have accumulated into the sediments on the bottom of the Sound. Scientists have evidence of toxic chemicals such as PCBs, PBDEs (flame retardants), and mercury persisting in the tissues of many living organisms. PCBs pass through the food web from tiny zooplankton through Chinook salmon to seals and orcas.

Toxic chemicals are still flowing into Puget Sound waters and sediments from a variety of sources. As the population of the Puget Sound region increases, the amount of chemicals coming from our households and businesses also will increase. The magnitude of toxic activity is a significant threat to Puget Sound.

Central Puget Sound is showing the effects of toxic contaminants. Human health advisories are in effect for consumption of a variety of fish species in Puget Sound and in Lakes Washington and Union. NOAA has identified reproductive problems, associated with exposure to endocrine-disrupting compounds, in English sole in Elliott Bay.

What King County Is Doing to Control and Clean Up Toxic Pollution

King County is a leader in attempting to remove all kinds of toxics from the waters of Puget Sound. It participates in programs to collect medical waste and to prevent toxic substances from entering the county wastewater system. The county is playing a key role in contaminated sediment removal and capping primarily along the Duwamish River. The recontamination of sediment continues to make the process along the Duwamish a difficult Superfund cleanup.

The **Local Hazardous Waste Management Program** (LHWMP) provides collection and recycling services and offers public outreach aimed at proper handling and reduction in use of hazardous products. In 2006, LHWMP collected 2,970 tons of household hazardous waste from more than 52,400 customers. Also, more than 260,400 gallons of used motor oil were collected at public and private collection sites throughout the county. Collecting these substances helps prevent wastes from entering Puget Sound and its associated water bodies.

King County is a member of a project team called PH:ARM (Pharmaceuticals from Households: A Return Mechanism) that includes state and local agencies, NGOs, and business interests that pilot models for the safe collection and disposal of unused medicines. Since October 2006, the program has collected more than 3,000 pounds of unused pharmaceuticals. Programs like this can help reduce the presence of endocrine-disrupting compounds and other medicines in Puget Sound.

The **Industrial Waste Program** regulates industries to ensure that they treat their wastewater for harmful substances before discharging it to sewers whose contents ultimately reach Puget Sound. For example, the amount of mercury in the biosolids produced at the county's wastewater treatment plants has decreased by over 50 percent since Industrial Waste began its Dental Waste Program.

Although the wastewater in combined sewer overflows (CSOs) is greatly diluted by stormwater, CSOs may be harmful to public health and aquatic life because they can carry chemicals and disease-causing pathogens. **WTD** is working to bring all its CSO sites under control (no more than one overflow per year, on average) by 2030. In 2007, design began on CSO control projects for four Puget Sound CSO sites—North Beach, South Magnolia, Murray Avenue, and Barton. These projects were given priority because they are near Puget Sound beaches where there is the potential for human contact.

WTD has participated in several sediment capping and cleanup projects near CSO sites, removing over 70,000 cubic yards of contaminated sediments, in the Lower Duwamish Waterway. With other members of the Lower Duwamish Work Group (Seattle, Port of Seattle, and Boeing), the county recently completed the remedial investigation (RI) for the Lower Duwamish Superfund site. The RI will be used to identify cleanup goals that will rectify the existing imbalance between maritime, ecological, and recreational uses of the waterway.

WTD is partnering with the Port of Seattle to dispose of the most contaminated of sediments from the East Duwamish Waterway near Terminal 30. The sediments are being dredged to create cruise ship berths and to remediate sediments near the Lander CSO. Rather than being disposed of in an open water dump site in Elliott Bay, which had been approved and permitted, the sediments will be taken to an upland disposal site. This action will reduce by 75 percent the amount of PCBs released into Elliott Bay and provide additional protection to organisms that have already accumulated high concentrations of PCBs, including salmon and orca.

During the State Environmental Policy Act (SEPA) review process for road projects, **RSD** identifies potentially contaminated sites through historical and technical investigations. Contaminated soils and groundwater are removed, contained, and disposed of in accordance with Washington and King County waste management requirements. Where toxic material such as creosote-treated wood and lead paint are removed, materials are contained, treated, and disposed of at approved facilities. Where

possible, less toxic materials are substituted for the more toxic materials in use. Remediation along linear sites is challenged by the technical difficulties in sealing off contamination emanating from offsite so that remediated areas do not become recontaminated.

Planned Activities and Important Challenges

Findings of Ecology's Toxic Loadings Report
Ecology, in collaboration with other partners, recently conducted an initial investigation of toxic chemical loadings into Puget Sound (*Control of Toxic Chemicals in Puget Sound, Phase 1: Initial Estimate of Loadings*). This effort will help PSP take a first step toward understanding how best to protect and restore the Sound. The assessment used existing data to provide an initial ballpark estimate of contaminant loadings from several of the main pathways to the Sound, such as stormwater, air deposition, oil spills, CSOs, and wastewater dischargers. Because of data limitations, there are large uncertainties; the report identifies major data and information gaps to be filled.

Major conclusions of the study are as follows:

- There are significant data gaps in knowledge about how toxic chemicals reach the Sound.
- Non-point surface runoff is one of the largest contributors of toxic chemicals to the Sound.
- Air transport and deposition of contaminants is a significant source of some chemicals (PAHs, PBDEs).
- Sufficient data are not available to accurately estimate the contribution of toxic chemicals from wastewater.
- CSO and oil spills contribute relatively little to the total loading; however, they can have significant local effects.

The study made the following recommendations:

- Quantify contributions from industrial and municipal wastewater.
- Estimate contributions from contaminated sediment, biota, and ocean inputs.
- Evaluate the contribution of specific chemicals through specific pathways. The chemical classes that require most study are phthalates, PBDEs, hormone disrupters, PAHs, and PCBs.
- Upgrade Puget Sound fate and transport models and predict impact of proposed control actions.
- Evaluate contaminant loadings in stormwater runoff.
- Develop and test air pollution transport models.
- Evaluate seasonal and geographic effects on contaminant loading.

Collection and Disposal of Unused Medicines
A major regulatory obstacle constraining the PH:ARM project is the federal Drug Enforcement Administration's (DEA) rule prohibiting anyone other than law enforcement to take back unused controlled substance drugs such as narcotics. Governor Gregoire has sent a letter in support of PH:ARM's request for a DEA waiver, as have U.S. Senators Murray and Cantwell. More effort will be needed to convince DEA to allow us to proceed.

In 2008, the project will expand to Bartell Drug retail pharmacies throughout Puget Sound to test the quantities and types of unused medicines that need safe disposal and the logistics involved in

collecting complex types of waste. Collection options for nursing homes will also be explored. Funding for the pilot project has been cobbled together from a variety of small sources. Additional funding to implement the pilot will be needed in 2008 and 2009.

Full collection of unused medicines beyond the PH:ARM pilot will be expensive. The burden to pay for proper management of old pharmaceuticals should not fall on local governments. A product stewardship approach whereby pharmaceutical manufacturers are required to implement and pay for a collection system to handle unused products sold, such as has been developed in British Columbia, may be more effective at controlling pharmaceutical waste. A bill will be introduced in the 2008 Washington State Legislature to require such an approach. Enacting such a law (similar to the recent Washington State electronic waste law) would be expected to reduce the volume of pharmaceuticals that reach Puget Sound.

CSO Control and Sediment Cleanup

Recontamination was discovered in areas of the Lower Duwamish Waterway where contaminated sediment had been remediated. Dispersed urban sources of these contaminants make them difficult to control, and recontamination will continue to be an issue for all cleanups in the river and Elliott Bay. Some cleanups have been delayed because ongoing contaminant sources have not been controlled. Further, there is debate among stakeholders as to the appropriate level of cleanup. For example, some argue for "total cleanup" and others suggest cleanup to levels that prevent further degradation.

The four CSO control projects currently under design are located in densely developed residential neighborhoods; it may be a challenge to site facilities needed to control peak storm flows to meet Ecology's control standard. Some neighborhoods are interested in pursuing low-impact development (LID) approaches, but LID opportunities can be complicated by the nature of these wastewater and stormwater systems, first designed in the early twentieth century to help keep basements dry and stabilize steep slopes. Technical issues, such as available space for drainage swales to replace storm drains, will affect the feasibility of neighborhood retrofits.

Identify Areas and Sources of Contamination

An additional challenge is the lack of data to sufficiently understand and identify contaminant sources. Source control and/or source substitution are key elements in keeping contaminants from reaching Puget Sound; monitoring is necessary to evaluate the effectiveness of source control programs.

In 2008, WTD will complete a food web model for Central Puget Sound that will be used to model bioaccumulation in organisms. This model will show how toxics accumulate in the food chain and help assess priorities for reductions in pollutant input.

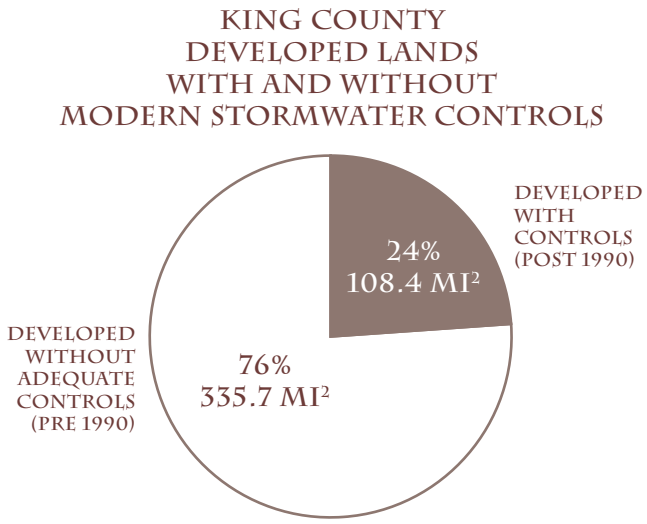
Recommendations for the 2008 Work Plan

- Support requests for federal DEA waiver to collect unused pharmaceuticals (with WLRD and LHWMP as leads and opportunities for King County Council and King County Board of Health to play a role)
- Support a 2008 bill in the Washington State Legislature to require product stewardship (with WLRD and LHWMP as leads and roles for King County Council and King County Board of Health)
- Clean up contaminated sediments at Denny and Duwamish CSO sites (with WTD as lead)
- Develop food web model for Central Puget Sound (with WTD as lead)

IMMEDIATE ACTION 5—Significantly Reduce Polluted Stormwater Runoff

Stormwater runoff is an important pathway for toxic substances and other pollutants to reach fresh and marine waters. Sudden increases in streamflow during high rainfall, exacerbated by urbanization, can damage habitat in streams by incising the streambed, washing away spawning gravels, and polluting wetlands. Toxic stormwaters may also cause adverse effect in otherwise suitable habitats. For example, NOAA Fisheries has observed high levels of pre-spawn mortality in adult coho salmon returning to urban creeks in the Seattle area.

NPDES general municipal stormwater permits, recently issued by the state to most municipalities in the Puget Sound region, target compliance with state Water Quality Standards. A wealth of information implicates stormwater as a likely contributor to exceedances of pollutant standards and to degradation of water body conditions essential to fish use—both key components of the Water Quality Standards.



Although King County jurisdictions have been leading the charge in developing and applying best available stormwater controls to new development since the late 1970s, the application of water quality controls and substantially more effective flow controls did not occur until the early 1990s. Roughly three-quarters (over 300 square miles) of developed land in all of King County was developed before 1990, prior to adoption of modern stormwater standards, and is likely in need of improved stormwater control. These lands need to be evaluated for retrofits in order to meet Water Quality Standards in local water bodies. In unincorporated King County alone, over two-thirds of the developed landscape, or about 150 square miles, may need stormwater retrofitting.

Some pollutants in stormwater runoff resist treatment technologies and/or are ubiquitous in the environment.[4] Many of these pollutants are byproducts of materials and products commonly used by the public everyday. It is currently not clear what types of source controls, including product bans or substitutions, will be most effective in removing these pollutants from new, existing, and even undeveloped land. A significant challenge is a general lack of monitoring data necessary to identify contaminant sources and understand the most problematic contaminants.

Monitoring indicates that air deposition of phthalates transported by stormwater runoff may be the dominant source of phthalate recontamination of the capped contaminated sediments near the Diagonal/Duwamish CSO/Storm Drain in the Lower Duwamish Waterway. This discovery led to formation of the Sediment Phthalate Work Group, composed of representatives from EPA, Ecology, King County, and the Cities of Seattle and Tacoma. The work group is looking at environmental occurrence, sources, risks and receptors, source control and treatment, and regulatory aspects of phthalate sediment contamination.

Monitoring data are also necessary to determine the effectiveness of existing stormwater control facilities. Currently, there are limited data to evaluate the effectiveness of stormwater treatment for

[4] Examples of such pollutants include dissolved zinc, dissolved copper, some pesticides, phthalates, polybrominated diphenyl ethers (PBDEs), and polycyclic aromatic hydrocarbons (PAHs).

a significant number of chemicals. Facilities and BMPs cannot provide 100 percent mitigation of all impacts created by impervious surface because of limitations in technology. Keeping all facilities and BMPs fully functional, especially when privately maintained, is also difficult.

What King County Is Doing to Reduce Polluted Stormwater Runoff

WLRD updates and implements King County's Surface Water Design Manual and Stormwater Pollution Prevention Manual. These stormwater control requirements are implemented through permit review of new development and redevelopment projects. To facilitate compliance with maintenance and source control requirements, WLRD inspects commercial and industrial sites/activities that have the potential to generate higher concentrations of pollutants in stormwater runoff.

