NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM MUNICIPAL STORMWATER PERMIT PROGRAM ANNUAL REPORT FOR CALENDAR YEAR 2004

King County
March 31, 2005

PROGRESS ON ADDRESSING EXCEPTIONS TO SWMP 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 finally approved the Lake Sammamish portion of the County's SWMP. Reporting information about Lake Sammamish may now be found in the report under "*Identification of Known Water Quality Improvements or Degradation"* and under *"Status of Watershed-wide Coordination."*

Surface Water Design Manual (SWDM)

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 Surface Water Design Manual (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 BMPs to include residential activities. We are providing a hard copy of the SWDM and SPPM to Ecology coincident with this report. We request that Ecology begin its review of the County's new manuals and ordinances for equivalency with its 2001 Stormwater Management Manual for Western Washington.

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 SWMP

All the requisite components of a SWMP are in place in King County, with the exceptions noted above. Although there are some minor changes in the timing, magnitude, or name of some of our compliance activities, 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, 2004 to December 31, 2004, King County's losses to annexation in terms of land area were approximately 1,028 acres.

No incorporations occurred in 2004 and none are expected in 2005.

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 stormwater related activities in 2003 was $54,222,266. Actual spending for 2003 was $52,071,092--an increase of 4.88% from 2002 actuals. The adopted budget for 2004 by the County Council is $53,499,872--a slight decrease of 1.33% from the 2003 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

SWS Inspections 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 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 2004.

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. 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 Stormwater Management Program. SWS has upgraded the complaint tracker program to include GIS/GPS capabilities to facilitate monitoring drainage complaints and using facility maps. The Maintenance Information System[2] has also been

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[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.

[2] The SWS Maintenance Information System (MIS) enhances the Drainage Investigation and Facility Maintenance (DIFM) Unit's Facility inspection and maintenance programs. This

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 DI&I, 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 2004.

	INVENTORY TOTALS (as of 12/31/03)	WORK PROGRAM	INSPECTION TOTALS				
			2000	2001	2002	2003	2004
Public							
2-Year Bond	163	2-Year M/D Bond Inspections	272	350	425	436	526
Residential R/D	1654	Inspections	986	950	929	854	885
		Special Use Permits	37	45	35	53	62
Total	1817	New Facilities Inventoried	68	45	54	61	55
Private							
M/F Comm incl City	1376	Inspections	1396	1130	1240	1303	1371
NPDES Facilities (conveyance-only)	490	NPDES Inventories	6	10	6	10	10
Total	1866	New Facilities Inventoried	37	45	85	111	63

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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 *(Including corrections to the information provided in the 1999 report for calendar year 1998.)*

INVESTIGATION TYPE	CARRY OVER	NEW (in '04)	CLOSED (in '04)	OPEN
COMPLAINTS★ (quick response)	31	72	112	65
REVIEWS☆ (more complex response)	213	55	56	269
SITE CONSULTATIONS☆ (for businesses)	279	192	126	486
ENFORCEMENTS☆ (violations issued)	30	8	6	31

★ **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 Dept. of Ecology, KC Health, DDES, Washington State Patrol, Labor and Industries, EPA, Hazardous Waste, Solid Waste, King County Roads, or others.

☆ **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-familty and commercial sites with flow control or water quality facilities. Residential sites with flow control or water quality facilities will soon be included in the audit process.

- **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 thought 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 Control Inspection & Enforcement Program (the Program) is based in the King County Department of Development and Environmental Services (DDES). In 2002, the separate program for permitted sites merged into the ongoing programs of the Building Inspection Section, Site Development Services Section and the Land Use Inspection section. An additional five (5) Site Development Specialists in the Code Enforcement Section have been assigned to non-permitted activities, especially those affecting ESA compliance. This program continued through 2004.

