

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM MUNICIPAL STORMWATER PERMIT PROGRAM ANNUAL REPORT FOR CALENDAR YEAR 2005

**King County
March 31, 2006**

PROGRESS ON ADDRESSING EXCEPTIONS TO STORM WATER MANAGEMENT PROGRAM APPROVAL

A Washington State Department of Ecology (Ecology) letter of August 1, 1997, partially approved King County's stormwater management program (SWMP). Exceptions to the approval included the County's proposed revised Surface Water Design Manual (SWDM) and the County's actions to control phosphorous in Lake Sammamish. In a letter dated September 2, 2004, Ecology approved the Lake Sammamish portion of the County's SWMP.

On Monday, October 25, 2004, the King County Council adopted updates to King County's Critical Areas, Stormwater, and Clearing and Grading Ordinances. The new ordinances went into effect on January 1, 2005. The legislation may be viewed online at <http://metrokc.gov/ddes/cao>. On January 24, 2005, two County-adopted public rules put into effect a new SWDM and Stormwater Pollution Prevention Manual (SPPM) that implement the stormwater control portions of the new ordinances. The new SWDM should completely resolve any outstanding issues of equivalency of the County's SWDM with Ecology's 1992 Stormwater Manual for the Puget Sound Basin as required under the municipal permit. The new SWDM is also designed to be equivalent to Ecology's 2001 Stormwater Management Manual for Western Washington. The new SPPM expands the County's requirements for source control Best Management Practices (BMPs) to include residential activities. We provided a hard copy of the SWDM and SPPM to Ecology coincident with last year's report and requested Ecology to review the County's new manuals and ordinances for equivalency with its 2001 Stormwater Management Manual for Western Washington. As far as we know, Ecology still has not begun this review.

During 2005, King County's Water and Land Resources Division Stormwater Services (SWS) Section conducted classes on using the new SWDM. Thirty people were trained in Designing Water Quality Facilities, 32 in Introduction to the King County Runoff Time Series, 51 in Designing Flow Control Facilities, 16 in Advanced KCRTS, and 16 in Introduction to the Backwater Program.

The following discussion focuses on the elements of the annual report required by permits WASM13001, WASM23001, and WASM33001.

S10 (B) 1: STATUS OF IMPLEMENTING THE COMPONENTS OF THE Storm Water Management Program (SWMP)

All the requisite components of a SWMP are in place in King County, although the new SWDM, which sets significantly higher standards for development than the manual originally adopted to comply with our permits, is still awaiting Ecology's equivalency review. Although there are some changes in the timing, magnitude, or name of some of our compliance activities, most notably in the increased scope of our watershed-wide coordination, our program today continues to be substantially the same as that described in our approved SWMP.

S10 (B) 2: NOTIFICATION OF RECENT OR PROPOSED ANNEXATIONS OR INCORPORATIONS RESULTING IN A DECREASE IN PERMIT COVERAGE AREA

From January 1, 2005 to December 31, 2005, King County's losses to annexation in terms of land area were approximately 1,521 acres.

No incorporations occurred in 2005 and none are expected in 2006.

A map showing the current status of annexations and incorporations in the County is included in the Appendix.

S10 (B) 3 & 4: DIFFERENCES BETWEEN PLANNED AND ACTUAL EXPENDITURES FOR THE REPORTING PERIOD & REVISIONS TO THE REMAINING YEARS OF THE FISCAL ANALYSIS

King County's detailed fiscal analysis is included in the Appendix. In summary, the County's planned spending for NPDES municipal stormwater related activities in 2005 was \$58,206,804. Actual spending for 2005 was \$52,472,121 – a decrease of 2.44% from 2004 actuals. The adopted NPDES municipal stormwater related budget for 2006 by the County Council is \$55,900,587 – a slight decrease of 3.96% from the 2005 adopted budget.

S10 (B) 6: A SUMMARY DESCRIBING COMPLIANCE ACTIVITIES, INCLUDING THE NATURE AND NUMBER OF OFFICIAL ENFORCEMENT ACTIONS, INSPECTIONS, AND TYPES OF PUBLIC EDUCATION ACTIVITIES

Enforcements and Inspections

Stormwater Services Section Inspection and Enforcement Activities

Drainage facility inventory numbers have remained fairly constant – new facilities are keeping up with those lost to annexations and incorporations. The Stormwater Services Section (SWS) of the Water and Land Resources Division (WLRD) continues to provide inspection, complaint investigation, and maintenance services to six contract cities. SWS also continues to inventory commercial conveyance-only facilities, but does not inspect them. However, these inventoried facilities are used by the water quality compliance staff to schedule water quality source control site audits.

SWS continues to be the initial investigator of drainage and water quality complaints. As shown, many facility complaints result in corrective work orders. Additionally, SWS corrects drainage problems by designing small improvement projects through our Neighborhood Drainage Assistance program.¹ The 2-year maintenance/defect program continues to include quarterly inspections of new drainage systems before they are accepted for maintenance. Maintenance programs have remained substantially unchanged in 2005.

SWS provided maintenance assessments and notification of maintenance needs to property owners with private flow control and water quality facilities in unincorporated King County, and to several Cities under contract. Property owner compliance increased from the previous Self-Assessment program. In 2005, a new program was instituted for self certification of commercial properties for water quality self audits. Under this new program, property owners were asked to complete a self audit of required source control BMPs. Some problems with the program were identified in its first year that made the program less successful than hoped. Of the 478 self-certification packets sent out, very few were returned. Property owners appear to need additional information to successfully complete a site audit. This program will be reassessed in 2006 to address problems and to increase compliance with the King County Water Quality Code, KCC 9.12. Additional programs including inspection of large single-family residential drainage facilities, and an enhanced water quality source control site audit program have been initiated to enhance the SWMP. SWS has upgraded the complaint tracker program to include GIS/GPS capabilities to facilitate monitoring drainage complaints and using facility maps. The

¹ The Neighborhood Drainage Assistance Program (NDAP) is a Water and Land Resources Division program that addresses drainage problems not covered by other drainage response or road maintenance programs. It builds small projects to remedy off right-of-way drainage problems, many of which are located on private property. NDAP projects quite often result from a SWS drainage complaint investigation that escalates to a drainage review. The projects are prioritized and then funded for construction on an annual basis. Contracted maintenance crews perform the work under the guidance of SWS engineers. NDAP has been a successful program for addressing problems neither referred to other agencies nor addressed by general maintenance programs within SWS.

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Maintenance Information System² has also been redeveloped to improve maintenance tracking, reporting, and scheduling. The historical database contained in this program is used to do a “phased” analysis for scheduling inspections. This software has been redeveloped to better suit the redefined responsibilities of Drainage Investigation and Inspection (DI&I) Unit of the SWS Section, and to fit many of the newer flow control and water quality facility features developed in the updated Surface Water Design Manual.

Enforcement Actions & Inspections-- Flow Control and Water Quality Facilities

The spreadsheet below identifies the total number of Flow Control (FC) inventories and assessment activities for 2005.

	INVENTORY TOTALS (as of 12/31/05)	WORK PROGRAM	INSPECTION TOTALS					
			2000	2001	2002	2003	2004	2005
Public								
2-Year Bond	174	2-Year M/D Bond Inspections	272	350	425	436	526	450
Residential R/D	1664	Inspections	986	950	929	854	885	561
		Special Use Permits	37	45	35	53	62	55
Total	1838	New Facilities Inventoried	68	45	54	61	55	142
Private								
M/F Comm incl City	1558	Inspections	1396	1130	1240	1303	1371	1060
NPDES Facilities (conveyance-only)	504	NPDES Inventories	6	10	6	10	10	8
Total	2062	New Facilities Inventoried	37	45	85	111	63	180

² The SWS Maintenance Information System (MIS) enhances the Drainage Investigation and Facility Maintenance (DIFM) Unit's Facility inspection and maintenance programs. This computerized program is used to maintain a facility inventory, perform facility inspections, produce work authorizations or maintenance correction letters, and to track completion of work. The historical database contained in this program is used to do a "phased" analysis for inspection scheduling of publicly owned facilities. This software has been redeveloped to better suit the redefined responsibilities of DIFM, and to fit many of the newer flow control facility features developed in the Design Manual.

Enforcement Actions & Inspections--KCC 9.12 Activities

INVESTIGATION TYPE	CARRY OVER	NEW (in '05)	CLOSED (in '05)	OPEN
COMPLAINTS* (quick response)	63	70	72	61
REVIEWS* (more complex response)	265	24	34	255
SITE CONSULTATIONS† (for businesses)	428	83	51	460
ENFORCEMENTS^ (violations issued)	34	7	11	30

★ **Water Quality Complaints (quick response):** All water quality complaints that are received by WLRD are reviewed by a Senior Engineer to see if an initial quick visit by a drainage investigator may be sufficient to solve the problem. If so, the investigator visits the site and collects all pertinent information. If the problem is a simple problem or one that can be resolved with a minor amount of information as required by the King County Water Quality Code or education by the investigator, the complaint can then be closed. If the Senior Engineer determines the complaint is more involved at the time of the initial review, an Engineer investigates the problem as a Water Quality **Review**. If the problem is identified as a potential violation that needs coordination with other agencies, a referral is made to the appropriate agency.

If a drainage investigator visits the site and finds more involved issues at the site, or if the individual or business where the complaint originates needs more detailed, technical information, the complaint is “turned to” a Water Quality **Review**.

★ **Water Quality Reviews:** (Handled by an Engineer II.) These problems often require additional site investigation and may require a water quality site audit, meeting with the property owner or site manager, and writing letters to the property or business owner where the water quality problem is occurring and explaining in more detail KCC Code 9.12, or outlining additional ways to correct the water quality problem. A review often requires additional research to find the source, potential impacts, and severity of the water quality problem. A review also may require coordination with other agencies such as Washington State Department of Ecology, Seattle/King County Department of Health, Department of Development and Environmental Services, Washington State Patrol, Labor and Industries, US Environmental Protection Agency, King County Hazardous Waste, King County Solid Waste, King County Roads, or others. In 2005, WLRD updated KC Code 9.12 and the SPPM to include residential property requirements to implement source control BMPs. With this code change, reviews now include requirements for residential properties to implement residential BMPs newly adopted as part of the SPPM.