The division also leads and participates in the Stormwater Outreach for Regional Municipalities (STORM). Composed of nearly three dozen jurisdictions in four Central Puget Sound counties, STORM was formed to develop consistent regional messages, share resources, and comply with NPDES stormwater permits.

DDES reviews development proposals to ensure that they are designed to be consistent with the *Surface Water Design Manual*. DDES also inspects developments during construction to ensure that stormwater runoff during construction is controlled and that required stormwater facilities are installed according to required standards.

WTD looks for opportunities to use low-impact development (LID) techniques on its projects. For example, the Brightwater Treatment Plant will reduce impervious area by about 50 percent from previous uses on the site and will incorporate features to substantially improve the quality and quantity of water leaving the site and entering the nearby Little Bear Creek.

RSD is responsible for the maintenance and function of about half of the stormwater conveyance, storage, treatment, and discharge facilities in King County. RSD performs a number of activities to reduce pollution from stormwater runoff:

- Uses Regional Road Maintenance Endangered Species Act Program Guidelines, approved by NOAA Fisheries, including implementation of BMPs to protect water quality, habitat, and aquatic resources and participation in a collaborative region-wide forum that shares ideas for impact reduction.
- Collects recyclable material and hazardous waste from construction activities and the right-of-way and collects material generated during street sweeping, catch basin maintenance, and vactor cleaning.
- Obtains NPDES permits for construction projects over one acre and works with Ecology water quality inspectors to ensure implementation of Clean Water Act requirements.
- Incorporates LID techniques (such as porous concrete, porous asphalt, and bioretention facilities) as alternatives to conventional stormwater facilities for capital projects. RSD is currently monitoring the performance of recently completed LID project elements through a grant from Ecology.

Planned Activities and Critical Challenges

Basin-wide Analysis and Planning

King County has long advocated that the ability to effectively manage stormwater and the discharge of toxics into Puget Sound will require a significantly broader watershed or basin scale approach, particularly for stormwater retrofitting and controls on new development. Without the perspective

and findings of such an approach, it will be very difficult, if not impossible, to manage the significant stormwater problems in Puget Sound—particularly as the area continues to grow in population and land development.

Given that King County's basins, and the water bodies they drain, cross multiple jurisdictional boundaries, it will be essential to coordinate stormwater planning efforts and retrofit improvements regionally in order to optimize cost-effectiveness and restoration benefit. This coordination will require that other nearby municipalities make similar investments in stormwater planning and retrofit improvements.

Stormwater basin monitoring, analysis, and planning are also essential for determining the most appropriate changes in technical standards and other regulations to better achieve PSP priorities. For example, a no-net increase in runoff volume from development sites could be established but would substantially increase the number of facilities and BMPs that must be inspected and maintained. Basin analysis would determine whether and where such a measure would be needed. However, stormwater quality data are limited and are insufficient to fully identify problem areas and the effectiveness of existing treatment.

Funding

Public Outreach. STORM recently submitted a grant application for approximately $1 million from Ecology's Stormwater Management Implementation Grants to fund a multi-year outreach media campaign (titled STORMing Puget Sound) to raise general awareness about best management practices that individuals can undertake to improve water quality. STORM will experience a significant gap in funding if the recently requested Ecology grant funding is not awarded.

Municipal Stormwater Permit Compliance. The cost for municipal stormwater permit compliance could be considerable. The county (especially WLRD) will need to evaluate reducing programs that do not directly support permit compliance, raising stormwater fees, and other strategies to address compliance. Additionally, participation and resource commitments have been slowed by the need for clarification by the state on the breadth of efforts required to comply with the public outreach and education requirements of municipal stormwater permits.

Stormwater Retrofitting. A large capital fund could be needed to retrofit the 150 square miles of unincorporated land area developed prior to 1990—not to mention similar areas in incorporated cities. Any preliminary estimate would need to include the cost to find potential sites for controls, determine the most cost-effective application of controls, develop conceptual designs to assess feasibility, and prioritize implementation of controls. Doing this will require a systematic analysis of the basins where older developed areas are concentrated. Such analysis should be coupled with an analysis to identify the most cost-effective and protective controls for new development yet to occur within basins where urban/suburban density development has or will occur. Current zoning and parcel sizes indicate that over 132 square miles of basin area in unincorporated King County should be analyzed.

To make acceptable progress by 2020 toward Puget Sound recovery, the county and all other local governments should work together to evaluate existing funding for stormwater planning starting in 2009 and to determine the amount needed to complete planning activities by 2020, with a retrofit program proceeding in parallel and informed by the analysis. Ideally, King County and others should ramp up capital budgets for stormwater retrofits. Existing rough estimates need to be refined during the next one to two years. The effort should include evaluation of, and a strategy for, retrofit planning at the basin scale. Such a strategy must be coordinated with Ecology, PSP, and other jurisdictions at a basin and watershed level. Additionally, the effect of annexation could reduce King County area-specific obligations.

Recommendations for the 2008 Work Plan

- Secure grant funding for STORM program and stormwater retrofit analysis pilot in 2008 (with WLRD as lead)
- Develop a strategy for complying with the increased requirements of the municipal stormwater permits anticipated in 2009–2010 (with WLRD as lead)
- Work with PSP, Ecology, and others to develop a major new effort to address critical local government stormwater retrofits (with WLRD as lead, working with PSP)

SECTION 5 — ENVIRONMENTAL MONITORING

King County's Water and Land Resources Division (WLRD), through its Science, Monitoring, and Data Management Section and its Environmental Laboratory, is a regional leader in conducting environmental monitoring. WLRD also serves as a technical resource and provides specific technical services to WTD.

King County has been monitoring the environment (predominantly the aquatic environment) for more than 40 years. The knowledge gained from this monitoring has been instrumental in more cost-effective expenditure of public funds and in helping the county avoid environmental problems and maintain public health and safety. Without the valuable baseline data collected during the past four decades, tracking progress toward long-term goals and projecting the long-term environmental response to management decisions and actions would not be possible. Consistent proactive environmental assessment is also essential for development and informed use of environmental indicators, such as the indicators developed through KingStat and the Puget Sound-wide indicators identified by PSP.

WLRD (and WTD) work closely with local, state, and federal agencies on the design and implementation of its monitoring programs. County scientists also collaborate with other agencies and organizations on regional monitoring efforts, including the following:

- Ecology's Regional Monitoring Coordination Committee (formerly, Puget Sound Monitoring Consortium)
- Puget Sound Assessment and Monitoring Program (PSAMP)
- Puget Sound Nearshore Ecosystem Restoration Program (PSNERP)
- Pacific Northwest Aquatic Monitoring Partnership (PNAMP)
- Puget Sound Marine Environmental Monitoring (PSMEM)

For the most part, each monitoring program works on issues different from those being addressed by the other programs. Coordination of these programs will be a major task for the PSP Science Manager. This task will be helped by the fact that members often participate in more than one program. For example, a WLRD scientist is participating in PSAMP, PSNERP, and PSMEM.

In December 2005, King County's marine monitoring program was the subject of a formal peer review by PSAMP to ensure that appropriate coordination between organizations, study design, and technical approaches were used. Comments from this review were incorporated into subsequent monitoring efforts.

PSP plans to hold all partners accountable for the recovery of Puget Sound by 2020. The first major component of accountability will be to make sure that funds from PSP are spent on what they are

supposed to be spent on and used in a timely manner. The second major component is to make sure that completed projects are contributing to a healthier Puget Sound. This second component will potentially require increased monitoring from local entities like King County. The monitoring will assist in identifying problems, focusing actions to address these problems, and tracking progress toward improving the health of Puget Sound. PSP is currently considering how the expanded monitoring will be funded and implemented.

WLRD's technical expertise and monitoring infrastructure place it in a position to fill several monitoring gaps related to the PSP's six goals. However, the division faces financial constraints in its two primary funding sources for environmental monitoring—the Wastewater Fund and the Surface Water Management Fund. WLRD scientists will actively engage with PSP's Leadership Council and its Science Panel to ensure ongoing coordination and partnership in filling these gaps. In addition, WLRD staff are serving on an Ecology-convened regional committee that is evaluating collaborative monitoring needs, governance options, and gaps for Puget Sound.

The following subsections summarize WLRD's existing monitoring programs and then describe important data gaps and how King County could help address these gaps to assist PSP in realizing its goals.

Existing and Planned WLRD Monitoring Programs

The primary focus of WLRD's monitoring programs is on water quality and quantity, with substantially less emphasis on monitoring ecosystems, local habitat, and biological resources and their responses to changing conditions. Existing efforts monitor the following indicators:

- Weather
- Flows in streams and rivers
- Water quality in streams, lakes, groundwater, and Puget Sound
- Sediment quality in streams, lakes, and Puget Sound
- Number and diversity of benthic macroinvertebrate communities in streams and Puget Sound as indicators of water and sediment quality
- Contaminants (metals) in shellfish from Puget Sound beaches
- Phytoplankton community structure at select Puget Sound locations
- Habitat and biological monitoring, including limited evaluation of kokanee populations, salmonid escapement in the Cedar River and in Bear Creek, amphibians and macroinvertebrates in urban planned developments, and baseline biophysical conditions and processes in the Green River

Despite the extensive breadth of these monitoring efforts, important spatial, temporal and constituent gaps remain in King County's and others' efforts to track environmental conditions in the county. For example, funding limitations preclude water quality and stream benthic macroinvertebrate monitoring in WRIA 7 (Snohomish/Snoqualmie watershed), allow for groundwater monitoring only on Vashon-Maury Island, and often confine routine water quality monitoring to conventional parameters such as oxygen, nutrients, and pH. Most contaminants in surface water are monitored only on a limited basis.

Appendix B to this report presents a summary of the types of monitoring programs, including existing programs, that might be included in a comprehensive environmental monitoring program in King County. Starting in spring 2007 as part of the 2008 budget process, KCDNRP laid out the

efforts and attendant funding that should be considered for a more comprehensive monitoring effort. The amount is considerably larger than what is currently funded. These proposed expansions and additional unfunded monitoring program expansions are presented in Appendix C.

A collaborative approach to monitoring is essential because of cost considerations and the need for consistent data.

Important Data Gaps for Puget Sound Partnership

King County scientists have been actively involved in efforts to assess the status of Puget Sound. For example, the Puget Sound Action Team's *2007 Puget Sound Update* incorporates in its analysis data supplied by King County.[5] King County scientists and managers helped prepare a series of seven working papers that identify knowledge gaps important to the recovery of Puget Sound and the development of the 2020 Action Agenda.[6]

King County's ongoing participation in PSP activities and its understanding of issues facing Puget Sound were used to identify six high-priority areas where the county has significant expertise and can play a substantial role in filling knowledge gaps:

- Monitoring and modeling of persistent, bioaccumulative, and toxic chemicals (PBTs) including source evaluation and prioritization
- Monitoring and modeling of nutrients, primary productivity, and oxygen
- Monitoring of viable salmonid population validation metrics
- Functional assessment of river-floodplain ecosystems
- Monitoring emerging contaminants
- Data management, integration, and reporting

Monitoring and Modeling of Persistent, Bioaccumulative, and Toxic Chemicals

A class of chemicals known as persistent, bioaccumulative, and toxic (PBTs) have been identified as a high concern in Puget Sound. These chemicals are long-lasting in the environment, appear at higher levels in top predators in the food chain, and are especially harmful to exposed organisms. Examples of PBTs include polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers (PBDEs), DDT, and mercury. Although some PBTs such as PCBs and DDT have been banned for many years, they are still present in the environment at levels of concern. Exposure to PBTs can have a wide range of possible effects on exposed animals. PBTs have been implicated as a possible cause of infant mortality and population decline in orcas in Puget Sound and are associated with a variety of impacts on other fish and marine mammals. In addition to being an ecological concern, PBTs pose a potential human health risk because they are present at elevated levels in fish and shellfish that are commonly consumed by people.

Improved monitoring of the sources of PBTs, their movements in Puget Sound, and their accumulation through the food chain is a high priority. Monitoring results suggest that modeling of these processes is necessary to understand how reducing sources of PBTs might improve ecological health throughout the Sound. Monitoring and modeling of PBTs would likely entail partnerships between PSP, Ecology, EPA, U.S. Geological Survey (USGS), University of Washington (UW), King

[5] *http://www.psp.wa.gov/puget_sound/update.htm*

[6] *http://www.psp.wa.gov/our_work/2020agenda/2020agenda_advanced.htm*

County, and others. King County can provide leadership and technical expertise in experimental design, sample collection and chemical analysis, data analysis and interpretation, data management, and modeling.

King County is the largest wastewater discharger to Puget Sound and is responsible for the cleanup of some of the most contaminated sediments at combined sewer overflow sites in the Duwamish River and Elliott Bay.

