

- Ensure compliance with the GMA (Growth Management Act);
- Provide for King County Comprehensive Plan implementation; and,
- Develop comprehensive models (assessment tool) to evaluate potential impacts to the Lake Sammamish, Lake Washington, Lake Union and Ship Canal systems.

For the years 2000 through 2004, the work program will refocus its efforts to more broadly address countywide water quality, habitat and biological factors for developing the ESA-related WRIA Plans, Wastewater HCP and assist in wastewater treatment plant and reuse facility siting. In addition, predictive models will be developed to assist in forming and assessing alternatives and assisting in evaluating recommendations for facility site selection, effluent discharge locations, water withdrawal, affects of locks operation and mitigating measures associated with wastewater system development and operations. Facilities or water related activities.

New Monitoring Initiatives 2000–2004: Element 1

King County Department of Natural Resources (KCDNR) will prepare WRIA-based Habitat Conservation Plans to respond to impending Endangered Species Act (ESA) requirements. The County also will initiate and implement the Regional Wastewater Services Plan (RWSP). The RWSP needs to be coordinated with and support King County's Endangered Species Act (ESA) requirements.

These two, closely related ESA response efforts will require an assessment of the present condition of King County water resources (an inventory and collection of chemical, biological and physical water resource data for lakes, streams, and other water resources areas), as well as monitoring the effectiveness both short term and long term recommendations of the WRIA-based conservation plans and the Wastewater HPC.

New Monitoring Initiatives 2000–2004: Element 2

The Seattle Water Department has identified sufficient drinking water to supply projected demand through 2014. The department has stated that wastewater reuse may potentially augment the supply after 2014.

The King County Executive has recommended that the Regional Wastewater Services Plan include \$20 million to study the potential for reusing wastewater as a method to supplement the drinking water supply by allowing withdrawal of water from Lake Washington and/or other areas.

This program will assist in determining the effluent quality needed to prevent adverse environmental and human health impacts from a northern or southern discharge into Lake Washington. It will also assess the role of non-point pollution on the overall water quality of the Lakes Sammamish-Washington system and how these pollution sources may affect reuse options. The program also will address the local, state and federal regulatory constraints, freshwater withdrawals, and tribal concerns on the use of reclaimed water.

New Monitoring Initiatives 2000–2004: Element 3

- Projected regional growth and development requires enhanced water resource monitoring to ensure salmon recovery, public safety, public health and environmental quality.
- A mathematical model and risk assessment approach is being implemented to:
 - Model impacts of future actions that may affect regional water quality;
 - Provide a predictive tool to evaluate the water quality impacts of various land use and facility siting options;
 - Support the wastewater HCP;
 - Provide a long term comprehensive water quality analysis tool;
 - Determine the present quality of lakes, streams and other water resource areas, e.g. wetlands, shorelines, and beaches;
 - Identify short- and long-term water quality trends;
 - Identify existing or potential water quality problems and suggest corrective measures.

New Monitoring Initiatives 2000–2004: Element 4

The Modeling Assessment and Analysis Unit implements on-going programs and activities associated with freshwater quality management which is annually approved by Council budget and monitoring resolutions. On-going or baseline tasks and activities include water quality sampling, macroinvertebrate sampling, wetland monitoring, habitat and stream channel assessments and land-use monitoring, fish surveys, NPDES support, and hydrologic monitoring for various streams and lakes throughout King County. This includes maintaining data reported from about 28 rain gauges and 72 stream gauges; and water quality sampling and aquatic life survey work at more than 250 sites and 18 swimming beaches.

During 1999, efforts will be made to integrate past work products and activities, as well as new initiatives into the year 2000–2004 work program. Monitoring sites will be evaluated and some new monitoring locations identified. A review of historical data will also be conducted and evaluated.

Research

Urban Issues Study: Tri-County Salmon Recovery Strategy

On January 11, 1999, work began on an important piece of the Tri-County's overall salmon recovery effort, the Tri-County Urban Issues Study ("Study"). The Study begins with a thorough review of the existing scientific literature on salmon habitat and recovery efforts in urban areas. The objective is to provide a "state of the knowledge" regarding salmonid recovery and habitat requirements in urban areas. The Study will catalog and summarize all relevant documents, with special emphasis placed on studies and data being prepared for concurrent ESA response efforts within the Tri-County area.

The database will be held in hard copy, CD ROM format, and on an Access database so that the database will be available to all Tri-County participants.

The literature review will result in the identification of potential criteria that could prove suitable for use in assessing stream conditions within the Tri-County area. Once specific criteria and methods to evaluate conditions of urbanized streams and rivers are identified, application of the evaluation criteria will begin. In the application phase, candidate sites will be selected that represent a range of urban conditions. These sites will be useful for making comparisons between existing versus potential habitat quantity and quality. The sites also will be assessed for use as templates to guide future restoration and recovery efforts. The Study will provide the structure to use restoration efforts in the Tri-County area to improve the science of urban restoration activities.

The Study also will evaluate the sufficiency of existing stormwater and natural resource management practices and programs within the Tri-County region for protecting salmonids and salmonid habitats, and identify potential alternative practices that would increase the level of protection. Concurrently, the Study will assess the effectiveness of regulations, guidelines, design standards and enforcement that potentially affect salmonid recovery and recommend options for streamlining and modifying regulations to best protect and enhance salmonid resources.

After all the data has been compiled and reviewed, recommended options for recovery will be developed and approved by Tri-County participants. The final work product will summarize the information compiled by the Study into a document that provides an assessment of measures for habitat restoration, habitat protection, regulations, enforcement, operations and maintenance practices, and monitoring methods that could be implemented as part of a recovery plan and potential 4(d) rule. See Chapter 5 Appendix 5.4 for Urban Issues Study Scope of Work.