- ✦ **Site consultations/Water Quality Site Audits:** An Engineer II visits a business or commercial/multi-family residential property site with the owner/property manager. All BMPs that are required for the site to achieve compliance with KCC 9.12 are discussed and an implementation schedule is agreed upon. Once the owner/property manager feels that all BMPs are in place, the engineer revisits the site, and if the site is in compliance, a compliance letter is sent, and the file is closed. Audits are performed on all multi-family and commercial sites with flow control or water quality facilities. Under changes to KCC 9.12 in 2005, residential sites with flow control or water quality facilities will soon be included in the audit process. For residential properties identified as having pollutant generating activities associated with home based business activities, site audits with BMP recommendations have already begun.

- ▲ **Enforcements:** This category covers a variety of water quality problems. The first step in the process (after a site investigation) is an informal action known as a Notice of Violation letter. The letter explains in detail the specific violation and the steps necessary to correct the Violation. If the violation is an intentional or repeat violation, or of an egregious nature, a formal action or Notice and Order with civil penalties and fines may be issued. Once the violation is corrected, a Release of Violation letter is sent. The types of violations we see vary and involve both business and residential properties.

We have formulated new procedures/policies to complete site consultations on all inventoried private/commercial flow control and water quality sites over a specified time period based on staff restraints. We also plan on completing site audits/consultations on all inventoried “conveyance only” facilities, based on a prioritization system of potential pollution generating activities at specific businesses. SWS continues to inventory commercial “conveyance” only facilities. Water quality audits/consultations will be completed on these sites as staffing resources allow even though these sites do not qualify for SWM fee reductions. As new facilities are added to our commercial inventory, business site audits will be completed assuring compliance with Ecology’s request to audit all new businesses that have pollution generating activities and to ensure source controls BMPs are implemented.

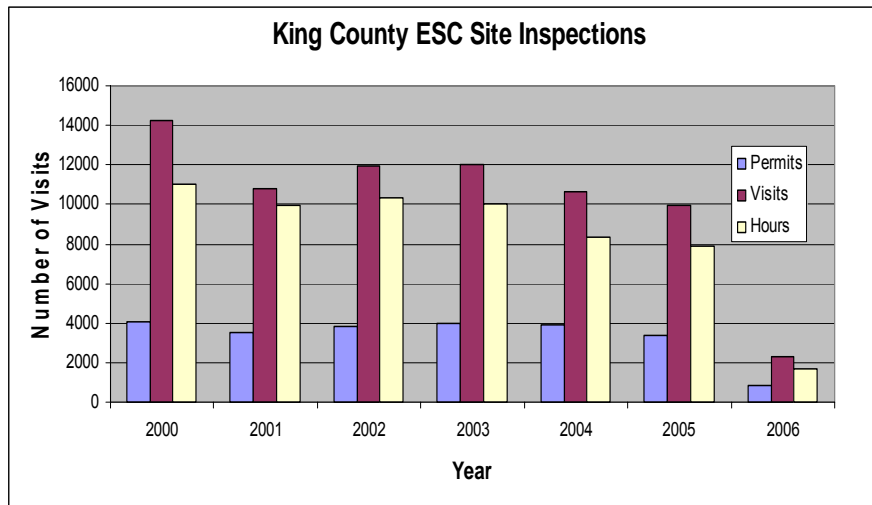
Erosion and Sedimentation Control

The Erosion/Sediment Control (ESC) Inspection & Enforcement Program for development (the Program) is based in the King County Department of Development and Environmental Services (DDES), Land Use Inspection Section (LUIS). Annually, the program inspects and monitors permitted development and construction of building permits and land use development activity. LUIS is currently staffed by 7 engineer inspector, 3 program managers plus a supervisor. Additional monitoring for grading permits are done by field staff in the Site Development Services Section and for non-permitted sites code enforcement officers may take actions against property owners.

The ESC program continues to use regular building and site inspection staff that have been trained on enhanced inspections of permitted activities for ESC compliance throughout the

County. The inspectors performing enhanced ESC inspections visit sites to observe whether appropriate ESC BMPs are used. The inspectors are authorized not only to note violations, but also to provide on-site training and education in the proper use and installation of ESC BMPs.

The ESC inspection program serves three main functions. First, it enhances ESC inspections on permitted activities, as described above. These include permitted activities from clearing and grading, short plats, subdivisions, commercial, and residential. The Appendix includes a map that shows the 3,378 permitted sites with erosion inspection tasks during 2005. For the year, in addition to regular inspections, these sites received over 9957 separate erosion monitoring visits which account for 7915 ESC site inspection hours or an average 0.8 hours per site visit. A County map has been prepared that shows the site locations that have received ESC inspections in 2005.



The above chart illustrates the relationship of ESC inspections reported over a 6 year period. Some inspections resulted in violation notices, stop work orders and enforcement actions. Frequently, enforcement occurred during, or immediately after, a major rain event. Some ESC inspections occurred prior to rainfall which resulted in a more proactive approach and more success in preventing potential erosion problems.

A second function of the program involves the provision of technical assistance through guidance on the use of BMP's at specific construction sites. Many of the site visits involved educating property owners and builders to help focused builders' attention on better erosion control practices. In addition to on-site meetings, the DDES web page offers additional information to builders at <http://www.metrokc.gov/ddes/> and each autumn, permit applicants receive a written notice and mailing. The notice alerts builders that BMP requirements are needed and should be in place prior to the end of the growing season and beginning of the rainy season (before late October).

The third function of the program is the pursuit of enforcement actions for sites where ESC requirements are not being met or BMP's are not being maintained. DDES provides 24 hour complaint response 7 days per week for environmental emergencies, which often are related to

non-permitted sites. The County's Road Maintenance Section provides a 24 hour number (1-800-KC-ROADS) plus a DDES complaint line (1-888-437-4771) that is transferred to the Roads desk after hours. A DDES staff person is on-call after normal working hours and on weekends to assure rapid response to environmental emergency complaints. In 2005, over 14 after hour emergency call-outs were logged. A number of those involved stop work orders and required follow-up inspections.

Under most permits issued by DDES, developer/building applicants are required to post a site restoration financial guarantee and agreement. The amount of the financial bond is based on the extent of site development work and \$7,500 must be a cash deposit with DDES. If applicants are unresponsive to requests for compliance with a ESC plan or BMPs, DDES may prepare a work order and accomplish restoration under an erosion control contract, renewed annually. After the needed erosion control work is complete, the developer must restore the cash restoration financial guarantee to begin working again. The developer is also responsible for any additional charges in excess of the financial guarantee amount and may be subject to bond forfeiture, legal action and/or civil penalties. For non-permitted sites, the property owner is liable for restoration costs and may be subject to civil penalties.

Inspections & Consultations—Hazardous Waste

On-Site

The On-site Consultation team conducted 601 site visits to businesses in 2005. Visits include an evaluation of chemical disposal and storage practices to determine if improper discharges to storm or sewer drains were occurring. As a result of these visits, the following stormwater-related changes in businesses behavior occurred:

- Over 2,200 gallons of contaminated wastewater were diverted from storm drains to the sanitary sewer.
- More than 2,700 gallons of hazardous chemicals were moved into secondary containment and/or under cover to prevent accidental release into nearby storm and sewer drains.

Survey

In 2005 the Survey Team conducted work in areas of Auburn, Kirkland, and Shoreline. City staff requested the Team to inspect businesses and provide technical assistance about hazardous materials handling, and to pay special attention to storm and surface water concerns and issues. The Team is providing reports to the cities regarding their activities and findings. The Team inspected businesses in two areas of each of the cities, conducting a total of 693 unannounced site visits. As a result of these inspections, environmental compliance improved at 86.1 % of businesses selected and revisited for compliance issue follow-up (31 of 36).

Response Network Team

The Response team's primary work involves investigating public complaint calls (RFA) or interagency referrals on the mismanagement of hazardous materials. The team responded to

about 200 RFAs last year. Of those calls, about half of the alleged problems reported had the potential or directly impacted storm drains and surface-water runoff. As has been the case for the past decade, automotive-related businesses continue to generate the most complaint calls, with improperly managed automotive fluids impacting soil and stormwater. The Response team responded to a growing number of complaints related to illegally abandoned materials (including wastes like paint, construction debris, and occasional dumps of drug-lab-related wastes).

Interagency Resource for Achieving Cooperation (was Interagency Regulatory Analysis Committee)

The Response Team also administers, facilitates, and leads the Interagency Resource for Achieving Cooperation (IRAC). IRAC's Streamlining Enforcement workgroup is working to obtain stronger support for regulatory enforcement so that businesses found out of compliance with environmental regulations, including stormwater regulations, can be brought into compliance more quickly and thereby reduce their impacts to the environment.

CAPITAL PROGRAMS

Water and Land Resources Capital Projects (CIP) Section

PROGRAM OVERVIEW

The primary role of the WLRD Capital Projects (CIP) Section is to design and build capital projects in direct support of WLRD's capital needs. In addition, the CIP Section provides a broad range of engineering and environmental support services. CIP Section "clients," both internal and external to King County government, include King County's Department of Natural Resources and Parks (DNRP), Wastewater Treatment Division (WTD), Solid Waste Division (SWD), and the King County Department of Transportation (KCDOT). Other municipalities as well as county and state agencies also commonly request support.