Monitoring and Modeling of Nutrients, Primary Productivity, and Oxygen

Human-caused nutrient loadings into Puget Sound at concentrations that exceed natural levels have resulted in well-documented environmental problems in various parts of the Sound. Excess nutrients can cause elevated accumulation of seaweed and excessive phytoplankton blooms. The decay of seaweed is causing noxious odors in a growing number of beaches, with associated human health concerns and low dissolved oxygen levels. Excessive phytoplankton blooms also contribute to dissolved oxygen (DO) depletion, resulting in well-documented problems in Hood Canal and some southern arms of Puget Sound. In King County, limited data suggest that Quartermaster Harbor is at risk of summer DO depletion problems. Such depletion can have serious effects on local fish, crabs, and other species that inhabit the area. Moreover, changes in productivity of marine ecosystems associated with excess nutrients may be linked to toxic blooms of some marine organisms that can be problematic for marine mammals and humans.

Monitoring and modeling of the sources and movements of nutrients, the use of nutrients by seaweed and algae, and the impacts of decay on DO will involve a coordinated effort among various entities. Work is already under way to better understand the issues in Hood Canal and south Puget Sound. Expanding this work to the rest of Puget Sound will require the efforts of King County, Ecology, PSP, UW, EPA, USGS, Public Health (state and local), and local jurisdictions. King County can provide leadership, especially in the Central Basin of Puget Sound, and technical expertise in water quality and phytoplankton sample collection and analysis, data interpretation and management, and modeling.

Monitoring of Viable Salmonid Population Verification Metrics

Recovery of Puget Sound salmonids is a central goal of PSP and serves as a touchstone for entities throughout the region. Recovery of ESA-listed salmonids will ultimately be judged by four metrics: (1) population abundance, (2) productivity, (3) spatial structure of the population (within the Puget Sound watershed, for example), and (4) diversity (genetic, phenotypic, and behavioral variation). The importance of monitoring these metrics is widely recognized. The *Draft Regional Adaptive Management and Monitoring Plan for Puget Sound* (December 2006), prepared by a subcommittee for Shared Strategy for Puget Sound, states:

> ...the validation metrics are *the* crucial indicators for success in Puget Sound salmon recovery. Ultimately, the region's goal is to improve every salmon population, and the best measure of a salmon population's health is through the VSP [viable salmon population] parameters of abundance, productivity, spatial structure, and diversity. If only one set of data could be measured to assess Puget Sound recovery, it would include these four indicators. (page 81)

To meet these needs, current salmonid monitoring efforts should be expanded to better estimate the spatial structure, diversity, and proportional productivity of contributing sub-watersheds for every viable population. The current approach is insufficient to track these critical validation metrics. Important differences exist among habitats and how they change over time in response to restoration and to increasing human pressures. The tributaries, floodplain, and mainstem channel habitats in a

watershed vary in their capacity to produce salmon, but these differences are poorly known. Further, it is important to track changes in the genetic, physical, and behavioral characteristics of salmon in rivers. Relatively little is known about the ways in which populations and sub-populations of juvenile salmonids transition from freshwater habitats to estuarine and marine areas of the Sound. These issues are key to understanding how to most effectively spend acquisition and restoration dollars.

WLRD can play a key role in recovering viable salmonid populations in King County through the following efforts:

- Quantifying, in partnership with other agencies, juvenile salmon leaving sub-watersheds to estimate the proportional productivity of major sub-watersheds
- Quantifying changes in available spawning and rearing habitat in sub-watersheds contributing to juvenile production
- Monitoring the timing and habitat preferences of marine nearshore areas

However, there is no funding available for these efforts with the exception of occasional grants. Salmonid monitoring is the responsibility of the co-managers—the Washington State Department of Fish and Wildlife and the tribes. Neither has sufficient funding to perform the monitoring necessary to adequately define viable populations for the salmonids of Puget Sound. King County should work with the co-managers and PSP to help address these needs.

Functional Assessment of River-Floodplain Ecosystem

Healthy floodplains and riparian forests function as natural water purifiers that filter excess nutrients and trap contaminants from urban runoff. The status of lowland rivers and streams is recognized as one of the key indicators of the health of Puget Sound. Degradation of rivers and streams has impaired important processes that regulate the transfer and storage of materials (including chemicals and nutrients) that affect ecological conditions in the Sound. Clearing of riparian forests in many places and levees constructed for flood control prevent habitat-forming wood and salmon prey from entering the river. The loss of forested corridors contributes to high stream temperatures. Riparian areas along rivers, including floodplains, also play an important role in trapping excess sediments and nutrients in runoff from upland areas.

Providing setbacks and improving the habitat quality of flood control facilities along river corridors are expected to aid in recovery of threatened salmonids and benefit Puget Sound. River and floodplain habitat functional assessments are required to ensure that the new facilities are salmon-friendly and to maintain essential buffering functions while delivering the expected level of flood protection. These assessments include monitoring habitat formation rates, floodplain connections, rates and types of bank erosion, organic transfers to rivers, and the amount of complex habitat. Moreover, the viable salmonid population monitoring mentioned above cannot be adequately performed unless the physical habitat dynamics are quantified for rivers and their tributary watersheds.

Monitoring Emerging Contaminants

Thousands of chemicals are used daily in this country; only a small fraction of these chemicals are routinely monitored in the environment. In the past several years, additional focus has been placed on new and emerging contaminants and their potential impacts to aquatic life, wildlife, and human health. In Washington State, polybrominated diphenyl ethers (PBDEs), which are commonly used as fire retardants and for other purposes, have been banned because of heightened concerns. PBDEs are

very persistent.[7] Other examples of possible contaminants not routinely tested in environmental samples include endocrine-disrupting compounds (hormones and a variety of other compounds), pharmaceuticals and personal care products, and polyfluorocarboxilic acids (PFOs – used to manufacture Teflon®). PBDEs and some other emerging contaminants are also classified at PBTs.

Data Management, Integration, and Reporting

A robust data management, integration, and reporting program is essential to successfully implement the 2020 Action Agenda. King County's continual investment in state-of-the-science information handling systems has facilitated the development of the latest techniques in spatial analysis and modeling. As a result, King County is a national leader in geospatial data analysis.

The county has been working for several years to implement a robust data management program for environmental monitoring data. Multiple environmental monitoring data sets are currently managed in relational databases with Web-based front ends that allow the public, other jurisdictions, and state and federal agencies to view, download, and analyze the data. For example, the county's freshwater swimming beach monitoring program bacteria level data and beach closure information are presented at *http://dnr.metrokc.gov/wlr/waterres/swimbeach/default.aspx,* while surface-to-bottom profiles of Puget Sound water quality are presented at *http://dnr.metrokc.gov/wlr/waterres/marine/DownloadData.aspx*. Other datasets managed in a similar fashion include stream and river flows, small lake water quality, stream water quality, and lake water quality.

Funding Challenges for Environmental Monitoring

Environmental monitoring in King County faces stiff funding challenges because of the lack of a dedicated funding source and ongoing financial pressures on funds traditionally used for monitoring (SWM and WTD). SWM funds available for environmental monitoring are expected to decline for the next four years because of ongoing and anticipated future annexations combined with increased programmatic requirements in the stormwater section imposed by the NPDES stormwater permit.

Addressing the six high-priority knowledge gaps require increased costs beyond King County's existing monitoring program investment. Preliminary ranges in possible costs are summarized in Table 1.

Table 1. Preliminary Estimated Costs to Address Known Knowledge Gaps in King County

Knowledge Gap	*Estimated Range in Annual Cost*
Monitoring and Modeling of Persistent, Bioaccumulative, and Toxic Chemicals	$70,000 – $300,000
Monitoring and Modeling of Puget Sound Nutrients, Primary Productivity, and Oxygen	$50,000 – $180,000
Monitoring of Viable Salmonid Population Verification Metrics	$400,000 – $600,000
Functional Assessment of River-Floodplain Ecosystem	$100,000 – $300,000
Monitoring Emerging Contaminants	$100,000 – $300,000

[7] Although PBDEs are being banned, there are numerous products (furniture, computers, televisions) in use that contain PBDEs. These contaminants are very persistent and, despite the ban, will be present in the environment for many years.

Development of a stable financial structure for funding general environmental monitoring in King County and across Puget Sound is a high priority for 2008. The importance of environmental monitoring has been highlighted by PSP, for tracking long-term trends over time, for characterizing sites where action is needed, and for tracking the effectiveness of the restoration efforts in meeting their stated goals. In addition to facing pressures from external factors, the current funding structure also constrains the environmental monitoring programs because of the geographic and programmatic limitations and requirements of the various sources of funding. There are a variety of possible sources of funds for implementing these programs, including reprioritizing money already allocated to environmental monitoring, increasing contributions to monitoring programs from funds that are already contributing to monitoring and that are recognizing significant fund constraints (primarily SWM and WTD), tapping other King County funds (such as Roads and CX/Public Health) to contribute to the environmental monitoring programs, and, perhaps most importantly, developing a collaborative funding strategy in coordination with PSP and other outside organizations. Regardless of the source funds, movement within King County to an overhead-approach for funding environmental monitoring, similar to the approach used for GIS, would improve the monitoring program's ability to generate the information necessary for PSP and KingStat across the range of topics and geographies in King County.

Recommendation

In 2007, WLRD developed a science business plan that addresses many of these gaps and includes the following recommendation about filling these gaps. King County should collaborate with PSP and other monitoring groups (including Ecology's Regional Monitoring Coordination Committee—formerly the Governor's Puget Sound Monitoring Consortium, PSAMP, the Washington Forum on Monitoring, and Shared Strategy (now part of PSP) to help develop a strategy for funding and implementing a collaborative monitoring program that meets both King County's regulatory and adaptive management needs and contributes to understanding progress toward the recovery of Puget Sound. The county should also evaluate changes to its financial structure to allow for more equitable funding of the recommended monitoring programs.

Recommendation for the 2008 Work Plan:

- Collaborate with PSP and other monitoring groups to develop a strategy for funding and implementing a collaborative monitoring program (with WLRD as lead and major roles for WTD and DOT-RSD)

SECTION 6 — COMMUNICATION AND COORDINATION STRATEGY

This section describes King County's existing and proposed venues for communicating with the public and coordinating with other entities regarding protection and recovery of Puget Sound. It concludes with a discussion of the Executive Initiatives for Communication and Coordination.

Existing Communication and Coordination Venues

KCDNRP communicates with and reaches out to the public about the protection of water quality in a variety of different ways and with a wide range of messages. Topics include, among others, natural yard care, reducing pesticide use, recycling, wastewater system improvements, habitat protection and

restoration, eco-consumerism, green building, swimming beach monitoring, and hazardous waste disposal. While varied, each of these topics speak to actions and behaviors that impact water quality in creeks, rivers, streams, and Puget Sound.

King County also participates in a number of venues that provide opportunities for communication and coordination among elected officials, jurisdictions, and other stakeholders in Puget Sound recovery. Examples include King County's inclusion in the WRIA meetings, Executives Sims' involvement as a member of the Ecosystem Coordination Board, and county scientists' involvement in the PSP science work group.

Communicating with the Public

KCDNRP administers the countywide Water Quality Survey every year and the Environmental Behavior Index (EBI) every other year. These surveys track public awareness, attitudes, and behaviors related to water quality issues and programs. The Water Quality Survey takes places in December, with findings available soon after. The next EBI is scheduled to take place in May 2008, with findings available in June. Both surveys were recently reviewed to ensure that results will provide meaningful baseline and historical reference data regarding public opinion and King County's efficacy in altering behaviors in relation to Puget Sound recovery.

As mentioned in Section 4, KCDNRP has partnered with 36 jurisdictions, including the Cities of Tacoma, Bellevue, and Seattle and Kitsap, Snohomish, Pierce, and Mason Counties, to apply for a $1 million grant from Ecology. The goal of "STORMing Puget Sound" is to change common practices that result in pollution throughout Central Puget Sound via a collaborative, highly leveraged region-wide multimedia public education and outreach campaign. This approach and initial messages and focus were developed to relate to PSP's media campaign, recently developed by a consultant using state funding.

Under the terms of King County's NPDES permit for municipal stormwater, the county submits annual reports to Ecology that include an analysis of public education and outreach activities. The annual report that documents 2007 accomplishments and a surface water management plan that documents plans for 2008 will be ready for public review in January 2008 and for submittal to Ecology per NPDES permit requirements by March 21, 2008.

To support the regional salmon conservation and recovery effort, KCDNRP participates in the development of work products, including public education and outreach materials, under interlocal agreements that involve cost sharing by more than 45 cities and jurisdictions. Work includes advocating for salmon priorities and funding; coordinating between multiple diverse parties; running programs, tours, and workshops related to watershed health and salmon recovery; and tracking and monitoring implementation of actions.

Other examples of King County's past participation in coordinated public education and outreach strategies related to regional water quality include the Shared Strategy for Puget Sound communications team. The team included federal, state, and local governments; tribes; and environmental organizations. This body of work will be assumed by PSP in 2008. King County will continue its participation. King County communications staff have been represented on the Lower Duwamish Waterway Group, along with the Port of Seattle, City of Seattle, King County, and The Boeing Company. The group is working to remediate contaminated sediments in the Lower Duwamish Waterway.

Communicating and Coordinating with Other Jurisdictions

The regional salmon recovery process provides opportunities for elected officials and others to improve communication and coordination. At the watershed level, watershed forums and councils provide a unique venue for elected officials (and other stakeholders) to stay in informed and to play a role in setting priorities for salmon recovery actions in their respective watersheds. The forums may be appropriate venues for coordinating efforts and sharing information pertaining to Puget Sound recovery. Each watershed forum will need to evaluate the extent to which it wishes to take on this role.