The Program continues to include enhanced inspections of permitted activities for Erosion/Sediment Control compliance (ESC) throughout the County. The five erosion control contracts let in 2001 were replaced in 2002 by a single contract, saving limited funds and simplifying the processing of work orders. Under this program, the County notifies the developer that they are in default of their restoration financial guarantee agreement. Then the department prepares a work order under the erosion control contract. The cash portion of the restoration financial guarantee is used to pay the erosion and sedimentation control contractor. 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

The inspectors performing enhanced ESC inspections visit sites to observe whether appropriate ESC Best Management Practices (BMPs) are used. The inspectors are authorized not only to note violations, but also to provide on-site training in the proper use and installation of ESC BMPs. Enhanced ESC inspection areas include the Green River, Cedar River, Sammamish River, Bear Creek, and the Snoqualmie River Basins. [See the Appendix for a map showing enhanced ESC inspection visits performed during 2004.] The Program's services to the Lake Sammamish drainage area are limited to activities permitted by DDES. The Program also implements that portion of the County's response to the Endangered Species Act (ESA) relating to the inspection of non-permitted sites. DDES provides 24 hour 7 days per week complaint response via the Road Maintenance Section's 24 hour 1-800 number—1-800-KC-ROADS. (King County also has a 24 hour x 7 day environmental emergency complaint line--1-888-437-4771.) After hours and on weekends a staff person is always on standby to assure rapid response to complaints. In 2004, over 14 afterhour emergency call-outs were logged. Two required follow-u inspections and potential code enforcement and one resulted in a stop work posting.

The enhanced 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 number of permitted sites with enhanced erosion inspections during 2004. For the year, a total of over 1,972 separate erosion monitoring inspection visits representing 2,109 hours were conducted at construction sites. This is a decrease from the hours reported the previous year, though spread out over several inspectors and fewer repeated site visits. Some inspections resulted in violation notices and enforcement actions. Frequently, enforcement occurred during, or immediately after, a major rain event. Many ESC inspections occurred prior to rainfall and needed corrections were addressed which meant that the program was more successful in monitoring and preventing potential erosion problems.

The second of the program's three main functions involves the provision of technical assistance through guidance on the use of BMP's at specific construction sites. Many of the site visits focused builders' attention on better erosion control practices. In addition, the DDES web page offers additional information to builders at http://www.metrokc.gov/ddes/esa/ as well as a written notice and mailing to builders in the fall. This notice alerts builders that BMP requirements were needed to be in place prior to the end of the growing season and beginning of the rainy season.

The third main function of the enhanced ESC inspection program is the pursuit of enforcement actions for sites that are not permitted and are in violation of King County Surface Water Design Manual or other regulations that apply to water quality, and for ESA compliance for both permitted and non-permitted activities.

Inspections & Consultations—Hazardous Waste

On-Site

The On-site Consultation team conducted 573 site visits to businesses in 2004. All visits included 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:

- 1300 gallons of contaminated process water containing detergents and oils were diverted from storm drains to the sanitary sewer.
- 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 2004 the Survey Team conducted work by watershed/drainage areas in Kent and Bellevue, with the cities providing detailed watershed and drainage maps and prioritizing the order of work by areas of most concern. The Team is providing reports to the cities regarding their activities and findings by local watershed area. In addition, one Survey Team Member continued work on the Duwamish Project with SPU and Industrial Waste Staff.

City of Kent and City of Bellevue Staff requested the Survey Team to inspect businesses and provide technical assistance about hazardous materials to businesses in watershed areas and to pay special attention to storm and surface water concerns and issues. The Survey Team conducted a total of 810 unannounced site visits to businesses in seven areas: Bellevue – Kelsey Creek Drainage Area, Bellevue – Richards Creek Drainage Area, Kent – Lower Mill Creek Watershed Area, The City of Newcastle, The City of Algona, The City of Pacific, and Seattle – Duwamish Project Area. Of primary concern, as expressed by each city, were stormwater-related issues. As a result of these visits, environmental compliance improved at 91.67% of businesses selected and revisited for compliance follow-up (55 of 60).