Interdisciplinary teams within the CIP Section are responsible for developing and implementing projects and providing innovative "state-of-the-art" expertise to its clients. These teams offer technical direction and advice for a variety of challenging ecological and surface and storm water related problems and issues. CIP Section team members are comprised of ecologists, engineers, geologists, landscape architects, water quality specialists, and other technical support specialists. They produce multi-objective projects that address water quality problems, fish and wildlife habitat enhancement and restoration, localized flooding impacts, damage from erosion and sedimentation, hazards to human health and safety, and alterations to hydrology. Solutions to these problems include implementing a variety of traditional and non-traditional capital projects such as:

- ◆ Regional storm-water storage facilities that aid in flood damage reduction and improvements to water quality;
- ◆ Improved access to upstream habitat by removing or replacing antiquated culverts that are barriers to fish migration;

- ◆ Restoration and enhancement of stream, wetland, and floodplain habitats for fish and wildlife;
- ◆ Reduced sediment impacts from landslides and channel and streambank erosion.

PROGRAM ELEMENTS

Capital projects are received from a number of sources, but the majority of projects originate within WLRD. Sources include:

1. Basin plans and other reconnaissance efforts performed by the former Surface Water Management (SWM) Division or WLRD and its partners have historically been the main source of large projects. Numerous projects identified by basin plans remain to be implemented; some remain in unincorporated King County while others have become the primary responsibility of cities as new areas are annexed or incorporated.
2. SWS recommends projects created in response to citizens' drainage complaints and requests from other agencies and municipalities.
3. The rural capital reconnaissance, begun in 2000, is developing into an important new source of projects to address long-standing drainage, sedimentation, and water quality problems in the expanded surface water area.
4. Future capital projects identified through Water Resource Inventory Area (WRIA) planning are expected to improve flooding, drainage and water quantity problems and restore degraded aquatic habitat.

A committee, consisting of project proponents and the ecologists and engineering staff who will ultimately do the design and permitting, prioritizes projects in a two-step process. First, projects are ranked by effectiveness and feasibility. "Effectiveness" measures the overall value of a project on the basis of considerations such as the severity of the original problem, how thoroughly the proposed project would resolve the problem, project cost, durability of the design once built, and possible upstream and downstream impacts of the project. "Feasibility" concerns issues such as physical access to the site, landowner willingness to participate in the project, and the likelihood of securing permits. Finally, project rankings are adjusted to reflect a number of secondary considerations such as the multiple benefits provided by some projects, public visibility or support for certain projects, and geographic equity among potential projects.

To efficiently manage the diversity of capital projects, CIP is divided into five principal areas:

Large Project CIP

Large Project CIP includes capital projects identified in basin plans through special studies as well WRIA plans and other sources. Projects are prioritized through the CIP Master List process involving the CIP Section and basin planning personnel. Large and small basin plan CIP projects are prioritized during preparation of the basin plans. Upon completion of a basin plan, CIP Section and basin planning personnel adjust priorities based on changing basin conditions but strive to respect the plan's original ranking of projects and its goals and objectives. These large projects account for most of the capital program.

Neighborhood Drainage Assistance Program (NDAP)

The CIP Section's NDAP addresses localized flooding, erosion and sedimentation problems that primarily affect private property, and are caused by nonexistent, inadequate or malfunctioning storm-water conveyance systems. The NDAP applies to both residential and commercial properties. Neighborhood drainage problems are addressed through enforcement actions, maintenance procedures, the construction of capital improvement projects, and/or through the provision of technical assistance for privately funded solutions. Customer service is the goal of NDAP.

NDAP gives the CIP Section authority and funding to manage surface water runoff outside of County maintained right-of-ways and tracts. NDAP, along with existing CIP Section activities and coordination with KCDOT, provides the CIP Section with an opportunity to more comprehensively manage storm water systems. Citizens receive direct benefits from solving flooding and erosion problems that cause property damage, threaten health and safety, and degrade natural resources within their neighborhoods. NDAP also gives the CIP Section the opportunity to control surface and storm water runoff at their source, therefore preventing degradation of valuable streams, lakes, and wetlands. NDAP does not address the entire off-road drainage system; rather, it solves localized problems as they arise. In many cases NDAP will accept regular maintenance responsibility for new facilities and those repaired by County crews.

The CIP Section is notified of neighborhood drainage problems when citizens file a drainage complaint, usually after a storm event. NDAP field staff members investigate all complaints about the off-road system to collect drainage-related information, and screen and prioritize problems using impact criteria. The criteria include the type and number of items affected (home vs. yard), severity of impact on the items affected (yard eroded vs. minor yard flooding), potential to cause further damage, damage to natural resources, and the need to adjust expenditures and revenues in identified basins. NDAP staff members then route the problem to one of three solution groups: enforcement, maintenance, or capital construction. Staff members will perform a cost/benefit analysis and solve as many problems as funding allows. The CIP Section also offers technical assistance and recommends solutions to all program participants.

Drainage and Habitat Improvement Program(DHIP)

DHIP builds small capital projects that resolve minor drainage, erosion, and sedimentation problems, and/or improve water quality, fish passage, and enhance wetlands and habitat in or along natural stream systems. The program focuses on projects that 1) are technically complex, requiring hydrologic modeling, backflow analysis, detailed plans, and/or extensive survey; 2) could have significant downstream impacts; or 3) require use of heavy equipment.

DHIP projects are ranked and prioritized by the DHIP Core Team using objective criteria such as 1) protection of public health, safety, and private property; 2) protection of beneficial uses such as aquatic, wetland or fish resources; 3) project cost, liability, and chance of success.

Small Habitat Restoration Program (SHRP)

The goal of the Small Habitat Restoration Program (SHRP) is to build effective and inexpensive small scale habitat restoration projects that restore physical, chemical, and biological habitat-forming processes for fish and wildlife in stream corridors and wetlands. The program focuses on 1) developing habitat management plans; 2) providing technical assistance; and 3) constructing habitat restoration projects. These may include stabilizing eroding streambanks, installing fencing for livestock, controlling invasive weeds, and planting native vegetation. In the Rural Service Area, SHRP focuses on specific stream corridors to reduce or eliminate the "piecemealing" of projects among sites scattered throughout different basins. This stream corridor focus is a landscape-level approach to restoring habitat-forming processes and practicing adaptive management. SHRP projects originate from Basin Plans, County staff, the general public, and community groups.

SHRP also provides technical assistance to property owners and other agencies interested in pursuing their own habitat or enhancement projects.

Rapid Response, Opportunity, and Emergency CIP Program (RROE)

The Rapid Response, Opportunity, and Emergency (RROE) Capital Improvement Program funds the design and construction of capital improvements that require emergency or urgent responses to situations that pose imminent danger to life or property. Typical emergency projects address failures of surface water conveyance systems, flooding, landslides, erosion conditions, or other environmental hazards. The program also capitalizes or provides cost-sharing opportunities that meet or promote WLRD's overall objectives.

OTHER PROGRAMS

The Ecological Services Unit (ESU) within the CIP Section manages other programs that directly support the surface water CIP program. They include:

Native Plant Salvage Program

ESU continues to salvage, hold, and propagate native plants for use in surface water, KCDOT, and WTD Capital Improvement Projects and programs where re-establishing native vegetation is desirable or required. In conjunction with WLR's Public Involvement staff, ESU held six volunteer-staffed events throughout King County during 2005, involving 223 volunteers. Approximately 11,552 native plants were salvaged from development sites in 2005 and approximately 5,500 plants were salvaged by landowners for re-establishing native vegetation and habitat in their own yards. About 10,152 plants were replanted at project sites during the fall and winter dormant periods. These will include salvaged plants, plants propagated at the holding facility, and plants donated to the holding facility by local vocational nursery programs, and private property owners. The program results in significant cost savings to the County and promotes the preservation of native plant gene pools through the extensive use of locally adapted plants. Learn more about salvaging and the naturescaping program described below at: <http://dnr.metrokc.gov/wlr/pi/salopps.htm>.

Management of the Washington Conservation Corps Crew

ESU manages the Washington Conservation Corps (WCC) crew for use on numerous surface water and Roads Capital Improvement Program projects. Crews provide extensive construction support for stream and wetland restoration projects and for projects where work in sensitive areas requires the extensive use of hand labor. Besides offering a low impact method to construct projects in sensitive areas, the use of the WCC crew results in considerable cost savings to the County. In return, crewmembers receive training and job experience in the field of ecological restoration.

CIP Monitoring and Maintenance Program

ESU manages the CIP Monitoring and Maintenance Program. This program creates and implements project-monitoring plans in order to assess project performance and to meet regulatory monitoring requirements. In 2005, twenty-five project sites were monitored and/or maintained through the CIP Monitoring and Maintenance Program. Of these projects, twelve will have formal 2005 monitoring reports prepared and distributed to appropriate regulatory agencies. The remainder of the project sites did not require reporting in 2005, but were visited to determine what maintenance activity (e.g. replanting, watering, weeding) was necessary to assure success and meet permit conditions. In 2005, five project sites were replanted, four were watered, and sixteen required weeding. Baseline data documenting pre-project conditions were collected from two project sites constructed in 2005 for comparison to post-project conditions in upcoming years (Taylor Creek and Lions' Club).

SUMMARY

CIP Highlights

The CIP Section constructed nine large capital projects during 2005, at a construction cost of about \$1.61 million, and plans to construct 9 to 14 large capital projects in 2006.

Program Highlights

DHIP constructed two projects in 2005, at a cost of \$100,000, and plans to construct one in 2006. RROE constructed six projects in 2005, at a cost of \$200,000, and plans to construct two in 2006. SHRP constructed 60 projects in 2005, at a cost of \$262,000, and plans to construct 70 in 2006.

OPERATIONS AND MAINTENANCE

Department of Transportation, Road Maintenance Division

In 2005, the program of the Road Maintenance Division continued unchanged from 2004. A description of the 2004 program may be found at

<http://dnr.metrokc.gov/wlr/stormwater/NPDESAnnualReports/2005/roads%20maintenance%20narrative.pdf>.

Department of Natural Resources, Parks Division (Parks)

Parks manages over 25,000 acres of land and over 200 parks. In addition, Parks has hundreds of miles of trails. Maintenance activities include maintaining athletic fields, swimming pools, and buildings; replacing culverts; cleaning and reestablishing ditches; cleaning storm water structures; controlling non-native vegetation; irrigating athletic fields and landscaping areas, and managing natural resource areas.