At the direction of the King Council, we successfully included PSP coordination as a key component of the recent December 12, 2007, multi-watershed assembly. This event was organized by WRIAs 7, 8, 9, and 10 and included representatives from all four watersheds. During this day-long workshop, leadership from cities, counties, and stakeholder groups were able to discuss their priorities for coordination across watersheds and share visions for ecosystem recovery. Also at this event, David Dicks, PSP Executive Director, provided an update on the Action Agenda process and took questions from the participants. Three Ecosystem Coordination Board members also participated in the event: Dan Wrye of Pierce County; Gary Rowe, Skagit County Administrator; and Executive Sims.

At the regional level, the Puget Sound Regional Salmon Recovery Council, which has representation from each of the 14 Puget Sound watersheds, will be serving as an advisory body to the PSP Leadership Council. The Puget Sound Regional Salmon Recovery Council was initiated by Shared Strategy for Puget Sound and; starting in 2008, will be staffed by PSP.

King County also participates in routine discussions with the Suburban Cities Association and the Association of City Managers. The county is an active member of the Coastal Counties Caucus within the Washington State Association of Counties and will continue to use this association as a venue for discussions on Puget Sound recovery and county interests and responsibilities. In addition, the Regional Water Quality Committee is a venue for the county to work with cities on water quality programs and issues and on other activities related to Puget Sound recovery.

Proposed Communication and Coordination with Puget Sound Partnership

Communicating with the Public

KCDNRP is already folding its extensive public education and outreach efforts related to Puget Sound water quality into PSP efforts. The county is currently represented on the Puget Sound Education, Communication and Outreach Network (ECO Network) and PSP's creative advisory team, which participated in the development of the Public Awareness and Engagement Plan. In addition, the county plans to participate in the PSP launch of an outreach campaign in 2008. Participation in these groups provides the opportunity to coordinate outreach activities with other agencies and organizations involved in Puget Sound protection, to review materials, and to provide expertise in the creation of messages and materials.

An example of current efforts to integrate King County's work with Puget Sound recovery efforts is the link on KCDNRP's Web site and a companion brochure, both of which identify actions the public can take to play a role in the recovery and protection of Puget Sound.[8] In addition, a variety of brochures (Sound Tips, Environmental Behavior Index), outreach events (Earth Day Expo, Puget Soundscape, Mud Up, Northwest Flower and Garden Show, Duwamish Alive), Web links, and news releases reach thousands of Puget Sound citizens and have provided effective tools for conveying key

[8] *http://dnr.metrokc.gov/soundtips/*

messages. Since January 2006, KCDNRP has issued approximately 160 news releases that address a wide range of subjects related to PSP core messages. KCDNRP will continue to integrate its efforts with emerging PSP public education and outreach efforts.

Public Health–Seattle & King County could improve its communication with the public, if more funding were available, by completing the linkage of its digitized documents to its database system and providing the public with GIS and Web access to its records. In addition, the agency could make better use of its GIS capability to illustrate current conditions and track progress in an easily understood format.

Task Force for Aquatic Reserves

The county will collaborate with PSP and the state Legislature to encourage the formation of a task force under the Ecosystem Coordination Board and the Science Panel to research both science and policy issues related to the establishment of marine reserve areas in Puget Sound. It is recommended that this task force be led by research staff from the University of Washington's School of Marine Affairs, with assistance from other university departments, and that it include representation from the tribes, Washington State Department of Natural Resources, Washington State Department of Fish and Wildlife, Northwest Straits Commission, and local governments.

It is further recommended that the task force consider models of marine reserves both in North America and elsewhere in the world, including the uses permitted in existing reserves. The task force should consider how both existing and future reserves can support and balance the six goals for a healthy Puget Sound (as listed in the legislation establishing PSP).

The Washington State Department of Natural Resources (WDNR) is currently developing a habitat conservation plan (HCP) for its management actions on state aquatic lands. King County and others should encourage WDNR to include in the HCP a review of management actions related to aquatic reserves.

This work should be accomplished over the next 12–18 months in parallel with PSP efforts to develop the detailed measurements and necessary actions needed to achieve its goals for a healthy Puget Sound.

Executive Initiatives for Communication and Coordination

As a the South Central Puget Sound Action Area representative on PSP's Ecosystem Coordination Board (ECB) and the board's newly appointed chair, Executive Sims will play a key communications and coordination role with our many partners in the South Central Puget Sound Action Area (see Action Area boundaries) and the other stakeholders represented on the ECB. The ECB's duties were clearly articulated in the legislation establishing PSP and focus on communication and coordination.

The ECB will advise and assist PSP's Leadership Council (Council) to carry out its responsibilities in implementing its duties, including development and implementation of the 2020 Action Agenda. The ECB's duties include the following:

- Assisting cities, counties, ports, tribes, watershed groups, and other governmental and private organizations in the compilation of local programs for consideration for inclusion in the Action Agenda as provided in Section 8 of SB5372.
- Upon request of the Council, reviewing and making recommendations regarding activities, projects, and programs proposed for inclusion in the Action Agenda, including assessing existing ecosystem scale management, restoration and protection plan elements, activities, projects, and programs for

inclusion in the Action Agenda.

- Seeking public and private funding and the commitment of other resources for plan implementation.
- Assisting the Council in conducting public education activities regarding threats to Puget Sound and about local implementation strategies to support the action agenda.
- Recruiting the active involvement of and encouraging collaboration and communication among governmental and nongovernmental entities, the private sector, and citizens working to achieve the recovery of Puget Sound.

In addition to the Executive's attendance at ECB meetings, the Puget Sound Team will develop a list serve (Internet e-mail group) to use for regular communication with other partners working to implement recovery in the South Central Puget Sound Action Area. The purpose of this communication will be to provide ongoing information on the work of the ECB as well as to solicit input on the PSP efforts. This list will include other counties, cities, sewer and water districts, watershed groups, tribes, environmental organizations, businesses, farmers and other large landowners, and interested citizens located in the South Central Puget Sound Action Area. Some of these stakeholders have their own representatives on the ECB as well.

SECTION 7 — ACTIONS IN 2008 TO MOVE PUGET SOUND RECOVERY FORWARD

As described in this report, King County has multiple roles and responsibilities in Puget Sound recovery. Both the Executive branch and the Council have significant responsibilities in recovering Puget Sound. Much of the work of King County departments already supports PSP's goals and objectives. However, there are gaps and opportunities for enhanced work to help the region meet its goal of Puget Sound recovery by 2020. King County must work with others in the region to help recover our cherished Puget Sound. We do not know all that this will entail over the next 12 years. The PSP 2020 Action Agenda will help the region and King County identify the necessary work, but King County need not wait for the Action Agenda to begin taking actions. As discussed in this report, we are already doing many things and we know of others that need to be addressed. There are some very key actions that the county can take in 2008 to help move Puget Sound recovery forward. The attached 2008 work plan and timeline highlight some of the most important steps King County can take in 2008.

KING COUNTY ACTIONS IN 2008 TO SUPPORT PUGET SOUND RECOVERY

	Who leads	Milestone for 2008	Notes on future years / continued work
1. PARTICIPATE IN PSP ACTION AGENDA AND COORDINATE AMONG COUNTY DEPARTMENTS			
Puget Sound Team Tasks			
Work with partnership to identify draft 2020 Action Agenda priorities	KCPST	KC Actions submitted in spring	
Set priorities for countywide projects and technical studies that will help obtain state and federal funding via PSP in the 2020 Action Agenda	KCPST	KC priorities identified in September action agenda	
Assess the county's readiness and resources to contribute to the necessary environmental monitoring and studies that are required as part of the PSP	KCPST	Contributions identified in spring	
Coordinate communications and meetings with PSP and local jurisdictions in King County	KCPST	Ongoing — utilize monthly meetings	
Coordinate all county programs related to the restoration and protection of Puget Sound	KCPST	Ongoing — utilize monthly meetings	
Collaborate strategically with the new PSP agency to evaluate new and expanded funding options and opportunities for establishing partnerships with diverse stakeholders	KCPST	Concept developed by fall 2008	
Participate in PSP Outreach and Education Efforts	DNRP/ Exec		

2. HELP ADDRESS THE GOVERNOR'S 5 AREAS FOR IMMEDIATE ACTION			
I. Identify and Address Areas with Immediate Septic Problems			
Develop strategy for increased funding and coordination for onsite sewer systems retrofits and controls	PH-SKC		
II. Protect Puget Sound habitat			
Identify opportunities for enhanced protection on DOT RSD projects	DOT		

	Who leads	Milestone for 2008	Notes on future years / continued work
Initiate Reclaimed Water Comprehensive Plan	WTD	Initiate planning, hire consultants, identify and begin stakeholder process	Complete draft plan by December 2009.
Adopt new Shoreline Master Program	DDES/DNRP are co-leads w/ major role for KCC	Adoption with Comprehensive Plan	Implement
Support for land conservation acquisitions and incentives programs	WLRD		
Continue efforts to understand and address climate change	KC Climate Team	Identify climate related actions for the 2020 Action Agenda	
III. Implement priority projects to restore damaged forests, rivers, shorelines, and marine waters			
Short-Span Bridge replacements (DOT-RSD is lead)	RSD		22 bridges by 2012
Support PSP in seeking increased funding for Puget Sound habitat restoration projects	KCDNRP w/ opportunities for KCC role		
Support PSP in forming a task force to research issues related to formation of Marine Reserve Areas	KCDNRP w/ opportunities for KCC role		
IV. Accelerate control and cleanup of toxic pollution			
Support requests for federal DEA waiver to collect unused pharmaceuticals	WLRD LHWMP w/ roles for KCC and KC BOH		
Support 2008 bill in the Washington State Legislature to require product stewardship	WLRD LHWMP w/ roles for KCC and KC BOH		

	Who leads	Milestone for 2008	Notes on future years / continued work
Develop food web model for Central Puget Sound	WTD	Complete calibrated model; coordinate with PSP to determine how to apply to entire Puget Sound.	Apply model to determine program's effects on bioaccumulative substances in food chain.
V. Significantly reduce polluted stormwater runoff			
Secure grant funding for STORM program and stormwater retrofit analysis pilot in 2008	WLRD		
Develop a strategy for complying with the increased requirements of the municipal stormwater permits anticipated in 2009/2010	WLRD	WLRD business plan to be developed	

3) ADDRESS NEED FOR ADDITIONAL PUGET SOUND MONITORING			
Collaborate with PSP, Ecology, and other monitoring groups to develop a strategy for funding and implementing a collaborative monitoring program	WLRD, with major roles for WTD and RSD	September 2008 (including defined role for King County)	Work with state Legislature to define funding and implementation

4) CONTINUE EXISTING WORK PROGRAMS THAT SUPPORT PUGET SOUND RECOVERY			
Capital projects — both direct restoration and other infrastructure with associated mitigation and landscape improvements	Multiple branches of KC	Ongoing — continued efforts	
Land management and regulation: CAO, clearing and grading, stormwater manual and code, and SMP.	DDES/ KCDNRP	SMP adoption	
Ongoing — continued efforts			

APPENDIX A

Descriptions of Existing King County Programs that Support PSP Goals

Best management practices for capital and maintenance projects. KCDNRP strives to use techniques and take precautions that minimize adverse impacts to water quality and habitat. It practices environmental mitigation measures, including best management practices, that are consistent with the State Environmental Policy Act (SEPA) and incorporates these measures into design plans and construction contracts. For example, the WLRD Capital Improvements Projects group takes specific actions to minimize turbidity during construction near and in waterways, works with certified erosion control specialists, and establishes fueling pads that protect sites from any fuel contamination during equipment refueling. King County's DOT has an approved maintenance manual that establishes standards for reducing environmental risks associated with construction and maintenance.

CAO, Clearing, and Grading regulations. Puget Sound Shorelines, its tributary rivers and streams, and associated wetlands are all important elements of Puget Sound Habitat. King County protects these habitat elements through its critical areas regulations. In 2004, King County was one of the first Puget Sound local governments to adopt a major update to its critical area regulations. The county's updated regulations took a system-wide view towards what is needed to protect critical areas. King County also protected all of its marine shorelines as a critical area. King County's regulations were developed after an exhaustive Best Available Science analysis by King County staff that was subject to independent peer review. Key elements of the regulations include:

- 165 foot buffers on all rural lakes, rivers, streams, and marine shorelines that support salmonids.
- Wetland buffers based on Ecology's updated wetland rating system. The buffers are based on a combination of the wetland's category, habitat value, and development intensity.
- Flood hazard regulations that limit development in the zero-rise floodway.
- Limits on the amount of clearing in rural areas. Rural development must leave between 50 and 65 percent of native vegetation.
- Stormwater management regulations that place an emphasis on infiltration and dispersion of stormwater in both urban and rural areas.

Climate change. A King County interdepartmental group developed and presented to the council a comprehensive *Climate Change Implementation Plan* in February 2007. The plan identifies potential impacts in King County from climate change, ranging from likely increases in stormwater and flooding resulting from increased frequency and intensity of storms, to stresses on water supplies and instream flows resulting from reduced snowpack and earlier runoff, to effects on vulnerable infrastructure resulting from rising sea levels. The plan outlines a set of mitigation and adaptation goals and strategies that will substantially reduce the county's contribution to greenhouse gas emissions in the region, achieve the goal set by the county executive of reducing emissions by 80 percent by 2050, and implement measures to anticipate and prepare for expected impacts to county facilities and programs. The mitigation strategies are focused on transportation investments, such as hybrid or clean fuel vehicles, and on trip-reduction programs. Adaptation measures include increased production and use of drought-resistant reclaimed water for nonpotable purposes, revising design standards and investment strategies for major capital projects, and generally using King County as a "living laboratory" for innovative approaches. King County is also developing information and tools—such as the just-completed "guidebook" for developing local government climate change strategies—to assist other governments and agencies in accelerating their climate change activities and planning.