Response

The Response team's primary work revolves around investigating public complaint calls (RFA) or interagency referrals on the mismanagement of hazardous materials. The team responds to about 300 RFA's a year. Of those calls, over 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 storm water. 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 Regulatory Analysis Committee

The Response Team also administers, facilitates and leads the Interagency Regulatory Analysis Committee (IRAC). As the lead of the IRAC Troublesome Site Workgroup, the Response team helps coordinate the interagency investigations and clean ups at problematic sites which often impact surface water. The workgroup initiated work on several auto wrecking facilities in 2004

and continues to work to achieve compliance with hazardous waste management and storm water issues.

IRAC Restaurant Grease Workgroup 2004
The IRAC Water Quality Workgroup on restaurant grease was formed to address the problem of grease entering the storm drainage system and sewers from improper grease handling and storage practices. Businesses often choose methods of storage and/or disposal that allow grease to overflow into storm drains and the environment. Clean up of restaurant grease by methods such as power washing or the use of cleaners or solvents can also cause more grease and hazardous materials to flow to the storm drain. The purpose of this workgroup is to research what are the common causes of grease mismanagement that lead to improper releases, disposal practices, what regulations and ordinances apply for each jurisdiction and what practices can be addressed to affect change.
In 2004 the workgroup report provided information and guidance to regulators and food service establishments about how to best collect, store, and dispose of fats oils and grease along with a list of contractors. The workgroup developed a "Pocket Guide to Best Management Practices for Restaurant Grease".

Duwamish Drainage Basin
During 2004 the Local Hazardous Waste Management Program continued to work with KC Industrial Waste and Seattle Public Utilities conducting outreach to businesses in the Duwamish River's drainage basin. Outreach has focused on educating and aiding these businesses in:

Proper management and storage of hazardous wastes;
Proper management of sanitary sewer discharges;
Proper management of stormwater runoff.

The primary goal of this work is to help reduce/eliminate recontamination of Duwamish River sediments (the Duwamish is a listed Superfund site, scheduled for cleanup). The work focuses on contaminants such as phthalates and other endocrine-disrupting chemicals, as well as oils, soaps, solvents, etc. This effort should help reduce the amount of harmful contaminants impacting stormwater runoff in the Duwamish drainage basin. Work on this project will continue through June of 2005.

CAPITAL PROGRAMS

Water and Land Resources Capital Projects (CIP) Section

PROGRAM OVERVIEW
The primary role of the Water and Land Resources Capital Projects (CIP) Section is to design and build capital projects in direct support of their Water and Land Resources (WLR) Division'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;
- Allowing access to upstream habitat by removing or replacing antiquated culverts that are barriers to fish migration;
- Restoring and enhancing stream, wetland, and floodplain habitats for fish and wildlife;
- Reducing 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 the WLR Division. Sources include:

1. Basin plans and other reconnaissance efforts performed by the former Surface Water Management (SWM) Division or WLR 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. The Water and Land Resources Division Drainage Services Section 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 Resources Inventory Area (WRIA) planning are expected to improve flooding, drainage and water quantity problems and restore degraded aquatic habitat.

A committee 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, effectiveness and feasibility are used to rank projects. "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" reflects the constructibility of the project by considering the issues such as physical access to the site, landowner willingness to participate in the project, and the likelihood of securing permits for the projects. 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, the capital improvement program is divided into five principal areas.

Large Project Capital Improvement Program
The Large Project Capital Improvement Program includes capital projects identified in basin plans through special studies as well WRIA plans and other sources. Projects were prioritized through the Capital Improvement Program Master List process involving the CIP Section and Basin Planning personnel. Large and small basin plan Capital Improvement Program projects are prioritized during preparation of the basin plans. Upon completion of the basin plan, CIP Section and Basin Planning personnel adjust priorities based on changing basin conditions, but strive to respect the basin plan's original ranking of projects and the intent of the basin plan's goals and objectives. Expenditures in this category represent a majority 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 within the Surface Water Fee Service Area. The NDAP applies to both residential and commercial properties. Neighborhood drainage problems will be addressed through selected enforcement action, maintenance procedures, the construction of capital improvement projects, and through the provision of technical assistance for privately funded solutions. The goal of the NDAP is to provide customer service within the Surface Water Fee Service Area.