Because of the low snowfall during the winter of 2004-2005, Parks implemented water conservation measures for its irrigation systems during 2005. Many of these measures have been adopted as standard practice because of their reduced water usage and associated cost savings.

Parks completed the development of a stormwater facilities inventory in 2004. Parks significantly increased the number of maintenance self-inspections performed for its stormwater systems during 2005.

In 2005, Stormwater Employee Awareness training was provided to staff employees whose jobs could impact stormwater pollution.

In 2006, Parks is planning to revise its BMP manual. The manual includes sections on small construction site erosion and sedimentation control practices, integrated pest management (IPM), irrigation, and other Parks day-to-day operations that could impact stormwater. The BMP manual was last updated in 2004.

In 2005, Parks continued its program to reduce the usage of harmful pesticides and hazardous materials. Parks will continue to implement the usage of less hazardous alternatives and methods in its operations. Parks is a member of the King County IPM team.

In 2005, Parks updated its Emergency Response Plan (ERP). The ERP provides guidance for employees in the event of natural disaster, a hazardous material release, and other significant events, such as terrorism. Emergency response training was provided to all Parks employees.

In 2005, as part of the KCDOT NPDES permit requirement, Parks initiated stormwater site inspections (wet season and dry season), training, and BMP implementation for its Renton Shop facility and developed a Stormwater Pollution Prevention Plan for the facility. This facility is on property is owned by KCDOT and therefore falls under their Sand and Gravel Industrial NPDES permit.

During 2006, Parks is planning to perform water quality audits of all of its shop facilities. Parks is planning to implement regular stormwater site inspections as well..

In 2005, Parks acquired 15 new solid waste containers and hardware for repairing another 10 containers.

In 2005, as part of the DNRP West Nile Virus response effort, Parks performed mosquito population monitoring of more than 300 stormwater WLRD ponds and all the stormwater ponds within Parks facilities. Many of these ponds were treated with larvicides to reduce mosquito populations. This work was done in accordance with the Aquatic Mosquito Control NPDES Waste Discharge General Permit issued by the Department of Ecology.

PUBLIC INVOLVEMENT AND TRAINING ACTIVITIES

Department of Natural Resources and Parks (DNRP)

Since 1998, DNRP has conducted an annual Water Quality Survey to track public awareness and attitudes on water quality issues and programs. The department uses survey results to help plan and carry out efforts to protect water quality and communicate with the public. A copy of the 2005 Survey is included in the Appendix

Water and Land Resources Division

Public Involvement Program

In 2005, WLRD staff members were surveyed to identify the five most critical water resources issues that are most effectively addressed through education and outreach, four for water quality: insufficient/fragmented riparian buffers, high temperatures, turbidity/sediment, nutrients/dissolved oxygen, as well as groundwater recharge/protection, surface water, and flooding problems on the water quantity side.

The **Groundwater Education and Outreach Program**, which offered *Groundwater – A Look Underground*, explaining our connection to groundwater and how we can protect it to grades 3-12, was not funded after the first quarter of 2005. However, during that quarter, 31 classrooms were visited and 920 students reached. The Program also participated in one science fair.

Volunteer **Beach Naturalists** taught thousands of citizens about the beach environment and how to protect it on six Puget Sound beaches over twelve low tide dates this summer. In this seventh season of county involvement in the program 130 trained volunteers made a record 13,347 contacts. Working with Seattle Aquarium staff, volunteer naturalists reached an additional 2,007 students and 412 adults during school days at the beach.

During the eighth season of the **Cedar River Naturalist** program, 39 dedicated volunteers spoke with 2,397 visitors at sites along the Cedar over four weekend dates in November. Naturalists at four riverside sites educate visitors about the Cedar's salmon species and lifecycle and about the river's human history, human impacts to salmon, and what each of us can do to help.

To promote **naturescaping**, 25 workshops were presented to 1,253 people in 2005. Attendees learned how and why to use native plants and shrink the lawns in their home landscapes, thus conserving water and keeping pesticides and fertilizers out of lakes, streams, rivers and marine waters. An additional 100 people attended a naturescaping-related seminar at the Pacific

Northwest Garden and Flower Show promoting the behavior change of planting the right plant for the right place.

Spring and winter issues of **Downstream News** were mailed to about 11,000 volunteers, teachers and others. Downstream News promoted opportunities and resources to learn about and protect habitat and water quality. The spring Downstream News highlighted the creation of a low-impact garden created at the DDES office in Renton and free buses available for water quality field trips offered by WTD. The winter issue thanked Lake Monitors for another outstanding sampling season with a 98% completion rate. View Downstream News on-line at <http://dnr.metrokc.gov/wlr/pi/downstream-news.htm> and the Lake Steward at <http://dnr.metrokc.gov/wlr/waterres/smlakes/news.htm>.

WLRD also continued the **Northwest Gardening Connection** (the Connection) as a component of its source control program. The Connection provides a web-site with links to environmentally-friendly gardening information and regular presentations by Master Gardeners and others who advocate gardening in a way that minimizes the use of pesticides, fertilizers, and water by choosing appropriate plants and providing a good environment for them. The site is located at <http://dnr.metrokc.gov/wlr/dss/gardening/>. While this program is open to the general public, most of its participants are King County employees, so it occupies a unique niche in connecting County employees to the environmental education the County provides to the public.

Natural Yard Care

King County's Natural Yard Care Neighborhoods (NYCN) program was launched in 2000 to encourage residents to adopt earth friendly yard and garden care practices. The program's social marketing-based strategy uses education to address barriers that prevent residents from implementing the desired yard care behaviors. The benefits of these behaviors are also thoughtfully presented. Personal contact with neighbors and interactive learning sessions are key components of this public outreach effort.

NYCN encourages residents to practice five natural yard care steps:

1. Build healthy soil
2. Plant right for your site
3. Practice smart watering
4. Think twice before using pesticides
5. Practice natural lawn care

The series of three workshops that comprise the NYCN program addresses each of these steps.

2005 was a year of exceptional growth and achievement for NYCN.

- ◆ A record 13 cities offered NYCN workshops in 16 neighborhoods.
- ◆ Almost 1,700 households signed up to participate.

- ◆ The program was supported by incremental funding from the cities that exceeded \$90,000, or an average of \$8,200 per community.
- ◆ For the first time, workshops were offered in the fall – and these were successfully received.
- ◆ New speakers were added to the roster, bringing greater depth to workshop content.
- ◆ An annual research tool, the Regional Environmental Behavior Index, was developed to measure behavior change.
- ◆ The door-to-door canvassing system, pivotal to the program's success, was formalized and upgraded.
- ◆ A debriefing session was held after all workshops had been completed, offering city contacts the opportunity to share successes and discuss challenges.
- ◆ NYCN received an award of excellence for innovative education.

Lake Stewardship Program

- ◆ In 2005, the Lake Stewardship Program trained and supported over 65 citizen lake monitors on 41 small lakes located in both rural and urban areas throughout the county.
- ◆ Contracts were signed with 8 cities in the county to work with citizens to monitor lakes within their boundaries.
- ◆ The **2003 Lake Monitoring Report** was completed and made available for downloading on the Lake Stewardship website at <http://dnr.metrokc.gov/wlr/waterres/smlakes/>. Water quality and quantity data for 54 county lakes were collected by the Program's Volunteer Lake Monitors and analyzed by Program staff for the report. Hard copies of the report, the ninth in a series, were distributed in 2005 to libraries, cities and volunteers.
- ◆ Work on the **2004 Lake Monitoring Report** was close to completion by the end of 2005.
- ◆ Technical assistance was provided in over 120 instances to lakeside residents and local jurisdictions, addressing water quality issues and protection activities.
- ◆ More than 15 presentations on lake ecology, water quality, and citizen involvement were made through the year upon request to community clubs, school groups, summer day camps, and other gatherings.
- ◆ The Program worked with the cities of Sammamish, Woodinville, and Newcastle to monitor Lakes Beaver, Leota, and Boren for fecal coliform bacteria.
- ◆ A workshop on aquatic nuisance and noxious plants was planned and carried out under contract to the City of Maple Valley.
- ◆ The program to eradicate *Hydrilla* from Lakes Pipe and Lucerne was continued, managed by the Program through an agreement with the cities of Maple Valley and Covington, using a grant from the Washington Department of Ecology.
- ◆ A restoration project to address the TMDL for phosphorus on Cottage Lake was funded by the Washington Department of Ecology as a Centennial Clean Water Fund grant and was initiated in October 2005.
- ◆ The program produced an Integrated Phosphorus Management Plan, planned and carried out an alum treatment on Lake Hicks (Garrett) in support of King County capital improvement projects in the watershed. Monitoring the success of the project is planned over the next several years.

- ◆ The Program continued to work with the community at Spring Lake in 2005 to treat noxious aquatic weeds and to monitor the effectiveness of the milfoil control work done in 2003 and 2004.
- ◆ Interim monitoring of Beaver Lake inlets and production of a biannual newsletter for the Beaver Lake Management District (LMD) was performed through an ILA with the city of Sammamish. Work was begun in October for the in-lake water quality evaluation to be completed in the last year of the 2nd Beaver LMD. Further cooperation began with the City of Sammamish for a 3rd Beaver LMD to be voted on in 2006.
- ◆ Program staff worked with the Washington Department of Ecology and a citizen's group to produce a Detailed Implementation Plan for carrying out the TMDL on Cottage Lake.
- ◆ A grant proposal to the Washington Department of Ecology Aquatic Weeds Fund was submitted for milfoil eradication work on North Lake. The grant was funded, but the area was annexed to the City of Federal Way in late 2005, so the Program turned the grant over to the City for carrying out the activities that were funded.
- ◆ The Program's extensive Web site was updated in 2005 to include timely information on lake-related events and news, and emerging lake-related issues. Go to:
<http://dnr.metrokc.gov/wlr/waterres/smlakes/>
- ◆ Staff members continued to meet with residents from Lakes Killarney, North, and Geneva to discuss potential aquatic weed removal projects at each lake in the near future.
- ◆ Staff members served as technical advisors on Maple Valley's aquatic weed removal project and Plan update.
- ◆ Staff members served on the Board as members and executive officers of the Washington Lakes Protective Association. Two staff members gave presentations on their work in King County at the WALPA 2004 annual meeting in Bellingham.