Climate change—Department of Transportation

The King County Department of Transportation has a key role in reducing climate change emissions in the region. Transportation accounts for over 50 percent of the region's greenhouse gas emissions. King County's transportation policies, programs, and services are working to reduce emissions. The county operates the largest fleet of articulated hybrid diesel buses in the United States, and leads transit agencies in the use of renewable biodiesel fuel. King County is the largest biodiesel customer in the state of Washington using over two million gallons per year. The Fleet Division provides hybrid vehicles and heavy duty vehicles for county use and has partnered with other governments to implement hybrid technology in the region. King County is also a leader in incorporating climate considerations into roadway design, construction, and operation and maintenance. New equipment monitors intersection delays to reduce travel times and new roadway designs—such as roundabouts—reduce vehicle idling and emissions. The department is committed to providing leadership in meeting climate change objectives for the region.

In 2007, Road Services Division (RSD) supported two initiatives related to climate change through the reduction of greenhouse gas emissions. One initiative sought to develop and implement a global warming response strategy for RSD in conjunction with countywide efforts. The second initiative was to develop green building guidelines specific to RSD projects.

In 2008, RSD is addressing climate change issues in a more comprehensive manner to reflect the goals of the King County climate plan by initiating a wide range of actions. These actions consisted of 12 specific proposals described briefly as follows:

- Division Environmental Goal Setting and Performance Monitoring - Environmental Management System (EMS) – develop an EMS to implement a systematic approach and effective tools for achieving goals and objectives related to climate change throughout RSD.
- DOT and Countywide Climate Change Committees – provide ongoing support for active participation in various working groups and committees for climate plan implementation and related activities.
- RSD Climate Change Committee – provide support to establish an RSD Climate Plan Implementation Committee to address mandatory goals and objectives of the King County climate plan.
- Added Traffic Intersection Cameras for Improved Signal Timing and Traffic Throughput - install additional traffic cameras at high priority intersections each year. Increasing the number of locations with cameras will improve the monitoring of the roadway system, allowing better incident response, and strategic manipulation of signal timing, thus reducing travel time and improving traffic throughput. King County has been installing four cameras per year at various locations.
- Conversion to Energy Efficient LED Traffic Signal Lamps, Pedestrian Signal Heads, and Street Lights - LEDs provide the dual advantages of using significantly less power and having a much longer useful life, both of which reduce operating costs. LED traffic signals use about 6 to 25 watts, while incandescent bulbs use about 70 to 150 watts. As a result, LED modules can save more than 90 percent in energy bills for traffic signals.
- Recycling Road Maintenance Equipment to New Climate Friendly Technologies - replace older gas-powered generators, pumps, mowers, and other gas powered tools with more efficient, eco-friendly and less polluting models.
- Participation in Puget Sound Energy's Green Power Generation Initiative - Roads Maintenance enrollment and participation, at the 100 percent level, in Puget Sound Energy (PSE's) Green Power Program at all of the eight maintenance facilities. The annual cost of Roads Maintenance participating in the Green Power Program is projected at $20,000 annually.

- Road Construction Climate Change Best Practices Guidelines – building on 2007 green building initiative, develop practical project management tools for incorporating cost-effective green building measures into RSD capital projects.
- Countywide Overlay Greenhouse Gas Emissions Reduction Strategy Report – identify specific road standards, specifications, materials, and processes that reduce GHG emissions during asphalt surfacing for the Countywide Overlay program.
- Standard Hydraulics Tools for Climate Change Adaptation – develop standard analytical tools with guidelines and procedures to address climate change impacts when planning and designing bridge, culvert, and seawall projects.
- Design Opportunities to Minimize Right-of-Way Greenhouse Gas Emissions Report – evaluate opportunities to design, maintain, and retrofit right-of-way in order to reduce and offset GHG emissions, including new management guidelines and pilot projects.
- New Approaches to Stormwater Treatment – evaluate opportunities for cost-effective, low-impact approaches for treating stormwater within existing road right-of-way consistent with climate plan goals and objectives.

Combined sewer overflow (CSO) control program. In response to the Clean Water Act of 1972, Metro adopted the Combined Sewer Overflow Program in 1979. Since adoption of this first program, Metro and then King County have prepared plans to respond to evolving CSO regulations, including the Ecology's "control" standard of no more than an average of one untreated discharge per year at each CSO location. King County's CSO facilities are regulated through West Point plant's NPDES permit. By May 2005, with completion of the Mercer/Elliott West and Henderson/Norfolk facilities, about 17 of King County's 38 CSOs were controlled. The remaining 21 uncontrolled CSOs will meet state standards between 2012 and 2030. The schedule for completing the CSO control projects was set to reflect priorities for protecting human health, the environment, and endangered species. The schedule calls for completion of the highest priority projects near Puget Sound Beaches in 2012.

Contaminated sediment cleanup programs. King County is carrying out a sediment management plan developed in the late 1990s to clean up contaminated sediment near CSO outfalls. In mid 2007, design was completed for cleanup of the old Denny Way CSO site in Elliott Bay; cleanup is scheduled for November 2007–January 2008. The county continues to work to improve water quality in the Lower Duwamish Waterway through actions such as reducing CSOs, restoring habitats, capping and cleaning up sediments, and controlling toxicants from industries and stormwater runoff. The county is participating in two early action sites to clean up portions of the waterway earlier than required. Post-cleanup monitoring at one of the sites is providing critical information on cleanup alternatives for the Lower Duwamish Waterway Superfund Site. The discovery of accumulations of phthalates and other chemicals during monitoring led to formation of the Sediment Phthalate Work Group, composed of representatives from EPA, Ecology, King County, and the Cities of Seattle and Tacoma, to examine the occurrence, sources, risks, receptors, source control, treatment, and regulatory aspects of phthalate sediment contamination.

Contaminated site remediation. During the SEPA review process for road projects, RSD identifies potentially contaminated sites through historical and technical investigations. Contaminated soils and goundwater are removed, contained, and disposed of in accordance with Washington and King County waste management requirements. Contractors on construction projects provide plans for the proper management of potential pollutants such as paint and fuel products. All potential pollutants are properly stored, and used as directed; excess materials are recycled or disposed of to approved facilities. Where toxic material such as creosote treated wood and lead paint are removed, materials

are contained, treated, and disposed of at regulatory approved facilities. Where possible, less toxic materials are substituted for traditional materials. Products such as plastic wood are used where treated wood may have been used in the past, and lead based paints are no longer used. New less toxic material options are being reviewed on a regular basis.

Environmental regulations and policies. King County Comprehensive Plan policies and supporting regulations, including the Shoreline Master Program, Critical Areas Ordinance, Drainage and Water Quality codes, and Clearing and Grading standards, all serve to protect the natural environment and preserve normative functions that keep waterways and the Puget Sound clean. King County has a long history of using best available science to establish standards and practices for its regulations. It is anticipated that continuing to update and ensure compliance with these regulations and policies will be one of the measures that PSP uses to identify a jurisdiction's compliance with the 2020 Action Agenda.

Development rights held in forest areas. Watershed functions – both hydrologic and biologic – are protected if a significant percentage of the land cover remains in forest. Research in the Puget Sound region indicates 65 percent forest cover retention is the minimum necessary before both the hydrologic patterns in the watershed and the dependent biologic systems begin to unravel. Forest retention moderates flood flows, increases summer low flows, protects water temperatures, and prevents the degradation of water quality. This is a keystone strategy for protecting resources in the forest production zone and the rural zoned areas of King County for it not only protects the natural resources present but buffers downstream areas against environmental degradation.

One of several tools used by King County to protect forested areas is to hold or extinguish development rights on forested lands. Usually, development rights are purchased leaving the underlying property in private ownership – rarely the development rights are donated. Funds for development rights acquisition come from a variety of sources including the local Conservation Futures Tax and various state and federal grant programs including SRFB, RCO (formerly IAC), and Forest Legacy among others. In addition, some development rights are offered for sale to other private property owners in a private to private transaction authorized through the County Transfer of Development Rights (TDR) Program.

Retiring or transferring development rights is being looked at more frequently as a way to preserve valued land functions. Because the underlying ownership remains private, liability for protecting and maintaining the land also remains a private responsibility. Also, the market value of the development rights represents only part of the value of the land and more land can be protected for the same dollar than in fee simple acquisitions. Both the maintenance and purchase price factors make this strategy more cost-effective than fee simple purchase in both the short and long term. It should be noted that the share of the total land value represented by development rights varies according to underlying zoning or grandfathered development potential which can vary from one unit per acre to one unit per eighty acres in rural King County.

The county currently holds or enforces extinguished development rights for 1,175 acres in the Natural Resource Land (NRL) Ecological inventory, 94,220 acres in the NRL forest land inventory, and 539 forested acres in the Transfer of Development Rights inventory – a total of 95,934 acres.

Environmental review, studies, and permitting. DOT's Engineering Services Section continues to implement measures to protect Puget Sound habitat in its environmental review, studies, and permitting of capital improvement projects (CIP). During the design of projects, impacts are identified through the environmental review process (SEPA/NEPA) and the completion of various special studies (e.g., biological assessments, stream/wetland studies, hydrology/geomorphology). Identified impacts

can include effects to fish and wildlife and their habitat. While threats to endangered and threatened species have been considered for years, CIP project teams are now broadening their evaluation to include other wildlife not protected by the Endangered Species Act. Considering these species, their habitat, and the processes that create their habitat is also important for the holistic recovery of the Puget Sound. Permitting has also contributed to protecting Puget Sound habitat by coordinating with regulatory agencies to ensure that the needs of transportation complement the needs of the natural environment hosting the project.

Habitat protection and land conservation. King County uses a variety of tools and approaches to protect high quality habitat lands throughout the county. These include perpetual protection through a variety of acquisition strategies that create public ownership, as well as providing incentives such as tax breaks for private landowners who wish to conserve resources on their property.

Property acquisitions are prioritized through a combination of functional planning efforts (e.g., salmon recovery and floodplain management plans), strategic conservation/ acquisition planning such as Greenprint GIS modeling, and work by staff who are familiar with the county's natural resources. Lands that are highest priority for long-term preservation are pursued for acquisition, to bring them into public ownership. In some cases this ownership is in the form of full fee simple ownership; other times it results in a conservation easement where the underlying property ownership remains in private hands but the county-owned easement precludes development and other potential impacts. The county's current inventory of protected lands includes 6,200 acres of ecological lands, 3,500 acres of forestry lands, and nearly 100,000 acres of conservation easements. These acquisition approaches have been a priority for well over a decade, dating back to the Waterways 2000 program. In 2006, 950 acres were acquired for a total of $8 million, using both local funding such as Conservation Futures and a variety of state and federal grants. Local funding has increased through the recent adoption of a six-year "parks expansion levy" which will provide funding for open space as well as regional trails. Open space funding under this new program is expected to amount to nearly $20 million over the next six years. Local funding for acquisition is highly leveraged with state and federal grant funds.

Incentives programs are used to encourage private landowners to conserve resources on lands with significant conservation value. These programs include the Public Benefit Rating System, the Timber Land Program, and Forest Land and Farm and Agricultural Lands programs. These programs reward property owners for their decision to conserve resources by providing them with lower property taxes. While any property owner who believes they meet program requirements may apply, staff also target subareas of King County and recruit program participants there. Targeted subareas include priority areas from salmon conservation and other planning efforts, areas of contiguous forest, etc. Taken together, there are currently over 300,000 acres enrolled in these incentives programs.

Another incentive program used by the county is the Transfer of Development Rights (TDR), which allows development rights to be exchanged from "sending sites" which are areas where resource protection is a priority, to "receiving sites" which are areas within the Urban Growth Area where increased densities are sought. These transactions can occur between private parties if they meet criteria established by the county, or can occur with assistance from a County TDR bank.

Another form of conservation on private lands is participation in a variety of county programs that provide technical assistance to landowners regarding stewardship actions they can take on their properties. These programs include the Forest and Rural Stewardship Programs and the Farm Management Program.

Habitat restoration. King County dedicates significant funds and effort to restoring aquatic habitats, using both local dollars and grant monies from state and federal sources. For example, in 2006, Water and Land Resources spent $3.1 million on habitat restoration, completing over 15 projects throughout

the county. Most of these projects are specifically called for in WRIA salmon conservation or other regional plans. Recent examples have included the Auburn Narrows Side Channel Connection project, which created 1,600 linear feet of off-channel habitat and 55 acres of replanted riparian areas along the Green River; the Lions Club Side Channel project along the Cedar River, which created over 30,000 square feet of side channel habitat; and the 10-acre Lower Raging River Floodplain Reconnection project. King County's Wastewater Treatment Division is also contributing substantially to habitat restoration, protection, and land conservation as a part of the mitigation program related to the development of the division's new Brightwater wastewater treatment facilities. Efforts include $38.5 million in habitat mitigation at various sites in King and Snohomish Counties and other adjacent jurisdictions, including a 43-acre salmon habitat and reforestation area on the Brightwater site in the Little Bear Creek basin.