The NDAP gives CIP Section the authority, funding, and ability to manage surface water runoff outside of County maintained right-of-ways and tracts. The NDAP, along with existing CIP Section activities and coordination with the KCDOT Division, provides the CIP Section with an opportunity to more comprehensively manage storm water systems. Citizens will receive direct benefits from solving flooding and erosion problems that cause property damage, threaten health and safety, and degrade natural resources within their neighborhoods. The NDAP also gives the CIP Section the opportunity to control surface and storm water runoff at their sources, therefore preventing degradation of our valuable streams, lakes, and wetlands. The NDAP will not

immediately address the entire off-road drainage system; rather, it will solve problems as they arise. In many cases the 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 will investigate all problems in the off-road system to collect drainage-related information, and screen and prioritize the 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 then routes the problem to one of three solution groups: enforcement, maintenance, or capital construction. Staff will perform a cost/benefit analysis and solve as many problems as funding allows. The CIP Section staff also offers technical assistance and recommended solutions to all program participants.

Drainage and Habitat Improvement (DHI) Program
The DHI Program builds small capital projects that resolve minor drainage, erosion, and sedimentation problems, and/or improve water quality, 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.

DHI projects are ranked and prioritized by the DHI 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 in stream corridors and wetlands that restore physical, chemical, and biological habitat forming processes for fish and wildlife. 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 livestock fencing, controlling invasive weeds, and planting native vegetation. In the Rural Service Area SHRP is focusing efforts on specific stream corridors in order 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, and 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 fund the design and construction of capital improvements that require emergency or urgent response to situations that pose imminent danger to lives 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 the 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 and KCDOT 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 2004. Approximately 10,900 native plants were salvaged from development sites in 2004 and approximately 5,500 plants were salvaged by landowners for re-establishing native vegetation and habitat in their own yards. About 10,054 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 the National Tree Trust, 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.

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 Program
ESU manages the Capital Improvement Program Monitoring Program. This program creates and implements project-monitoring plans in order to assess project performance and to meet regulatory monitoring requirements. In 2004, ESU monitored 16 previously constructed projects. Fourteen of these projects required the preparation of yearly monitoring reports that were submitted to regulatory agencies (the King County Department of Development and Environmental Services, the Washington State Department of Fish and Wildlife, and the US Army Corps of Engineers) in compliance with permit conditions. Three reports were *final* reports.

SUMMARY

CIP Highlights
The CIP Section constructed 5 large capital projects during 2004, at a cost of $1.16 million, and plans to construct 9 large capital projects in 2005.

Program Highlights
The DHI Program constructed 4 projects in 2004, at a cost of $350,000, and plans to construct 2 projects in 2005. The RROE Program constructed 3 projects in 2004, at a cost of $240,000, and plans to construct 2 projects in 2005. The SHRP Program constructed 29 projects in 2004, at a cost of $391,000, and plans to construct 50 projects in 2005.

OPERATIONS AND MAINTENANCE

Department of Transportation, Road Maintenance Division

The year 2004 saw continued efforts to improve the Road Maintenance Program to address salmonid impacts. A detailed report on these efforts is provided in the Appendix. The Appendix also contains a table showing detailing the combined Roads and Water and Land Resources Operations and Maintenance program for stormwater control facilities during the permit term.

Department of Natural Resources, Parks Division

Parks reduced water consumption in 2004 by continuing to employ the conservation measures adopted during the drought year of 2001. Due to the low snowfall during the 2004-2005 winter, Parks is expecting that it will have to increase conservation measures beyond those identified in the 2001 plan.