Local Hazardous Waste Management Program

The Local Hazardous Waste Management Program (LHWMP) has several efforts that aim to protect water quality by reducing residents' use of pesticides and household hazardous materials through education and training.

The following summarizes the diversity of the LHWMP Household Hazardous Waste (HHW) programs:

Schools

In 2005, HHW saw ~ 4640 students (grades 4-12) and their 118 teachers. The program offers a lesson about tracing the path of household products from the home--via storm drains and groundwater and runoff--to bodies of water bodies and to fish. Also offered is a lesson about proper disposal methods, including a discussion on why it's not a good idea to dispose of hazardous household waste in storm drains, or by dumping on the ground. Read the lessons at <http://www.govlink.org/hazwaste/schoolyouth/copy.htm>

General outreach

Distributed 15,000 general Household Hazardous Waste brochures, e.g. *Five Steps* <http://www.metrokc.gov/dnrp/swd/naturalyardcare/index.asp> & *Hazards on the Homefront* <http://www.metrokc.gov/dnrp/swd/education/curriculum.asp>.

Groundwater Program

The education and outreach portions of the Groundwater Program were not funded after the first quarter of 2005. The activities of that first quarter are described above.

Department of Natural Resources and Parks, Parks Division

Employee Training Related to Water Quality

Employee training is an important component of managing the park system's acreage to insure compliance with current regulations and model land management practices. Employees attended the following list of courses during 2005.

- Pesticide Applicators Re-certification - 25 employees
- Dangerous Waste Management – 2 employees
- Stormwater Awareness Training – 64 employees (did not include office employees)
- Renton Aquifer Training – 25 employees
- Emergency Response Training – 129 employees
- Noxious Weed Management – 25 employees

In 2005, three employees obtained re-certification as Construction Site Erosion and Sediment Control Leads (CSESL) consistent with requirements of the new KCSWDM and Ecology's Stormwater Management Manual for Western Washington.

Department of Executive Services

The Environmental Purchasing Program, of the King County Procurement & Contract Services Section, produces periodic (roughly bi-monthly) e-mail Environmental Purchasing (EP) Bulletins to highlight recycled and environmentally preferable products, events, contracts, and other materials of interest to participants in the program. These bulletins were originally produced for program contacts within King County, but are now distributed to suburban cities and others and have become a valuable tool for initiating the exchange of information with other programs.

Copies of two recent bulletins are included in the Appendix and can be accessed at <http://www.metrokc.gov/procure/green/bul92.htm> and <http://www.metrokc.gov/procure/green/bul93.htm>. Past bulletins can be found at: <http://www.metrokc.gov/procure/green/bulindex.htm>.

INTEGRATED PEST MANAGEMENT

The King County government continues its efforts to incorporate IPM principles in their internal operations as directed by the 1999 Executive Order. IPM is a well-established, holistic approach to managing pests and landscapes. It seeks to prevent or address pest problems by employing a wide range of strategies, generally using chemical pesticides as a last resort. The IPM approach considers the impacts of management methods on the environment and public health.

Some of the landscape management activities used last year that highlight IPM principles were:

- ◆ Continued hand pulling of weeds and using mechanical tools such as flame weeders, weed wrenches, and string weeders.
- ◆ Using mulch for weed suppression.
- ◆ Actively considering alternative methods, practices, and products.
- ◆ Tolerating a greater number of weeds in the landscape.

Other IPM activities included:

- ◆ The IPM Steering Committee (SC) met three times to communicate, coordinate and share experiences. The members are from county departments and divisions with a role in managing landscapes.
- ◆ The e-mail Info-Share, created to share expertise, solve problems, announce events and otherwise communicate, was distributed as needed.
- ◆ Staff members continued to research and provide information on local training opportunities.
- ◆ The Exception Request Review Sub-committee of the SC continued the process of reviewing requests to use Tier 1 products to control noxious weeds.
- ◆ Newly registered pesticides thought to be useful in county operations are reviewed by either an outside contractor, a county scientist, or both, and then ranked on the Pesticide Tier Tables. This helps determine their safety and usefulness as compared to pesticides currently in use. Test plots are used to compare the effectiveness of certain products in specific situations.

OTHER COMPLIANCE ACTIVITIES

The Appendix to this report includes information on other compliance activities continuing in the County, water-related CIP projects (improving fish passage, etc.), and mapping of the County's storm sewer system.

S10 (B) 7: IDENTIFICATION OF KNOWN WATER QUALITY IMPROVEMENTS OR DEGRADATION

Lake Sammamish Water Quality

Water quality goals for Lake Sammamish continue to be based on the assumption that the Lake is phosphorus limited and that control of phosphorus loading to the lake will control primary productivity and water clarity. The water quality control activities currently being carried out in

this watershed focus primarily on external phosphorus loading from the watershed. Control of external phosphorus loading results in many secondary benefits to the watershed, such as the control of erosion and sedimentation, and preservation of fish habitat, forest, and riparian cover.

An empiric goal of 22 µg/L mean annual volume-weighted total phosphorus (VWTP) is used to meet the mean summer chlorophyll-*a* goal of 2.8 mg/m³. Concentrations of chlorophyll-*a* ≤ 2.8 mg/m³ historically resulted in summer average Secchi disk transparency of ≥ 4.0 meters. Summer epilimnion VWTP, which is approximately the photic zone of the lake and more directly involved in phytoplankton dynamics during the stratified period, is being evaluated as a management tool for maintaining the summer chlorophyll-*a* and Secchi goals for the Lake. A goal based on summer epilimnion VWTP would be lower than the current whole lake annual VWTP goal to achieve similar levels of lake protection.

The water quality for Lake Sammamish from 1997 through 2005 has been good. Annual mean phosphorus concentrations have been consistently lower than the water quality management goal of 22 µg/L since 1996 (Figure 1). In the last nine years the annual mean VWTP at the south mid-lake sampling station (0612) has ranged from a low of 13 µg/L (1998) to a high of 20 µg/L (2004) (Table 1). Annual mean VWTP at the north mid-lake sampling station (0611) was a bit higher with a range of 14 µg/L (1998) to 22 µg/L (2004). Annual mean VWTP dropped down again in 2005 to 19 µg/L at both the north and south stations. Higher values in 2004 resulted from higher than normal phosphorus build-up in the hypolimnion at station 0611 during the long period of stratification. Maximum hypolimnetic VWTP in November 2004 was 62 µg/L at the northern station (0611) and 39 µg/L at the southern station (0612). In 2005 hypolimnetic build up of phosphorus was back within “normal” range, with a maximum VWTP of 31 µg/L at the northern station (September), and 41 µg/L at the southern station (November).

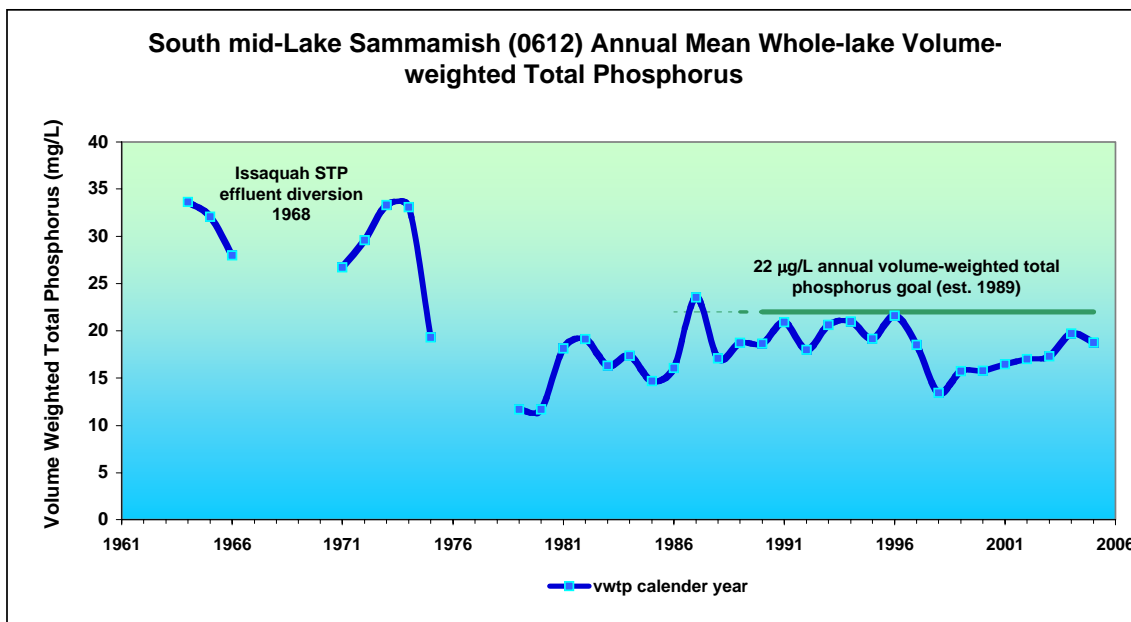


Figure 1. Mean annual volume weighted total phosphorus (VWTP) concentrations at the south mid-lake sampling station (0612).

For a decrease in the whole lake mean annual VWTP to result in decreased phytoplankton productivity and increased water clarity, the concentration of phosphorus in the photic zone (that part of the lake where sunlight and nutrients interact and support phytoplankton growth) also need to decrease. The more direct relationship between nutrient concentrations in the epilimnion (which approximates the photic zone), phytoplankton productivity, and lake transparency are reasons for looking at VWTP in this part of the lake. Figure 2 illustrates the epilimnion 12 month running means as well as the summer monthly epilimnion VWTP.