Industrial Waste Program. The Industrial Waste Program ensures that industries treat their wastewater for harmful substances before discharging the wastewater to sewers whose contents ultimately reach Puget Sound. In 2006, 128 permits and 302 industrial waste discharge authorizations were in effect, 376 inspections were conducted, and 70 Notices of Violation were issued. One indicator of the program's success is the reduction in the amount of mercury in biosolids produced at the county's wastewater treatment plants. The amount of mercury in the biosolids has decreased by over 50 percent since Industrial Waste began its Dental Waste Program.

Landowner incentive programs. A number of landowner incentive programs protect Puget Sound by maintaining increasing portions of the landscape in healthy forest and farmland. Through the Farmland Preservation Program, King County has acquired development rights on more than 13,000 acres of high-quality farmland. The Timber Land Program and the Public Benefit Rating System provide property tax incentives to encourage private landowners to voluntarily conserve and protect land resources, open space, and timber. In 2006, a total of 1,093 properties (10,514 acres) were enrolled in these two programs combined.

Local Hazardous Waste Management Program. The Local Hazardous Waste Management Program (LHWMP) is a regional program that complements other county efforts to protect water quality. LHWMP brings together resources from four local government agencies and 37 suburban cities to protect and enhance public health and environmental quality by helping citizens, businesses, and government reduce the threat posed by the production, use, storage, and disposal of hazardous materials. The program provides collection and recycling services and offers public outreach aimed at proper handling and reduction in use of hazardous products. In 2006, the Program collected 2,970 tons of household hazardous waste from more than 52,400 customers. Also, more than 260,400 gallons of used motor oil were collected at public and private collection sites throughout the county.

Low impact development (LID). Opportunities to incorporate low impact development (LID) techniques (e.g., porous concrete, porous asphalt, and bioretention facilities) are being considered as an alternative to conventional stormwater facilities for all Road Services Division (RSD) capital projects. LID techniques are a key part of a more innovative design approach being taken to retain natural drainage funtions and reduce the impacts of stormwater runoff from transportation infrastructure. RSD is striving to adapt LID techniques to its capital project requirements on a more consistent basis. For example, RSD is currently monitoring the performance of recently completed LID project elements with a grant from the Washington State Department of Ecology. In addition, several other capital projects that are currently in the design phase will use LID techniques in lieu of conventional stormwater facilities.

Mitigation and monitoring program. The Mitigation and Monitoring Program within the Department of Transportation, Road Services Division (RSD) has existed since 1995. The purpose of the program is to work with staff to design, construct, maintain, and monitor compensatory mitigation sites for the purposes of permit compliance and effective mitigation implementation associated with impacts to critical areas within King County. To ensure the continued protection or improvement of Puget Sound ecosystems, one of the RSD overall goals is to plan, build, operate, and maintain the road system in a manner that recognizes stewardship of the natural and human-made environments. Management and staff at RSD are committed to reducing environmental impacts resulting from implementation of its CIP program. They are also committed to providing the best and most appropriate mitigation when unavoidable impacts occur. Mitigation and Monitoring staff plays an integral role throughout the planning, construction, post-construction, and monitoring phases of mitigation process.

In an effort to improve water quality while considering the health of our ecosystems, RSD is now evaluating the relocation and upgrading of existing septic systems as part of project mitigation. It is not uncommon to find older residences with sub-standard septic systems adjacent to rivers, streams, or wetlands in the vicinity of an RSD project. These situations present an opportunity for RSD to work with homeowners to upgrade aging septic systems and relocate them farther away from environmentally critical areas. This is a win-win for all parties involved. An RSD project can efficiently meet water quality standards while assisting a homeowner in eliminating a significant source of pollution to our natural environment.

Monitoring marine and freshwaters for water quality, water quantity, sediment, and biological resources. King County runs a monitoring program for freshwater streams, lakes, and rivers and for the marine waters of Puget Sound. The components of this program, along with other regional monitoring programs, are summarized in Appendix B. The program samples water quality, sediment quality, stream flow, physical properties such as temperature and weather, biological resources, and other media. While this program represents a very significant and long-standing financial contribution from King County, we recognize that in order to track our progress on achieving the PSP goals for Puget Sound by 2020, gaps in location and type of monitoring will need to be filled.

Natural Yard Care Program. The Natural Yard Care Program provides education and training to residents throughout the county. The program emphasizes the following behaviors: build healthy soil, plant right for your site, practice smart watering, think twice before using pesticides, and practice natural lawn care. Thousands of people have participated in this training over the last several years, and follow-up surveys indicate a continued improvement in and use of natural yard card practices. The program measures behavior change through several mechanisms including the Environmental Behavior Index (EBI).

NPDES construction monitoring. King County Road Services Division (RSD) obtains NPDES Permits for construction projects over one acre in size. Temporary Erosion and Sediment Control Plans and Stormwater Pollution Preventions Plans are developed for each project and included in construction contract requirements. Environmental and Construction staff receives state approved training on proper implementation of Stormwater Best Management Practices (BMP) and stormwater permit requirements. Construction staff actively monitors stormwater runoff and BMP performance to protect water quality. RSD proactively works with Department of Ecology water quality inspectors to help ensure implementation of Clean Water Act requirements. The Environmental Unit is developing stormwater sampling plan guidelines for RSD staff to help implement proactive protection of surface and groundwater resources.

NPDES permit for wastewater discharges to Puget Sound. King County's treatment plants and associated facilities continue to comply with the terms and conditions of their NPDES permits and so are in compliance with the Washington State Water Pollution Control Act, the Federal Water Pollution Control Act, and the Federal Clean Water Act. Despite unusually heavy storms, neither the West Point nor the South Treatment Plant experienced exceptions to NPDES secondary treatment permit limits in 2006. Both plants received the National Association of Clean Water Agencies (NACWA) Platinum Peak Performance Award for operating five consecutive years with no permit exceptions. Two new treatment plants—Brightwater and Carnation—will feature advanced technology to produce highly treated wastewater that exceeds NPDES permit limits.

Onsite sewage program. PSP has identified the reduction of animal and human waste as a top priority. Public Health – Seattle & King County helps to ensure that over 115,000 septic systems, including 192 septic systems in Seattle, are safe. Septic systems treat wastewater when homes and buildings are not connected to public sewer systems. Proper operation and maintenance of these systems and replacement of failing systems help reduce nutrient loading and pathogens that can impair water quality.

Pollution prevention. The Road Services Division is responsible for the maintenance and function of about half of the stormwater conveyance, storage, treatment and discharge facilities in King County.

The Road Services Division is reducing its pollution footprint through a number of programs. These range from the simple installation of spill clean-up kits in all vehicles and the replacement of hydraulic fluid with vegetable oil in construction equipment to complex, wide ranging pollution prevention and remediation programs:

- The "CROW" program (Consolidated Reduction in Waste) collects recyclable material from construction activities and from illegal dumping on the right of way. The majority of this material is then recycled. This reduces the solid waste disposal stream and recycles materials such as wood, asphalt, concrete, metals, batteries, and electronic equipment.
- The "SWAP" program (Street Waste Alternative Program) collects material generated during street sweeping, catch basin maintenance, and vactor cleaning. These collected sediments bind pollutants such as metals, oils, and other chemicals. The SWAP program captures 10,000 tons of potentially contaminated waste every year. The waste is stored in secure facilities for bio-remediation and testing before being recycled as soil.
- The Hazardous Waste program collects hazardous material (such as oil and antifreeze) from the right of way preventing the material from entering surface or groundwater. The Road Services Division collects and properly disposes of about 5,000 pounds of hazardous materials every year. Much of this waste is dumped illegally in the right of way. The Road Services Division has also halved its own generation of hazard materials by 50 percent over the past 4 years.
- Each of the 25 pit sites in active use by the Road Services Division has a site specific Storm Water Pollution Prevention Plan to avoid discharge of pollutants to surface or groundwater. The Road Services Division also monitors groundwater at pit sites to ensure that our activities do not contaminate groundwater.

These programs are part of the Road Services response to the Endangered Species Act (ESA) listings and the National Pollution Discharge Elimination System (NPDES) requirements. The division participates in regional forums dealing with ESA and NPDES issues and has taken a strong leadership and conservation role in helping other agencies and jurisdictions respond to the complex environmental and regulatory arena of Puget Sound.

Reclaimed water production, application, infrastructure planning, and construction. In 2006, the county produced about 255 million gallons of reclaimed water for onsite use at the West Point and South Treatment Plants and for offsite uses, including habitat restoration, near the South plant. The Brightwater plant will produce water that meets state reclaimed water standards, with the goal of distributing the water to customers for reuse and reducing the volume of wastewater discharged to Puget Sound. In 2011, the Brightwater "backbone" system will be ready to convey reclaimed water west and south of the plant. The county continues to work with the state Departments of Health and Ecology to ensure that the design and construction of the backbone comply with state standards. In 2007, the county served as a co-sponsor of a Reclaimed Water Workshop. In addition, the county will produce a reclaimed water feasibility study by the end of the year that will help identify potential users, technologies, and funding sources. As a part of the study, staff met with representatives from local jurisdictions, water and sewer districts, parks, and businesses to discuss reclaimed water opportunities.

Regional Road Maintenance Endangered Species Act Program. Impacts to water quality in Puget Sound can arise from routine road maintenance and construction activities. We have implemented the Regional Road Maintenance Endangered Species Act Program Guidelines to help reduce water quality impacts from our activities. The program includes a strong educational and training program for all construction related employees, the implementation of Best Management Practices (BMPs) to protect water quality, monitoring before, during and after construction to evaluate construction methods, performing research and BMP evaluation programs, and participation in a collaborative region wide forum that shares ideas and experiences for impact reduction.

Regional water supply planning. In 2005, the county signed a memorandum of understanding with Cascade Water Alliance to work together on water resource and water supply planning. The members of Cascade Water Alliance are five cities and three water utility districts in the fastest growing parts of the county, where it is critical to address the challenge of maintaining adequate water supply for people and adequate streamflows for fish. As a result of the memorandum, the county convened a multi-stakeholder group that defined technical questions that are currently being considered by seven self-selected technical committees. The reports from these committees will be analyzed and synthesized into a single report that will include recommendations on how to incorporate what has been learned in this process. One expected outcome will be for the county and Cascade Water Alliance to undertake a coordinated water system plan that will address demand and supply alternatives such as Lake Tapps and reclaimed water.

Rural, forest, and farm stewardship programs. The rural stewardship program assists property owners in meeting the high standards set by the Critical Areas Ordinance for protecting the resources on their land when the flexibility of the code is insufficient to allow reasonable development. The program has provided assistance to 84 landowners, representing 500 acres, who want to improve the resource quality of their property. The program has approved 12 rural stewardship plans on 41 acres. The county's forestry program conserves forestland and improves forest health. Through direct assistance to landowners, the program encourages forest retention and stewardship. The program has affected 11,500 acres of forestland through forest stewardship education courses and approved forest stewardship plans. The forestry program is also working with communities to develop forest fire prevention plans. The agriculture program, in partnership with the King Conservation District, encourages farmers to develop farm management plans. The program has provided cost sharing, has assisted with implementation of best management practices to improve water quality on 247 farms, and has partnered with farmers who have restored riparian areas along over six miles of the Snoqualmie River.

Salmon habitat improvement. One of the most cost-effective means of salmon habitat improvement is to restore access to existing spawning and rearing habitat that has been blocked by road crossing structures such as culverts. Surveys suggest that many of the thousands of road crossings in King County streams are barriers or impediments to fish migration. The Road Services Division continues to replace barrier culverts with fish friendly designs year after year. To date we have restored fish access to over 70 miles of fish habitat.

RSD addresses elements of the landscape when determining priority projects for implementation. The drainage programs overall goal is to consider ecological processes, structure, and function of individual sites when designing culvert replacements, mitigation and/or restoration activities. This helps to ensure that the project sites are designed to work with ecosystems and habitats suitable for any particular species and are the result of various geologic, hydrologic, and biologic processes. Examples of processes may include the movement of water, sediment, nutrients, or energy; structures may include vegetation composition, food webs, or water chemistry; and functions may include nutrient cycling and the provision of a diverse array of habitats.

Short Span Bridge Replacement Program. RSD has identified 22 "short span" timber bridges that would be replaced between 2007 and 2012. Each bridge has a stream channel span that measures less than 20 feet across and is typically supported by abutments and/or piles within the stream channel. Two bridges were replaced in 2007. Four bridges will be replaced per year between 2008 and 2012.

The timber bridges were originally built in the 1950s and are treated with creosote that continues to leach oily residue into the riparian area to this day. All timber bridge piles, caps, and stingers are proposed for removal and disposal at an approved location.

Each new bridge will have wider channel span than the existing bridge to improve the shoreline habitat upstream and downstream from the bridge. Wider channel openings create less risk of channel scour. Less channel scour near the bridge will likely increase the service life of the bridge and decrease maintenance needs of the bridge. Bridge maintenance near critical areas has the potential to impact habitat, so the less maintenance needed over time, the less disturbance to wildlife. Protective channel bank plantings, seeding, and mulching will be provided as mitigation for disturbing the ground during pier removal. Blackberry removal in immediate project areas of disturbance provides native plantings an opportunity to become established. The new bridges will not have an increase in impervious surface area.