Parks manages over 25,000 acres of land and over 200 parks. In addition,
Parks has hundreds of miles of trails. Maintenance activities include replacing culverts, cleaning and reestablishing ditches, cleaning storm water structures, controlling non-native vegetation, etc.

Parks completed the development of a stormwater facilities inventory in 2004. Parks has developed stormwater inspections plans for each of its sites. Parks is expecting to expand stormwater maintenance inspections during 2005.

In 2005, Parks will expand its Stormwater Employee Awareness training program.

In 2004, Parks revised its Best Management Practices manual. The manual includes sections on small construction site erosion and sedimentation control practices, integrated pest management (IPM), irrigation, and other Parks Dept. day-to- day operations that may influence stormwater.

In 2004 and 2005, Parks will continue 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.

In 2004, Parks initiated recycling of household batteries and fluorescent lamps as part of its hazardous waste management program.

In 2004 and early 2005, Parks updated its Emergency Response Plan. The emergency response plan provides guidance for employees in the event of natural disaster, a hazardous material release, and other significant events such as terrorism or weapon of mass destruction (WMD).

In 2005, as part of the KC Roads NPDES permit requirement; Parks has initiated stormwater site inspections, training, and BMP implementation for its Renton Shop facility. The Renton Shop property is owned by KC Roads and therefore falls under the KC Roads NPDES permit.

PUBLIC INVOLVEMENT AND TRAINING ACTIVITIES

Department of Natural Resources and Parks

Since 1998, the King County Department of Natural Resources and Parks 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 Survey is included in the Appendix

Water and Land Resources Division

Public Involvement Program

Public outreach messages and activities continue to educate and involve citizens on issues of 5watershed and salmon health and water quality.

Volunteers Program

In 2004, 231 volunteer **planting and restoration events** were completed on King County Parks and Natural Lands. More than 4,365 volunteers provided over 25,394 volunteer hours to restoration projects and trail work . Volunteers planted over 8,600 native trees and shrubs at 14 King County sites and potted more than 25,000 tree and shrub seedlings to be used at future plantings. Planting new sites and maintaining existing plantings (by removing invasive plants and other work) helps prevent erosion, improve water quality and protect salmon habitat.

Native plant salvage events

The **Native Plant Salvage** program, now in its 12th year, reuses native plants from sites slated for development. Plants are nurtured for a year at the King County Native Plant holding facility before being replanted at important habitat restoration sites around King County. In 2004, 553 volunteers salvaged more than 10,900 plants worth at least $65,000. Learn more about salvaging and the naturescaping program described below at: http://dnr.metrokc.gov/wlr/pi/salopps.htm

165 volunteers participated as **Salmon Watchers**, noting the presence or absence of salmon species in numerous streams and rivers in King County.

In the lakes program, 97 volunteers participated as **lake monitors**, measuring water quality, lake level, clarity and temperature on their home lakes. Five lake-related workshops and educational events attracted 149 lakeside residents. Click on http://dnr.metrokc.gov/wlr/waterres/smlakes/ for more about lake stewardship.

Storm drain kits contain all the materials needed for volunteers to stencil storm drains with the message "dump no waste/drains to stream" Nine **storm drain stencil kits** were checked out this year, as well as six car wash kits. Free Clean Water **car wash kits** keep soap and dirt out of the storm drain system (and our streams) by diverting washwater from charity carwashes to the sanitary sewer system, where it is treated.

Grants Program
The Water and Land Resources Division **awarded 53 grants** to support improvements to water quality and wildlife habitat. The Division awarded $1,296,615 of King County funds and brought in an additional $1,401,912 in matching funds. Visit http://dnr.metrokc.gov/wlr/pi/grants.htm for more information.

Public Information and Education Programs
During 2004, Lexi Taylor delivered to grades 3-12 her 1-hour *Water Quality – Who Needs It?* presentations on water quality, wastewater treatment and individual responsibility for a healthy environment. Lexi visited 29 schools, 71 classes and reached 2,130 students. Ray Eldridge gave presentations to similar age groups on *Groundwater – A Look Underground*, which explains our connection to groundwater and how we can protect it. Ray visited 33 elementary schools and reached 1,670 students and also participated in several community educational fairs.