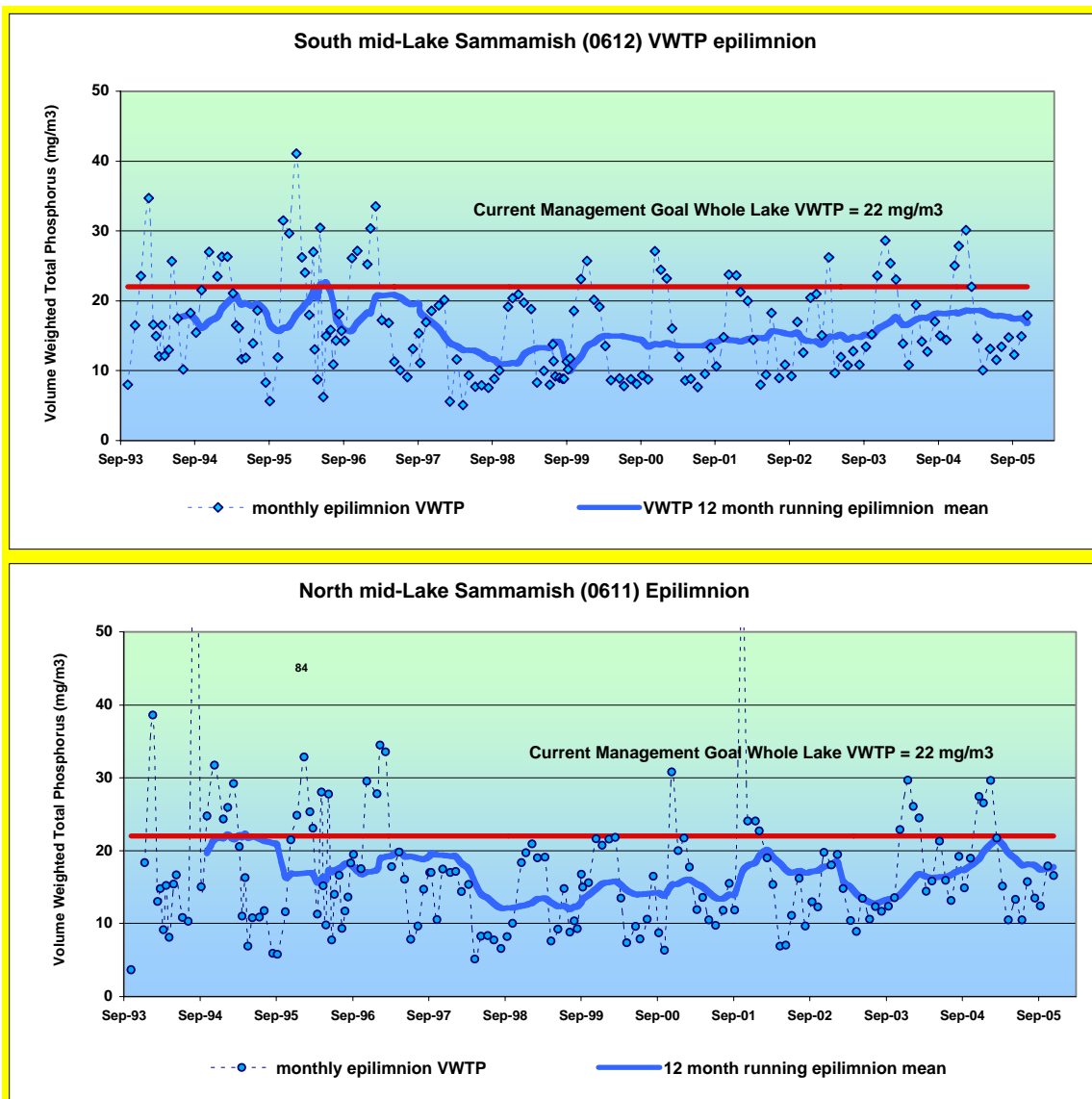


Figure 2. The dashed lines indicate monthly epilimnion VWTP concentrations for north and south lake for 0612 (diamonds) and 0611 (circles). The solid line is a 12-month VWTP

running mean for the epilimnion. A running mean de-seasonalizes data to show long-term trends. During winter mixed conditions, data from the top 15 meters was used to generate this mean.

Based on the models used to monitor Lake Sammamish, chlorophyll-*a* and Secchi disk transparency should both meet or exceed the water quality goals as well (chlorophyll *a* ≤ 2.8 µg/L and Secchi ≥ 4.0m) when phosphorus concentrations are ≤ 22 µg/L. The north and south average summer mean chlorophyll-*a* concentrations for 1998 and 2001 were less than the chlorophyll-*a* goal 2.8 mg/m³, while in all other years the summer mean chlorophyll-*a* concentrations exceeded the goals (Table 1). Secchi disk transparency for all eight years was at or better than the water quality goal of 4.0 m.

Table 1. Lake Sammamish mean annual volume-weighted total phosphorus, and mean summer epilimnetic total phosphorus, chlorophyll a, and Secchi depth collected at the north mid-lake station (0611) and the south mid-lake station (0612).

Station 612	Mean Annual Whole Lake Volume Weighted Total Phosphorus (ug/L) Calender year	Mean Summer Epilimnetic Total Phosphorus (ug/L) June-Sept	Summer Chlorophyll- <i>a</i> (mg/m ³) June-Sept	Summer Secchi Depth (meters) June-Sept
Goals*	≤ 22		≤ 2.8	≥ 4.0
1997	18	12	2.9	4.3
1998	13	8	2.7	5.7
1999	16	10	3.6	4.2
2000	16	8	4.0	4.6
2001	16	10	2.5	6.8
2002	17	12	3.0	5.1
2003	17	12	3.3	5.7
2004	20	16	3.3	5.2
2005	19	13	4.8	5.4

Station 611	Mean Annual Whole Lake Volume Weighted Total Phosphorus (ug/L) Calendar year	Mean Summer Epilimnetic Total Phosphorus (ug/L) June-Sept	Summer Chlorophyll- <i>a</i> (mg/m ³) June-Sept	Summer Secchi Depth (meters) June-Sept
Goals*	≤ 22		≤ 2.8	≥ 4.0
1997	20	13	2.4	5.6
1998	14	8	2.3	6.3
1999	18	12	3.9	4.0
2000	16	11	4.5	4.8
2001	19	12	2.7	6.2
2002	17	11	3.1	4.6
2003	15	12	3.4	5.4
2004	22	17	3.7	5.0
2005	19	13	4.8	5.3

As per the 1996 Lake Sammamish Water Quality Management Plan.

Boxes shaded blue indicates water quality goals have been met. Boxes shaded green indicates goals were not met.

The higher chlorophyll-*a* concentrations in 1999, 2000, 2002, 2003, 2004 and 2005 did not result in as great a loss of water clarity as expected from the model, or observed in the past. One reason may be a shift to more colonial forms of algae that concentrate chlorophyll-*a*, but because they are clumped do not decrease transparency to the same degree as unicellular algae. This phenomenon is being investigated in further detail for the upcoming Lake Sammamish Existing Conditions Report. Lower chlorophyll-*a* in 1998 and 2001 did result in higher summer water clarity. However, clarity was also relatively high in 2003 and 2005 as well. Transparency is affected by factors other than algal growth, including suspended solids. Decreased inputs of suspended materials from streams due to the dry weather conditions have a positive influence on summer water clarity. The summers of 2003 and 2005 were some of the driest on record. June and July of 2004 were also dry, but August 2004 was the wettest on record and September was also cooler with more rainfall than normally seen. 2005 saw a variety of extremes with relatively dry winter and summer months but with May rainfall one of the highest on record.

The relationship between the annual whole lake VWTP, and summer chlorophyll-*a* in Lake Sammamish is still functioning. The relationship between chlorophyll-*a* and Secchi disk transparency also still works with the exception of periods where colonial phytoplankton

predominates. The water quality goals that have been agreed upon for the Lake of 22 µg/L for mean annual VWTP, 2.8 mg/m³ for chlorophyll-*a*, and 4.0 m for Secchi disk transparency are still appropriate.

While summer water quality in Lake Sammamish has seen improvement, there are serious water quality issues in the fall. During the late summer and early fall of 1997, an extensive, toxic bloom of *Microcystis aeruginosa* covered much of the Lake. This bloom occurred even though the lake met the phosphorus and clarity water quality goals during this period. During the late summer of 1998, a bloom of *Microcystis aeruginosa* did not occur, however a sample was collected and analyzed for toxicity. Mouse bioassay tests indicated the cyanobacteria were not toxic. Subsequent strain analysis done at the University of Washington indicated that while the cyanobacteria species was the same (i.e., *Microcystis aeruginosa*), the specific strain was different and non-toxic. In an effort to examine potential environmental factors that influence the production of toxins, a graduate student investigated this issue in Lake Sammamish with the support of King County, Seattle University, and the University of Washington.

In 1999, low concentrations of *Microcystis aeruginosa* were collected from the lake and tested positive for toxicity when analyzed using the ELISA test. While there was no bloom of toxic cyanobacteria in the lake during the fall of 1998 or 1999, the same strain of toxic algae, producing toxins at low levels, was present in the lake. It is apparent that the toxic strain of *Microcystis aeruginosa* is endemic in Lake Sammamish. If water quality conditions in Lake Sammamish deteriorate in the future and result in a cyanobacterial bloom, it would be expected that toxic *Microcystis aeruginosa* would be present. There were no blooms of toxic cyanobacteria recorded in Lake Sammamish in 2000, 2001, 2002, 2003, 2004, or 2005. In 2001, a preliminary survey for microcystins in lakes Washington, Sammamish and Union was initiated. Data from this survey was used to develop the Sampling Analysis Plan for Toxic Cyanobacteria in Lake Washington, Lake Sammamish, and Lake Union (2003). Sampling began in May 2003 and continued through fall of 2004. In 2005, the sampling program was modified to include nearshore stations and swimming beaches. Microcystin concentrations in 2003 were all at or near detection. In 2004 and 2005 there were a few samples with measurable concentrations of microcystins, though concentrations were still very low (e.g., < 0.25 µg/L). Results of the 2005 microcystin testing in Lake Sammamish are shown in Figure 3.