Stormwater management program and service agreements with cities. Stormwater services are the nuts and bolts of basic environmental management. King County is the stormwater service provider for all of unincorporated King County and the contract service provider for several incorporated cities. In addition to maintaining, inspecting, and retrofitting stormwater conveyance, flow control, and water quality treatment facilities, King County Stormwater Services maintains and facilitates effective application of the county's stormwater facility design standards for new development and redevelopment (contained in the *Surface Water Design Manual*) and does the same for the county's stormwater source control requirements for existing development (contained in the *Stormwater Pollution Prevention Manual*). In addition to use in unincorporated King County, these manuals have been adopted by several incorporated cities. To reduce pollution, King County Stormwater Services also inspects many businesses each year to ensure compliance with the county's source control requirements.

Stormwater regulations. King County WLRD provides technical standards for development activities. Through this program WLRD updates and facilitates implementation of the King County *Surface Water Design Manual* and *Stormwater Pollution Prevention Manual*.

Program Goals:

- Require stormwater controls on development sites to reduce pollution from stormwater discharges to the maximum extent practicable and prevent them from causing or contributing to a violation of state water quality standards, state groundwater standards, and/or state sediment standards.
- Require stormwater controls on development sites to protect public safety and prevent property damage.

Program Objectives:

- Require stormwater flow control and treatment facilities on development projects to mitigate the stormwater quantity and quality impacts of new impervious surface and other land cover changes (e.g., clearing).
- Require stormwater flow control and treatment facilities on larger redevelopment projects to retroactively mitigate the impacts of existing impervious surface that is replaced.
- Require low impact development BMPs (a.k.a., flow control BMPs) to mitigate stormwater quantity impacts not able to be mitigated by facilities (runoff volume and flashiness, groundwater recharge).
- Require construction site pollution prevention BMPs (i.e., source control, spill control, and erosion and sediment control).
- Require applicable structural source control BMPs (e.g., spill containment, storage cover) when commercial and industrial sites are being developed.
- Require structural and/or behavioral source control BMPs (e.g., washing practices, pesticides, storage) applicable to existing business and residential activities that cause pollution.

STORM. In early 2007, Ecology promulgated new Phase I & II National Pollution Discharge and Elimination System (NPDES) Municipal Stormwater Permits. These permits contain public outreach and education requirements, which participation in a regional group may satisfy. Out of a desire to develop consistent regional messages, share resources, and comply with the permits, nearly three dozen jurisdictions in four Central Puget Sound counties came together in a collaborative effort to form a stormwater education and outreach consortium called STormwater Outreach for Regional Municipalities (STORM).

The group held its first meeting in the spring of 2007. At this meeting and two subsequent meetings, group debate focused on organizational structure, subcommittee creation, and outreach campaign subjects. Recent effort focused on the completion and submittal of a grant application (titled STORMing Puget Sound) for funding from Ecology's Stormwater Management Implementation Grants for approximately $1 million to fund a multi-year outreach media campaign focused on stormwater.

If awarded, these funds would be used to conduct a multi-media public education campaign that will raise general awareness about best management practices that individuals can undertake to improve water quality. The campaign will reach the Central Puget Sound region and much of the State of Washington. STORM participants will also utilize a host of local programs, informed by the science of social marketing, to perform the necessary educational components and help motivate individuals to make the real behavior changes. With these changes it is hoped that a reduction in pollution generation will occur and thus an improvement in water quality will be seen throughout the Puget Sound region. Finally, STORMing Puget Sound will assess the campaign's effectiveness and reflect on lessons learned.

Waste pharmaceuticals management. There is no safe, environmentally acceptable way to dispose of unused medicines from homes or long-term-care facilities in Washington State. The general practice is to "crush and flush" down the drain. Wastewater treatment plants are unable to remove most of these pharmaceutical chemicals, which are now being detected in Puget Sound's water, sediment, and fish. To address this problem, a project team called PH:ARM (Pharmaceuticals from Households: A Return Mechanism) that includes state and local agencies, NGOs, and business interests was formed to pilot models for the safe collection and disposal of unused medicines. PH:ARM has been operating secure collection bins at Group Health Cooperative clinical pharmacies since October 2006, and has collected more than 3,000 pounds of old pharmaceuticals to date. Sixteen pharmacies in Thurston, Pierce, King, Snohomish, and Kitsap Counties (as well as Spokane) are currently participating in the pilot.

Watershed approach to mitigation. King County Road Services Division is now using a programmatic mitigation approach to compensate for wetland and stream impacts on its larger projects. A programmatic approach generally involves combining compensatory mitigation for two or more projects affecting wetland or other aquatic resources, or in the case of long linear transportation projects, combining mitigation for all impacts along a project corridor in one location. For example, on the NE Novelty Hill Road Project (CIP 100992) King County is utilizing the watershed planning from the Lake Washington/Cedar/Sammamish Watershed (WRIA 8) Chinook Salmon Conservation Plan to identify one or two sites where mitigation for the entire project can be done, achieving the most basin-wide benefit. This plan was developed through a collaboration of citizens, scientists, community, business, and environmental groups, local elected officials, and public agency staff, and the science-based plan has been ratified by 24 local governments. The plan recommends actions to restore and protect habitat that salmon need to survive in the Lake Washington/Cedar/Sammamish Watershed. Mitigation for the NE Novelty Hill Road Project will implement a number of the actions identified in the WRIA 8 Chinook Salmon Conservation Plan as being critical to salmon survival in the watershed.

Watershed forums and salmon recovery plan implementation. King County is the service provider for three watershed forums whose primary task is to facilitate implementation of their respective salmon recovery plans. These plans are part of a regional Puget Sound salmon recovery plan and identify specific actions, including site-specific habitat protection and restoration projects and programmatic actions such as shoreline management programs and stormwater management practices. King County is also a local member of these forums and is implementing priority actions from these plans. In 2006, the Water and Land Resources Division (WLRD) spent close to $3 million on habitat restoration including actions in the Snoqualmie, Cedar, Green, and White River watersheds and a small habitat restoration project granting program. The watershed forums and councils are successful examples of how multiple jurisdictions can join together and leverage resources and expertise to address complex environmental challenges.

Wildlife crossing. RSD is in the process of developing a guide of best practices for identifying, designing, and implementing wildlife crossings on King County transportation corridors. These best practices will be based on best available science and successful projects around the world. The guide will include criteria for identifying potential wildlife crossing locations and a menu of options, including structural and non-structural measures, to facilitate the safe movement of wildlife across transportation corridors. This guide will provide the county with a tool for reducing wildlife-vehicle collisions and other wildlife-related accidents, as well as improving habitat connectivity and species biodiversity. As a pilot project, RSD is evaluating the NE Novelty Hill Road corridor for the possible implementation of a wildlife crossing underpass. This pilot project would include post construction

monitoring to learn how well the structural and non-structural features perform, particularly in an urbanizing area. The county needs to further identify wildlife and transportation corridor conflict zones, as well as specific target species.

APPENDIX B

Components of a Comprehensive Monitoring Program and Status within King County

Category	Program	Summary	Current Status	Who is Currently Doing?
Atmosphere	Climate Change	UW provides substantial regional expertise on climate change. Ability to coordinate with UW and translate science is a challenge for all jurisdictions.	Ongoing work by UW. KC could use additional staff and funding to address executive's initiatives.	UW, Ecology, KC, SPU, CWA, others
	Localized Weather Conditions	Weather is highly localized within King County, and varies considerably spatially. Weather monitoring at multiple locations allows for differentiation between local weather patterns.	Insufficient coverage to understand local variability	NOAA, UW, KC, USGS, SPU
	Atmospheric Deposition	Chemical deposition of contaminants from the atmosphere to uplands or surface waters can represent an important pollution source and can impact stormwater quality and/or chemical bioaccumulation through the food web.	Some very limited ongoing research.	UW, USEPA
	Air Quality	Air quality is highly localized within King County, and varies considerably spatially. Air quality monitoring at multiple locations allows for differentiation between local conditions.	Good coverage in urban area.	PSCAA
	Data Management	Data management is an essential element of any monitoring program.	New programs would need data management.	
Puget Sound	Offshore Water Quality	Offshore water quality is reflective of all inputs to the sound, and is indicative of overall health of Puget Sound.	Good spatial coverage, insufficient temporal coverage for certain parameters; limited data for many contaminants.	KC, Ecology
	Shoreline Water Quality	Shoreline water quality is reflective of localized inputs to the sound, and can vary considerably spatially.	Good spatial coverage except on Vashon-Maury Island, poor temporal coverage for certain parameters; limited data for many contaminants	KC, Ecology (only bacteria)
	Food Web	Puget Sound foodweb is composed of small plants (algae), small animals (zooplankton), and larger animals. Understanding the components of the food web and their interconnections is important to understanding the health of the sound and how it responds to various stressors.	Some limited work being done by UW-Tacoma. Limited phytoplankton sampling.	UW-Tacoma, KC

Category	Program	Summary	Current Status	Who is Currently Doing?
Puget Sound *continued*	Nearshore Habitat	The greatest concentrations of marine species live in nearshore habitat. These shallow waters are especially susceptible to impact from a variety of stressors.	Some work on eelgrass and kelp coverage and intertidal biota by WDNR and UW, site-specific monitoring, expansion warranted.	KC, UW, WDNR
	Shoreline Habitat	Shoreline habitat reflects the upland areas immediately adjacent to Puget Sound. The shoreline habitat has substantial impact on the nearshore habitat.	Some limited work being done by KC, but not much else. Expansion warranted.	All local jurisdictions on PS, Ecology
	Ambient Sediment Quality	Ambient sediment quality reflects overall chemical accumulation in Puget Sound from all sources.	Conducted by Ecology, limited work done by KC.	KC, Ecology
	Nearshore sediment quality	Sediment quality in nearshore (shoreline) areas reflects accumulation from nearby sources	Conducted by KC on a 5-yr rotating basis at select locations	KC, others may do in conjunction with site cleanup requirements
	Urban Area Sediment Quality	Urban area sediments have historically been impacted from industrial, municipal, and stormwater discharges and activities.	Done for individual sites, but spatial coverage is limited. Expansion warranted.	Seattle, KC, Ecology, Port of Seattle; and some landowners to meet dredge disposal regulations.
	Sediment Benthic Macroinvertebrates (NPDES)	Sediment benthic macroinvertebrates are part of the WTD NPDES permit for West Point.	Conducted by KC at select locations as part of NPDES monitoring.	KC
	Sediment Benthic Macroinvertebrates (Ambient)	Sediment benthic macroinvertebrates are a valuable indicator of ecosystem health at a small scale.	Coverage lacking in many areas, some work at specific sites.	KC, Ecology
	Chemical Bioaccumulation	Assessment of chemical bioaccumulation in plant and animal tissues provides an assessment of the degree to which these organisms have been impacted from exposure to contaminants in the sound and also provides data needed to protect human health related to fish consumption.	Some very limited work done by KC, WDFW for limited species, but expansion warranted.	WDFW

Category	Program	Summary	Current Status	Who is Currently Doing?
Puget Sound *continued*	Swimming Beach	Swimming beach monitoring is designed to detect potentially unhealthy levels of bacteria at swimming beaches.	Done by KC and Ecology using EPA grant.	KC, Ecology
	Harmful Algal Blooms	Harmful algal bloom monitoring is designed to track harmful algal blooms and toxin accumulation in shellfish, to help ensure safety for shellfish consumers.	Done by testing shellfish for toxins. Expansion to include bloom monitoring warranted.	WDOH, NOAA
	Data Management	Data management is an essential element of any monitoring program.	New programs would need data management.	
Freshwater	River/Stream Flow	River and stream flow is monitored to understand how basins respond to weather conditions and for floodplain and fish habitat management.	Pretty good coverage.	USGS, Ecology, KC, SPU, other jurisdictions
	River/Stream Water Quality	River and stream water quality is directly linked to runoff from land surface.	Good coverage for some parameters in WRIAs 8 & 9, but not in 7 or 10 or on Vashon Island. Expansion warranted. Limited contaminant monitoring.	Ecology, KC, other jurisdictions
	Large Lake Water Quality	Large lake water quality is related to runoff from areas around the lake, and from areas feeding all tributaries draining to the lake.	Good coverage for some parameters. Limited contaminant monitoring	Ecology, KC, UW
	Small Lake Water Quality	Small lake water quality is related to runoff from areas around the lake.	Few lakes are monitored. Expansion warranted. Limited parameters evaluated.	KC
	Swimming Beach	Swimming beach water quality monitoring is designed to detect potentially unhealthy levels of bacteria for the purposes of beach closures.	Done by KC. Good coverage.	KC
	Stormwater Quality	Stormwater quality monitoring will be required by the new municipal NPDES stormwater permit.	Not currently monitored.	None
	TMDL monitoring and modeling	Total maximum daily loads are developed for impaired water bodies as authorized by the Clean Water Act. Monitoring and modeling are necessary to develop and implement plans for meeting water quality standards.	Ecology responsible for TMDLs, KC providing substantial monitoring and modeling support.	Ecology and KC