With great beach weather and the lowest tides in 19 years, 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 sixth season of the program, a record 127 trained volunteers made a record 22,800 contacts. Working with Aquarium staff, 36 volunteer naturalists reached an additional 1,600 students and adults during school days at the beach. For more information about the Beach Naturalist program, visit http://dnr.metrokc.gov/wlr/pi/beach-naturalists.htm,

During the seventh season of the **Cedar River Naturalist** program, 50 dedicated volunteers spoke with 3,482 visitors to sites along the Cedar over six weekend dates in October and 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. Learn more at http://dnr.metrokc.gov/wlr/pi/cedar-river-journey.htm

To promote **naturescaping**, 16 workshops were presented to 625 people from Woodinville to Enumclaw in 2004. 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.

King County's **Programs for Educators** 2004-2005 School Year Edition booklet was also published and distributed, both in hard copy and on the web. It continues to serve as a valuable resource for environmental educators with updated listings of action projects, classroom programs, curricula, field trips, grants, Internet resources, newsletters, teacher workshops and videos. View it at http://www.metrokc.gov/dnrp/swd/education/documents/EduDir-2004.pdf

Spring and fall issues of **Downstream News** were mailed to about 11,000 volunteers, teachers and others, and four issues of the award-winning **Lake Steward** were mailed to 2,200 lakeside residents in the County. Both newsletters promoted opportunities and resources to learn about and protect habitat and water quality. The spring Downstream News highlighted the effects of global warming on Northwest land and water resources and reported on the decision halting pesticide use along salmon streams. Both publications are available on-line as well as in print versions. 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.

The **Living With Salmon in King County** brochure was completely rewritten, redesigned and reprinted in 2004. Its new layout gives prominence to "what you can do" to protect salmon. The brochure also covers the salmon life cycle, salmon species found in King County, the ESA status of King County's salmon and lists places to see and learn more about salmon in the County.

The **Wheels to Water** environmental school bus program reached 2,350 students on 110 field trips this year. This program, which provides free Metro bus transportation to water quality education sites throughout the County, received an EPA grant in September 2003 that helped fund the program to targeted schools through August 2004. For more information, visit http://dnr.metrokc.gov/WTD/wheelstowater/

WLR 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 MasterGardeners 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.

Lake Stewardship Program

- In 2004, the Lake Stewardship Program trained and supported over 100 citizen lake monitors on 53 small lakes plus Lake Sammamish and Lake Union for sampling and recording water quality and quantity information.
- The **2003 Lake Monitoring Report** was in production but not completed by the end of 2004 – written, edited and designed in-house. Water quality and quantity data for 51

county lakes were collected by the Program's Volunteer Lake Monitors and analyzed by Program staff for the report. The report will be made available on-line as a pdf file. Hard copies of the report, the ninth in a series, will be distributed in 2005 to libraries, cities and volunteers. http://dnr.metrokc.gov/wlr/waterres/smlakes/