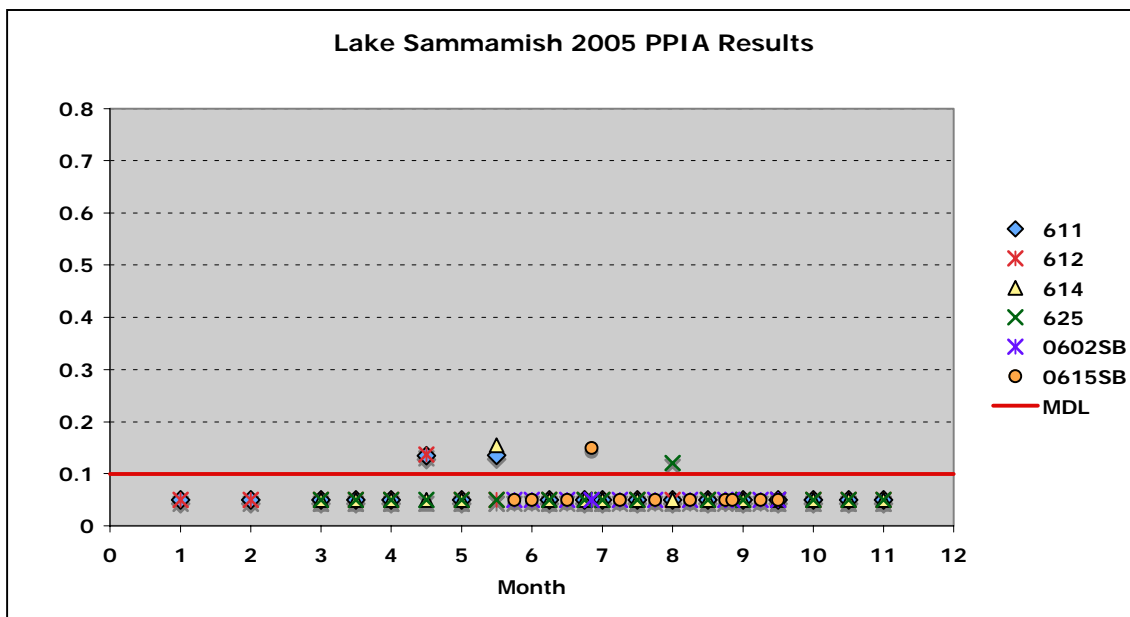
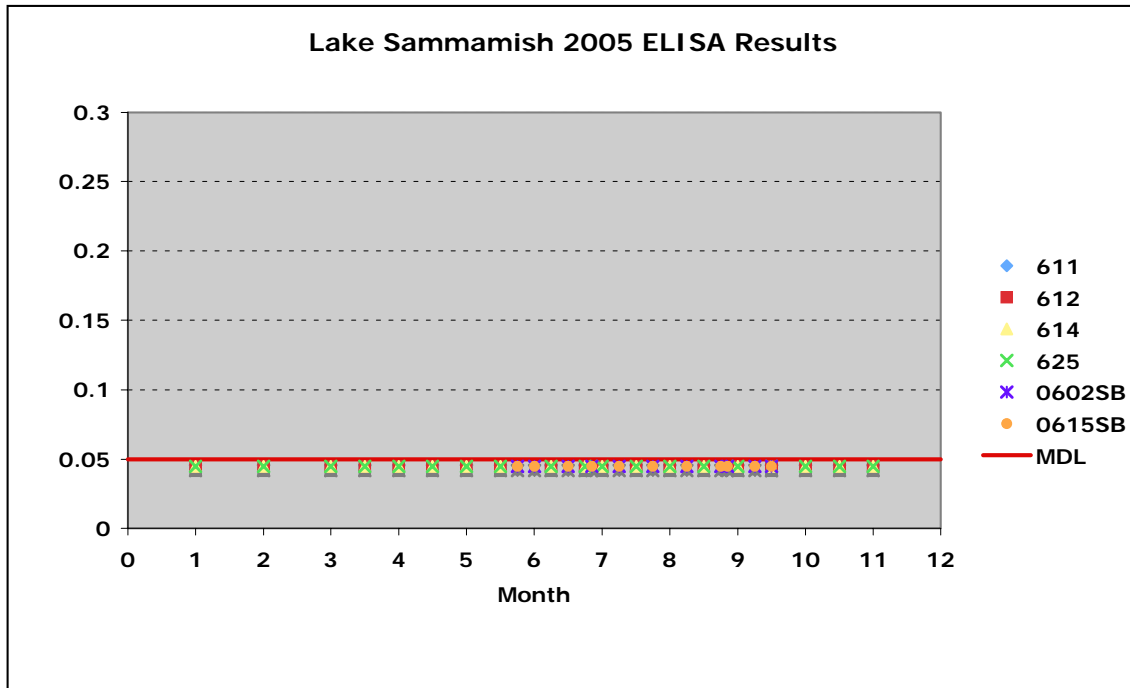


Figure 3. Microcystin concentrations measured at the north (0611) and south (0612) stations in Lake Sammamish in 2005.

In 1998 it was hypothesized that *el Niño* was influential in the excellent summer water quality. Summer primary productivity is dependent on addition of phosphorus to the stable upper photic zone of the lake (i.e., epilimnion) by a combination of external loading during storm events and internal loading from the hypolimnion. The large toxic bloom observed in 1997 occurred after a

significant rainfall event in September (3.27 inches in 5 days) that discharged into a very stable epilimnion. In comparison, during the summer of 1998, 1999, 2000, 2001, 2002, 2003, and 2005 there was less summer/fall rain and subsequently little external loading from the watershed or mechanism for mixing hypolimnetic water into the epilimnion and photic zone. In 2004 the epilimnion was also very stable for an extended period of time. However, when precipitation occurred in August and September, temperatures were cooler than normal and cloud cover more extensive, which may have inhibited excessive algal growth.

Summer weather and stream inflow patterns have a significant influence on summer water quality, but other factors obviously influence the response of the lake. Improved watershed management in the basin by citizens' groups and local governments can prevent water quality problems. All of the management policies in the Lake Sammamish watershed are designed to reduce external loading by controlling discharge of non-point source pollution to the Lake and associated streams. Assuming these policies are continued and successful, we should be able to meet the long-term water quality goals for Lake Sammamish.

Large Lakes Volunteer Program

Volunteers had been collecting physical data along the Lake Sammamish shoreline since 1999, in a program originally begun through a partnership between King County and *Save Lake Sammamish*. The program was discontinued in 2004 for lack of funding.

Beach Monitoring Program

To track public health issues related to swimming, a public swimming beach monitoring program was implemented in 1996, and continues as a cooperative effort of WLRD, KC Environmental Laboratory, the Seattle King County Public Health Department (SKCPHD), and a number of suburban cities. In 1998, 21 public swimming beaches on lakes Washington, Sammamish, Five-Mile, Wilderness, Pine, Beaver, and Green were sampled weekly from June through September. In 1999-2001, the public swimming beaches on lakes Washington, Sammamish, and Green were sampled weekly from June through September, while the other lakes were sampled by other jurisdictions and private laboratories. In 2000, sampling included the Magnuson Off-leash Dog Area. In 2002, 26 beaches and the off-leash area were sampled. In 2004, 24 beaches and the off-leash area were sampled. And in 2005, 27 beaches and the off-leash area were sampled. All bacterial data were immediately transferred to the SKCPHD for determinations on public health and contacts with the local jurisdictions and parks departments, and published on the King County Website at <<http://dnr.metrokc.gov/wlr/waterres/lakes/bacteria.htm>>.

Data from the beach monitoring program was used by the SKCPHD to identify potential public health problems. Bacterial counts all the beaches monitored in Lake Sammamish were within acceptable ranges and did not warrant swimming beach closures. Four Lake Washington swimming beaches were closed in July 2005. Matthews Beach was closed due to high bacteria stormwater inflow from Thornton Creek and was reopened after the streamflow diminished. Waterfowl were suspected as sources of bacteria in the Newcastle and Juanita beach closures. Sources of bacteria responsible for the closure at Gene Coulon beach were not identified.

The training program for local jurisdictions began in 2004 with the City of Shoreline being the first jurisdiction to take advantage of this program. In 2005 the City of Kenmore took part in this training. The first year of training includes sampling and handling protocols and laboratory analysis. After the first year these jurisdictions will be responsible for collecting and analyzing samples for their swimming beaches. Data analysis and publication on the DNRP webpage will be carried out by DNRP staff as part of our regional services.

Lake Sammamish Volunteer Program Summary

In 2005, King County did not conduct a volunteer monitoring program on Lake Sammamish.

Basin Management Evaluation Program (BMEP)

The Basin Management Evaluation Program (BMEP) has become smaller in recent years because of property access issues and decreased staff and funding.

Since 1994, King County biologists have actively surveyed the Bear Creek, Cedar River, and Issaquah Creek basins as part of an effort to monitor the health of native salmonid populations in WRIA 8. These surveys include active participation from local, state, federal, and tribal agencies. Since the listing of Puget Sound chinook salmon and bull trout as “threatened” under the federal Endangered Species Act (ESA), particular emphasis has been placed on documenting the distribution and spawning characteristics of these species. Salmonid surveys were conducted in Bear Creek and the Cedar River in 2005 and are planned for 2006. These surveys continue to focus upon ESA-listed species, with emphasis on making distinctions between hatchery raised and wild fish in the Lake Washington watershed.

However, habitat surveys were not performed in Bear Creek and the Cedar River tributaries in 2005. There are not sufficient resources to perform these surveys in 2006 either.

King County biologists have surveyed the nearshore environment along King County beaches and the southern portion of Snohomish County to determine the presence of ESA-listed species.