Category	Program	Summary	Current Status	Who is Currently Doing?
Freshwater *continued*	Large Lake Food Web	Large lake foodweb is composed of small plants (algae), small animals (zooplankton), and larger animals. Understanding the components of the food web, and how they change with time is important to understanding the health of the lakes and how they are responding to various stressors.	Some preliminary investigations by SPU, historic data by UW, some data from KC. Expansion and coordination warranted.	SPU, UW, KC
	Chemical Bioaccumulation	Assessment of chemical bioaccumulation in plant and animal tissues provides an assessment of the the degree to which these organisms have been impacted from exposure to contaminants in the lakes. Information provides basis for determining seafood consumption advisories for lakes.	Some very limited historic data from KC. Not currently monitored.	None
	Stream Shoreline Habitat	Shoreline habitat reflects the upland areas immediately adjacent to streams. The shoreline habitat has substantial impact on stream health.	Some limited data from KC, Ecology and other jurisdictions. Coordination and expansion warranted.	KC, Ecology, others
	River Floodplain Habitat	River floodplain habitat reflects the areas immediately adjacent to rivers that may occasionally flood. The floodplain habitat has substantial impact on river health.	Some limited data from KC, Ecology and other jurisdictions. Coordination and expansion warranted.	KC, others
	Large and Small Lake Shoreline Habitat	Shoreline habitat reflects the upland areas immediately adjacent to lakes. The shoreline habitat has substantial impact on lake health.	Limited to no data available.	None
	River and Stream Habitat	In-water habitat in rivers and streams (pools vs. riffles, LWD, shading, etc) have substantial impacts on health of the ecosystem.	Some data from restoration/ construction projects. Other data collected as part of other programs (e.g., macroinvertebrate monitoring). Coordination and expansion warranted.	Ecology, KC, SPU, other jurisdictions
	Stream Sediment Quality	Stream sediment quality is reflective of localized chemical inputs from surrounding land use.	Done by KC for WRIAs 8 and 9. Not done in WRIAs 7 and 10 and Vashon Island. Expansion of program warranted.	KC

Category	Program	Summary	Current Status	Who is Currently Doing?
Freshwater *continued*	Large Lake Sediment Quality	Large lake sediment quality is reflective of localized chemical inputs from surrounding land use, and from overall inputs from throughout the watershed.	Done by KC every several years. Expansion of program warranted. Ecology has collected some limited data associated with contaminated sites (Gas Works Park)	KC
	Groundwater Levels	Groundwater levels vary throughout the county, and can vary dramatically depending on pumping rates, weather and climate.	Done by KC on Vashon and Sammamish River Valley. Expansion and coordination of program warranted.	KC
	Groundwater Quality	Groundwater quality varies throughout the county, and can be impacted by local land use activities and natural geological conditions.	Done by KC on Vashon Island, water utilities with wells. Coordination and expansion of program warranted to monitor additional locations and parameters.	KC, water utilities with wells
	Wetland	Wetlands vary is size and function throughout the county. Wetlands provide natural water storage and filtering, as well as a myriad of other functions. Wetland health is vital to the health of the hydrologic cycle.	Wetlands monitored at UPDs. Previous efforts ended in early 1990s. Expansion warranted.	KC at UPDs, Ecology, USACOE and EPA for project specific needs
	Data Management	Data management is an essential element of any monitoring program.	New programs would require data management.	
Terrestrial Habitat	Land Use and Land Cover	Understanding county-wide land use and land cover is essential to understanding overall ecosystem health and land management effectiveness.	Data collected from LANDSAT images with ground-truthing. Expansion of program warranted.	KC, PSRC, UW and WDNR
	Forest Health	Forest health is reflective of land management activities by individual landowners. Provides habitat and protects water quality.	Some monitoring by large forest owners but expansion warranted.	Private land owners, WDNR.
	Invasive Plants	Invasive plants can alter the ecosystem and possibly outcompete native plants.	No ambient monitoring program in place. Noxious weeds targeted for removal based on reports of presence.	USDA, NRCS (agriculture related)
	Data Management	Data management is an essential element of any monitoring program.	New programs would require data management.	

Category	Program	Summary	Current Status	Who is Currently Doing?
Animals	Chinook Salmon	Chinook salmon are a listed threatened species and iconic of the region.	WDFW, KC (via KCD) do escapement estimates in select areas - expansion of program warranted.	WDFW, KC, NOAA, Tribes
	Kokanee Salmon	Kokanee salmon are native to the major lakes and sensitive to changes in lake habitat and surrounding land use changes.	WDFW conducts monitoring, expansion of program warranted.	KC, WDFW, Tribes, USFWS
	Steelhead	Steelhead are native to the region and under intense pressure.	SPU, WDFW conduct monitoring, expansion of program warranted.	SPU, WDFW, Tribes, USFWS
	Other Salmonids	Other salmonids are also sensitive to changes in habitat.	Limited to no monitoring, expansion of program warranted.	WDFW, Tribes
	Freshwater Fish Populations	Freshwater fish populations are reflective of overall ecosystem health.	There is no monitoring program for fish population health.	WDFW
	Stream Benthic Macroinvertebrate	Stream benthic macroinvertebrate populations are indicative of overall ecosystem health.	Extensive program by KC, also SPU, Ecology, Snohomish and Pierce Counties, other jurisdictions. Big gaps in WRA 7 and 10 and on Vashon Island.	KC, SPU, Ecology, Pierce and Snohomish counties and other jurisdictions
	Puget Sound Fish Populations	Puget Sound fish populations are reflective of overall ecosystem health.	Some limited work by WDFW, but expansion of effort warranted.	WDFW
	Amphibians	Amphibian populations are especially sensitive to a wide range of habitat changes due to their diverse habitat needs. Status of amphibian populations are an excellent indicator of ecosystem health.	Some work by KC at UPDs and some project monitoring by state/fed agencies, expansion warranted.	KC at UPDs, USGS, UFWS, WDOT, WDNR
	Marine Birds	Marine birds are dependant on healthy food web and habitat.	Some work by WDFW and UW, but expansion of effort warranted.	WDFW, UW
	Marine Mammals	Marine mammals are dependant on healthy food web and habitat.	Some limited work by WDFW, NOAA, and NGOs, but expansion of effort warranted.	WDFW, NOAA, NGOs
	Terrestrial Birds	Terrestrial birds are dependant on healthy terrestrial ecosystem and food web.	Very little effort, some project specific work. Expansion warranted.	WDFW, Audubon, USFWS, WDNR, USFS
	Terrestrial Mammals	Terrestrial mammals are dependant on health terrestrial ecosystem and food web.	Very little effort, some project specific work. Expansion warranted.	WDFW, USFS, USFWS, WDNR

Category	Program	Summary	Current Status	Who is Currently Doing?
Animals *continued*	Invasive Species	Invasive species may enter the county and outcompete native species and result in ecosystem imbalance.	Some work by NGOs, but expansion of effort warranted.	WDFW, Nature Conservancy, USDA (noxious weeds)
	Data Management	Data management is an essential element of any monitoring program.	New programs would need data management.	

APPENDIX C

Water Quality Monitoring Program Funding

Water Quality Monitoring Program Expansions Included in the Proposed 2008 Budget

Monitoring Program Element	Funding Source
Add phytoplankton monitoring at selected sites in Puget Sound and Lake Washington as an indicator of nutrient loadings, primary productivity, and food web health.	Reprioritized WTD Operating transfer to WLRD
Install high-frequency water quality monitoring instrumentation at four locations in Puget Sound, including Elliott Bay (through partnership with Aquarium), Quartermaster Harbor, and two additional as-yet-unidentified locations.	WTD CIP, Technology Enhancement Project
Re-establish water quality monitoring buoys on Lakes Sammamish and Washington.	WTD CIP, Technology Enhancement Project
Conduct detailed characterization of summer temperatures in Raging River to support salmon recovery efforts and TMDL development.	SWM

Unfunded King County Water Quality Monitoring Program Expansions to be addressed in Future Years

Monitoring Program Element
King County wetland mapping and monitoring
King County wildlife corridor habitat monitoring
Quartermaster Harbor intensive characterization
Stream benthic macroinvertebrate monitoring in WRIAs 7 and 10
King County wildlife monitoring
Invasive species monitoring

APPENDIX D

PSP LEADERSHIP COUNCIL MEMBERS

Chair: Bill Ruckelshaus **Term: Four-year term, ends June 25, 2011**

Bill Ruckelshaus chaired the Puget Sound Partnership effort in 2006, which led to the creation of the Puget Sound Partnership as a state agency in 2007. Ruckelshaus served as chair of the state Salmon Recovery Funding Board, which provides grants to protect and restore salmon habitat. He is also a member of the U.S. Commission on Ocean Policy, which brings attention to the importance of protecting and restoring saltwater areas, such as the Puget Sound, that are important to salmon recovery and a range of cultural, economic and quality-of-life interests. He co-founded the Shared Strategy process, the framework within which Puget Sound area watersheds are preparing groundbreaking plans for recovering harvestable and sustainable populations of salmon. Ruckelshaus was the first administrator of the U.S. Environmental Protection Agency, which was formed in December 1970. He served as director until April 1973.

Member: Billy Frank, Jr. **Term: Four-year term, ends June 25, 2011**

Billy Frank. Jr. of the Nisqually Indian Tribe has been chair of the Northwest Indian Fisheries Commission for 30 years. In this capacity, he "speaks for the salmon" on behalf of 20 Treaty Indian Tribes in western Washington. Under his leadership, tribes have successfully reasserted their traditional role as natural resource managers and secured other rights protected by treaties with the United States government. He has been celebrated regionally, nationally and internationally as an outstanding Native American leader and has been the recipient of numerous recognition awards, including the Albert Schweitzer Prize for Humanitarianism and the Indian Country Today Inaugural American Visionary Award.

Member: Diana Gale **Term: Two-year term, ends June 25, 2009**

Diana Gale is currently the chair of the Washington Public Works Board, which biennially awards over $300 million in loans to local governments for infrastructure upgrades and repair. Gale is a senior lecturer at the Daniel J. Evans School of Public Affairs at the University of Washington. She is the former managing director of Seattle Public Utilities, the City of Seattle Office of Management and Budget and superintendent of the Seattle Water Department. She has been on the board of the Seattle Opera, the Seattle Chamber Music Festival, Long Live the Kings, the National Water Research Institute, the American Municipal Water Association and the International Water Management Council.

Member: Martha Kongsgaard **Term: Two-year term, ends June 25, 2009**

Martha Kongsgaard was born and raised in Napa, Calif., to a family of jurists, grape growers and cattle ranchers. Kongsgaard married Peter Goldman in 1988 and collaborated with him to found the Kongsgaard-Goldman Foundation. The foundation gives grants to a variety of nonprofit environmental, social justice and arts organizations in the Pacific Northwest and Alaska, many of which affect Puget Sound. Her community activities include participation on the national board and the executive committees of Earthjustice, Islandwood, the Future of the Law Institute and Friends of the Methow. She chairs several major capital campaigns, including the Cascade Agenda, the expansion of Islandwood and the building of the LEED-certified Community Center at the New High Point. Kongsgaard has served as the president of Philanthropy Northwest and has spoken broadly about philanthropy and the environmental movement to wide and diverse audiences for the past 20 years.

Member: Dan O'Neal **Term: Two-year term, ends June 25, 2009**

Dan O'Neal is a member of the Washington State Transportation Commission where he served as chair from 2005 to 2006. O'Neal is on the board of The Greenbrier Companies (GBX), a publicly traded railroad car leasing and manufacturing company, and is a founder and investor in PowerTech Group, Inc., a business security software company. He chairs the Puget Sound Freight Mobility Roundtable and, until July 2005, served as chair of the Washington Freight Mobility Strategic Investment Board. He is on the board of the Cascade Land Conservancy and is a board member and vice president of the Hood Canal Salmon Enhancement Group. He previously was owner and CEO of a transportation and logistics company headquartered in Seattle. He served on the Interstate Commerce Commission (ICC) in Washington, D.C., from 1973 to 1980 and was chair of the agency from 1977 to 1980. Prior to the ICC, O'Neal was transportation counsel to the U.S. Senate Commerce Committee under the leadership of Sen. Warren G. Magnuson.

Member: Steve Sakuma **Term: Two-year term, ends June 25, 2009**

Steve Sakuma was raised on the family farm with operations in Washington and California. Sakuma is CEO of Sakuma Bros. Holding Co., a family-owned farming operation consisting of Sakuma Bros. Farms, Inc., Norcal Nursery, Inc. and Sakuma Bros. Processing, Inc. He is a retired US Army colonel and has 26 years of military experience. He has years of involvement with Skagitonians to Preserve Farmland, having served as a member of the board and as president. He is a board member of the Western Washington Agricultural Association and a Commissioner in Drainage and Irrigation District #14.

Member: Bill Wilkerson **Term: Three-year term, ends June 25, 2010**

Bill Wilkerson retired in December 2006 from his position as executive director of the Washington Forest Protection Association (WFPA), where he served for more than 10 years. Wilkerson was the lead negotiator in the state's landmark salmon recovery plan - the Forests & Fish Agreement - the largest Habitat Conservation Plan in the country, meeting requirements of both the endangered species and the clean water acts. Prior to joining WFPA, he was a partner in the law firm of Gordon, Thomas, Honeywell, Malanca, Peterson & Daheim. He served as managing partner and as chair of the firm's Resources Strategies Group. He was the director of the Washington Department of Revenue and the Washington Fisheries Department and held positions in the Interior and Commerce departments, the Office of the President and the U.S. Small Business Administration.

Source: PSP Web site, December 2007

King County

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