- Two public workshops and an open house were offered: a spring workshop on natural yard care, an early summer open house on noxious weed identification, and a fall workshop on the steps involved in forming community groups and Lake Management Districts.
- Technical assistance was provided in over 225 instances to lakeside residents and local jurisdictions, addressing water quality issues and protection activities.
- More than 20 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 Lake Steward**, the program's newsletter – produced entirely in-house – was distributed to approximately 2,300 lakeside residents and interested citizens each quarter. The newsletter provides information on a variety of water quality protection and enhancement activities, as well current reports on small lakes water quality data. The newsletter won first place for excellence in a national communications group contest. Copies were made available as downloadable pdf files on the website: http://dnr.metrokc.gov/wlr/waterres/smlakes/news.htm
- 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.
- Program staff gave a presentation on the County's involvement in the *Hydrilla* eradication project at the 2004 annual Western Aquatic Plant Management Society annual meeting held in Bellevue.
- Projects involving Lake Hicks (Garrett) trained 4th through 8th graders at White Center Heights Elementary and Cascade Middle School to do Level I monitoring on the lake, and worked with King County Parks and local community groups to replant native vegetation along the shoreline and remove noxious weeds from the park.
- Summer water quality monitoring of Lake Hicks (Garrett) was carried out, preparatory to producing an Integrated Phosphorus Management Plan required for an NPDES permit for alum treatment to be carried out in 2005 and to support King County Capital Improvement Projects in the watershed.
- The Program worked with citizens from North Lake to produce an Integrated Aquatic Plant Management Plan and to apply for grants to eradicate or control four different noxious weeds found in the lake and nearshore environments.
- The Program continued to work with the community at Spring Lake in 2004 to treat noxious aquatic weeds and to monitor the effectiveness of the milfoil control work done in 2003.
- Interim monitoring of Beaver Lake inlets and production of a biannual newsletter for the Beaver Lake Management District was performed through an ILA with the city of Sammamish

- The program continued to follow up on a special project started ten years ago in the Cottage Lake inlet streams. Special water quality monitoring was done to see if management changes along the streams have had an effect on water quality. This work helped supplement the design of the phosphorus TMDL on Cottage Lake.
- 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 application for funds available under the Centennial Clean Water Fund was submitted to Ecology in November 2004.
- **Fifty Ways to Love Your Lake** – a small poster detailing ways citizens can care for the lakes in their watershed – was created and distributed at workshops and community meetings.
- The Program's extensive Web site was updated frequently in 2004 to include timely information on workshops, training, new publications, photos, lake-related events and news, and emerging lake-related issues. Go to: http://dnr.metrokc.gov/wlr/waterres/smlakes/
- Program staff 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.
- Program staff served as technical advisors on Maple Valley's aquatic weed removal project and Plan update.
- Staff served on the Board as members and execitve officers of the Washington Lakes Protective Association. Two Program staff gave presentations on their work at 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 programs:

Green Gardening

The Green Gardening Program was conducted by the City of Seattle in 2004.

Schools Program

In 2004, the LHWMP Household Hazardous Waste School Program saw ~5500 students (grades 4-12) and their 121 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.

General outreach

Distributed 25,000 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.

Home Buyers Education

In 2004, we directly reached 47,000 new homebuyers in King County with information about proper disposal of household hazardous waste, including paint, pesticides, motor oil and other products that could end up going down the drain.

Natural Yard Care

Since 1997 the Natural Lawn Care Program, a cooperative effort with King County Department of Natural Resources, Seattle Public Utilities and other public agencies, has used advertising, media events, brochures, community outreach and other methods to encourage people to change their lawn care methods. Natural lawn care methods will mean reduced use of pesticides, fertilizers and water, and reduction of contaminated runoff and solid waste.

For the last four years, the Natural Yard Care Neighborhoods program has been using a community-based social marketing approach to target individual communities, train them in the techniques of natural yard care, and let them spread the word. It has been very successful at a fraction of the previous cost and is holding awareness levels high while changing the behaviors of nearly everyone who takes the training. Eleven neighborhoods were trained in 2004.

The Natural Yard Care program also maintains a website that includes much of the information provided by its print and other media materials. Find it at http://www.govlink.org/hazwaste/house/yard/.

Groundwater Program

Classroom Presentations

During classroom style presentations, the Groundwater Education Program provides students with the knowledge and skills they need to make informed decisions and behavior changes aimed at increasing the quality and quantity of groundwater.

Students are engaged in interactive classroom activities on the water cycle and groundwater conservation and protection and a home water use inventory/audit.

In 2004, 1670 students received the classroom Groundwater Program presentation. This included 12 districts, 33 elementary schools.