The project report can be accessed at

<http://dnr.metrokc.gov/wlr/watersheds/puget/nearshore/juvenile-salmonid-report.htm>.

Hydrologic monitoring continued in Soos Creek, Bear Creek, East Lake Sammamish, Issaquah Creek, and the Cedar River in 2005 and is planned for these waterbodies in 2006. Gauging in the Bear Creek, East Lake Sammamish, Issaquah Creek, and Lower and Middle Cedar River watersheds supports water quality investigations and habitat studies. Three new sites on tributaries to the Snoqualmie River continue to be gauged for hydrologic monitoring.

Land use and land cover assessments have not taken place since 2000. However, countywide satellite image analyses are being planned in 2006. It is expected that these assessments will take place in 2007.

Benthic macroinvertebrate monitoring did not take place in 2004, but resumed in 2005 at sites in Soos Creek, Bear Creek, Issaquah Creek, and the Cedar River, as well as five Mercer Island

drainage basins and Shinglemill Creek on Vashon Island. Benthic macroinvertebrate monitoring is planned for 2006 as well.

King County biologists continued to monitor water quality in 2005 in Soos, Bear, and Issaquah Creeks, East Lake Sammamish, and the Cedar River, and plan to conduct water quality monitoring in these waterbodies in 2006.

Wetland monitoring in King County has changed dramatically since the SWMP was written. King County has focused its wetland monitoring resources on mitigation banking sites; these monitoring sites include one site in the Sammamish plateau and another site near Swamp Creek. Wetland monitoring continued at the Urban Planned Developments (UPDs) in the Bear and Swamp Creek systems in 2005, and is planned for 2006. Wetland monitoring activities at the UPDs include vegetation and amphibian surveys. However, wetland monitoring did not take place in 2005 and is not planned for 2006 elsewhere in the Bear Creek system or in the Soos Creek, East Lake Sammamish, Issaquah Creek, and Cedar River systems.

A table showing the types and location of monitoring completed during the permit term is included in the Appendix.

S10 (B) 8: STATUS OF WATERSHED-WIDE COORDINATION

Implementation of Lake Sammamish Management Program

During 2005, King County implemented the Lake Sammamish Management Program as follows:

1. Forest Conservation Program – This program has been integrated into the King County forestry program and will continue to be implemented by DNRP's Resource Lands Section and DDES. The regulatory (65 percent forest retention on all rural zoned lands) and incentive (both the current use taxation and education) elements of the program are being implemented by a King County forester.
2. Non-point Source Control Program – Education activities for the Lake Sammamish Basin are now developed and implemented through the WRIA 8 process. However, traditional planting events, workshops, and the Issaquah Salmon Days emphasis on the whys and wherefores of phosphorus as a pollutant have continued.
3. Regulatory Compliance and Enforcement –most of the developing land in the Lake Sammamish Basin has incorporated or been annexed, so King County's role in protecting the lake from phosphorous inputs from construction sites is extremely limited
4. Enhanced Operations and Maintenance – no changes were made in maintenance practices for detention and water quality facilities in the basin in 2005.

5. Lake Protection Standards – 50 percent total phosphorus removal standards for new development were adopted for the unincorporated parts of the basin in January 1998. These standards have been implemented since that time, though they were superceded by adoption of the 1998 SWDM. In 1999, the County applied for and received a \$250,000 grant from the United States Environmental Protection Agency to evaluate the feasibility of implementing regional stormwater treatment in the Lake Sammamish Basin. The draft study was completed in 2002 and regional stormwater treatment was not deemed feasible for the Basin. In 2003, the final report was completed and a new scope of work was developed for the unexpended grant funds. The new scope of work outlined a process to determine the treatment effectiveness of water quality facilities in the Lake Sammamish basin built in compliance with the 1998 Lake Protection Standards. The study was completed in May, 2005. Two facilities in the Lake Sammamish basin were selected for assessment; samples were collected from the inflow and outflow points of these facilities during the period of January – November of 2004. Samples were analyzed for total suspended solids, total and ortho-phosphorus, hardness, pH, particle size distribution and selected total and dissolved metals (copper, zinc, lead and cadmium). The outflow pollutants were reduced for all pollutants except cadmium and lead in one of the two ponds. One of the two ponds achieved greater than 50% removal of total and ortho-phosphorus. The other study pond did not meet the 50% reduction goal, however, the influent concentration of phosphorus was below the concentration range that the treatment goal was intended for. Moreover, the total and ortho-phosphorus levels in both pond outlets were nearly identical. These data will be used by SWS to better understand the effectiveness of stormwater facilities designed to meet the Sensitive Lake Protection standards.

6. Public Ownership and Shoreline Access – King County is in the process of developing the East Lake Sammamish Trail on a former railbed. Permits were obtained in 2005 to construct the final portion of the interim trail within the City of Sammamish. Constructing started during the latter part of 2005 and is expected to be completed during March 2006. The other sections of the interim trail within the cities of Redmond and Issaquah were previously developed and opened for public use during March 2004.

King County, the King County Land Trust, and citizens continue to evaluate other possible shoreline parcel acquisitions in conjunction with trail development.

The three short-term programmatic actions identified for King County action—an erosion control program, a source control program, and implementation of the 50 percent phosphorus standards for new development—have all been incorporated into the County's ongoing management of the Lake. Two of the eight capital projects identified as short term actions—Valley Growers Nursery and Weowna Creek, —were constructed or completed during 1997 or 1998. Two are now under the jurisdiction of the City of Issaquah (Kelly Ranch, and the Bianca Mine). The Issaquah State Hatchery design project has transformed into a public education kiosk at the site that was completed in 2004. [More detail available in the Lake Sammamish Initiative Table provided in the Appendix.]

ILA Program

In 2001, work began on development of work products under the ILA construct involving cost sharing by more than 45 jurisdictions to support the salmon conservation planning effort. The work is now entering its sixth year and all jurisdictions are continuing to participate.

In WRIA 7, the Snohomish Basin Salmon Conservation Plan was approved in June 2005. It included guidance for local governments on updating local policies and regulations, 10 year habitat goals, and a project list. This Plan was adopted by all Snoqualmie Watershed jurisdictions. The Plan received an award from the American Planning Association in 2005. Local jurisdictions and watershed organizations continue to implement the recommendations in the Plan through restoration and protection projects, incentive programs, education, and regulatory updates.

In WRIA 8, the Draft WRIA 8 Reconnaissance Report, which includes known, probable, and possible factors of decline organized by sub-basin, was published in March 2001 and the Reconnaissance Assessment was updated and expanded as a Limiting Factors Report. The first draft of the Near Term Action Agenda was completed in December 2001 and adopted in 2002. Detailed scoping for the Salmon Conservation Plan took place in 2002 along with work on the Strategic Assessment. The Strategic Assessment provides the technical foundation for the conservation plan as well as baseline information needed for adaptive management. In 2002, WRIA 8 also hired a consultant to develop the Ecosystem Diagnostic and Treatment (EDT) model for the watershed, which will provide guidance for the development of recommendations in the conservation plan. The Steering Committee draft WRIA 8 Salmon Conservation Plan went out for public review in November 2004 and was revised in February 2005 based on public comments. The WRIA 8 Forum approved the Plan in the spring of 2005 and the Final 2005 WRIA 8 Chinook Salmon Conservation Plan was included in the Shared Strategy Puget Sound Salmon Recovery Plan (SSPSSRP) in July. All 27 jurisdictions ratified the Plan and extended their interlocal agreement to collaboratively implement the Plan. EDT work is in the final stages of identifying the "T" actions needed for each subarea. The Start List of actions in the plan is being prioritized for the first three years of implementation. The framework for monitoring is being established to provide the evaluation tool necessary for adaptive management of the Plan.

The Near Term Action Agenda for WRIA 9 was completed in 2002 and was based on findings in the WRIA 9 Reconnaissance Assessment Report from 2000. As with the other NTAAAs, it contained actions that could be taken while more detailed conservation planning was underway. Many of the recommendations of the NTAA were indeed carried out during 2002-2005; these accomplishments and others were chronicled on an annual basis (<http://dnr.metrokc.gov/Wrias/9/NTAA.htm>). During 2002-2004, the Strategic Assessment was conducted to answer key questions identified by the Reconnaissance Assessment Report. The fourth and final WRIA assessment and planning document was the *WRIA 9 Salmon Habitat Plan: Making Our Watershed Fit for a King*. This comprehensive salmon habitat plan was created in 2004 and early 2005. Following extensive public and Steering Committee review in 2005, it was finalized in August 2005. The Plan was subsequently approved by the WRIA 9 Forum of local governments (in September 2005) and ratified by enough local governments to

take effect in December 2005. (By early January 2006, *all* 16 local governments in the watershed and the City of Tacoma had ratified the Plan.) With its completion, the WRIA 9 Salmon Habitat Plan replaced the NTAA. As with the other WRIA plans, the Plan makes up a chapter in the SSPSSRP.

While not part of an ILA structure, King County continues to participate in planning and implementation for WRIA 10 recovery actions under Pierce County's lead. The WRIA 10 group completed its recovery plan in September 2003, followed with its submittal to Shared Strategy and incorporation into the SSPSSRP. The WRIA 10 plan submitted by Pierce County to Shared Strategy identifies potential actions, assesses their effectiveness, and prioritizes the actions necessary to meet recovery goals. Plan implementation, like the technical planning and plan development processes, will be accomplished by voluntary participation of watershed stakeholders and will also have project development and implementation guided by the WRIA 10 and WRIA 12 Salmon Habitat Protection and Restoration Strategy completed by Pierce County's lead entity technical group and citizen's committee.

CONCLUSION

King County's SWMP continues substantially as planned and disclosed in our approved submittal, although our management activities have expanded to more effectively address threats to the degradation of salmonid habitat caused by storm and surface water runoff and to make water quality improvements (including improved habitat elements--not just water chemistry) necessary to assure that salmonids can thrive in our waters.