Northern Outfall/Marine HCP Studies

Study Concept

The goal of both the marine portion of the wastewater HCP and the proposed northern treatment plant outfall siting studies are to ensure that existing and proposed wastewater operations in Puget Sound have minimal impact on biological and human resources of Puget Sound, with an emphasis on listed species. The approach to achieving that goal is outlined below.

Basics Building Blocks/Layers of Information

Physics: Where is the water going? Measurements of temperature, salinity, currents

Chemistry: What is in the water, sediments, plants and animals? Measurements of nutrients, metals and organics in the water, sediments and organisms.

Table 4

	Objectives	Schedule	Budget
Juvenile Chinook Production Evaluation in Bear Cr. & Cedar R.	The purpose is to quantify and characterize the populations of juvenile chinook salmon produced from natural spawners in the two primary spawning tributaries within the lake Washington watershed: Bear Creek and the Cedar River.	Cedar R. Jan. - Jul. 99 Bear Ck. Feb. - Jun. 99 (<i>Wa. Dept. of Fish & Wildlife</i>)	\$148,152
Life History and Ecology of Juvenile Chinook Salmon in Lk. Wa.	Determine distribution, relative abundance, residence time, patterns of food consumption, prey species, for juvenile chinook salmon in Lake Wa. based on habitat type.	Intensive: Feb. - mid Jul. Limited: Jul. - Feb. 99-01 (2 years) (<i>Wa. Dept. of Fish & Wildlife</i>)	\$382,547 (per year)
Diel Habitat Selection of Juvenile Chinook Salmon in the Cedar River	Measure diel habitat use, identify main- and off-channel rearing areas, and determine temporal changes in habitat use of juvenile chinook.	Jan. - Jun. 99 (<i>U.S. Fish & Wildlife</i>)	\$33,533
Juvenile Salmon Rearing and Outmigration in the Lake Union System	Document residence time and survival of sockeye (surrogate for chinook salmon), in Lake Union and assess alternative water management flow regimes and habitat restoration projects.	Apr. - Jul 00-01 (<i>Army Corps of Engineers-216</i>)	\$256,050 (per year)
Predator Study in the Ship Canal	Determine number of smallmouth bass and other predators and assess their diet.	Apr. - Jul. 00-01 (<i>U.S. Fish & Wildlife</i>)	\$53,900 (per year)
Juvenile Salmonid Habitat Use of Shilshole Bay	Determine distribution and abundance of juvenile chinook salmon through nearshore estuary habitat below the Locks.	Apr. - Jul. 99-00 (<i>U. Wa. -216</i>)	\$70,000 (1st year)
Adult Salmon Movement in Lake Wa. Watershed	Determine the number, timing, and distribution of adult chinook salmon in the Lake Wa. watershed	Jul. - Oct. 98-99 (<i>Wa. Dept. of Fish & Wildlife</i>)	\$174,000 (per year)

Biology: Where are the plants, animals and their critical habitats? Identify the populations of plants and animals in the study areas and what is their response to changes in Puget Sound made as a result of wastewater operations and construction.

Risk Assessment Process: Integration of Physics, Chemistry and Biology.

King County Studies to Address Factors of Decline in the Cedar River-Lake Washington Watershed

In participation with the United States Fish and Wildlife Service, the Washington Department of Fish and Wildlife, and the United States Army Corps of Engineers, King County is conducting a series of studies in the Cedar/Sammamish WRIA 8 to determine abundance and distribution of populations of chinook and factors for decline. Table 4 summarizes the objectives and schedules for those studies.

Cedar/Sammamish WRIA 8 and Green/Duwamish WRIA 9 Research Contracts

King County's salmon recovery research efforts are augmented by four contracts totaling \$450,000. This work will help fill information gaps and lay a solid technical foundation in those WRIA efforts for which King County has lead or support responsibility (WRIsAs 7, 8, 9, and 10). These contracts are summarized briefly below:

- A \$100,000 contract with R2 (with CH2Mhill, Shapiro, Historical Research Associates and Pacific Groundwater Group) to assist with the development of an inventory of Puget Sound chinook salmon and salmon habitat in the WRIsAs, and an assessment of the condition of existing salmon habitat. (This work is being closely coordinated with that of the tribes and the state, to build upon, and avoid duplication of, existing data and research efforts).
- A \$50,000 contract with R2 (with the same subcontractors identified above) to assist the County in the review and assessment of external, ESA-related technical documents that are relevant and important to WRIA-based salmon conservation and recovery planning, e.g., the Cedar River Habitat Conservation Plan (HCP). Other documents to be reviewed may include new forest management practices, and changes to the state salmon recovery strategy.
- A \$30,000 contract with Martin Environmental to help develop and articulate the ecosystem-based framework upon which the WRIA planning efforts will be built.
- A \$105,000 contract to develop an analytic model for comparatively assessing the factors of salmon decline in the WRIsAs, and for evaluating the relative cost-effectiveness of management alternatives. (A contractor for this task has not yet been chosen.)
- A \$165,000 contract with Foster Wheeler to undertake the following tasks: \$75,000 in Geographic Information System (GIS) support; \$36,000 to support a water quality assessment that will

help guide salmon recovery efforts in the WRIAs; and \$54,000 to support instream flow analysis as it relates to salmon recovery and conservation in the WRIAs.

Early Action Matrix

The following matrix includes other early actions that are proposed to address salmon and habitat needs.