Public Outreach

Public and adult outreach is accomplished primarily through informational booths at community and environmental fairs with the dissemination of materials and discussion of our exhibits and displays. At these festivals and fairs, interactive exhibits in the booth allow attendants the

opportunity to discuss groundwater with community members. A large groundwater model is used to show the relationship of those of us above the ground to the water below the ground. Citizens can also be directed to other resources to develop a positive attitude toward this resource.

The Groundwater Program had a presence at the following community fairs/festivals:
- Vashon Strawberry Festival
- Alpine Days (North Bend)
- Snoqualmie Railroad Days
- Issaquah Salmon Days

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 acreage to insure compliance with current regulations and model land management practices. Employees attended the following list of courses in 2004.

- Pesticide Applicators Re-certification - 18 employees (16 hours each)
- Dangerous Waste Management – 2 employees
- Stormwater Conference – 1 employee
- Renton Aquifer Training – 25 employees

In 2005, several employees will obtain re-certification as Construction Site Erosion and Sediment Control Lead. This is a new requirement of the new 2005 King County Stormwater Manual for large construction projects. Additional employees are currently being identified to obtain the certification during 2005.

Other Parks Activities to Benefit Water Resources

Parks reduced water consumption in 2003 by still employing the conservation measures adopted during the drought year of 2001.

Parks manages over 25,000 acres of land and over 200 parks. In addition,
Parks has hundreds of miles of trails. Maintenance activities include replacing culverts, cleaning and reestablishing ditches, cleaning storm water structures, controlling non-native vegetation, etc. Parks inventoried its stormwater quantity and treatment facilities and provided the data to DNRP during. During 2003, Parks started the development of a stormwater system maintenance and inspection program. The activity began with constructing accurate drawings of existing Parks stormwater systems. Parks is expecting to initiate maintenance inspections during 2004.

In 2004, Parks is expected to initiate Stormwater Employee Awareness training program.

In 2004, Parks is planning to revise the 2002 Best Management Practices manual. The manual includes sections on small construction site erosion and sedimentation control practices, Integrated Pest Management (IPM), irrigation, and other Parks Dept. day-to- day operations that may influence stormwater.

During 2003, Parks initiated surveying (using GPS) of the former logging roads and trails within Taylor Mountain Park. This activity was completed in March 2004. As part of The Fish and Forest Practices Act the long-term plan is to remove any unneeded roads and trial thus restoring natural habitat.

Department of Executive Services

The Environmental Purchasing Program, of the King County Procurement & Contract Services Section, produces periodic (about once a month) 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 bulletin is included in the Appendix and can be accessed at http://www.metrokc.gov/procure/green/bul85.htm and http://www.metrokc.gov/procure/green/bul87.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 Integrated Pest Management (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 weeds and using mechanical tools such as flame weeders, weed wrench's 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 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 continued to research and provide information on local training opportunities.
- Continued efforts to make changes in contract language for contractors working on county property. The county hopes this will reduce pesticide use over time as contracts are renewed.
- Continued the process of reviewing requests to use Tier 1 products for the control of noxious weeds.

Other Compliance Activities

In addition to the documents described above, the Appendix to this report also 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 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 primarily focus 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/m^3. Concentrations of chlorophyll-*a* $\leq$ 2.8 mg/m^3 historically resulted in summer average Secchi disk transparency of $\geq$ 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 2004 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 seven years the annual mean VWTP at the south

mid-lake sampling station (0612) has ranged from a low of 14 µg/L in 1998 to a high of 21 in 2004 (Table 1). Annual mean VWTP at the north mid-lake sampling station (0611) were a bit higher with a range of 15 µg/L (1998) to 23µg/L in 2004. Higher concentrations in 2004 are a result of higher concentrations building up in the hypolimnion during the long period of stratification. Volume weighted hypolimnetic total phosphorus concentrations were 49 µg/L at the northern station 0611 and 38 µg/L at the southern station 0612. Lower values at the southern station are likely due to the influence of Issaquah Creek.

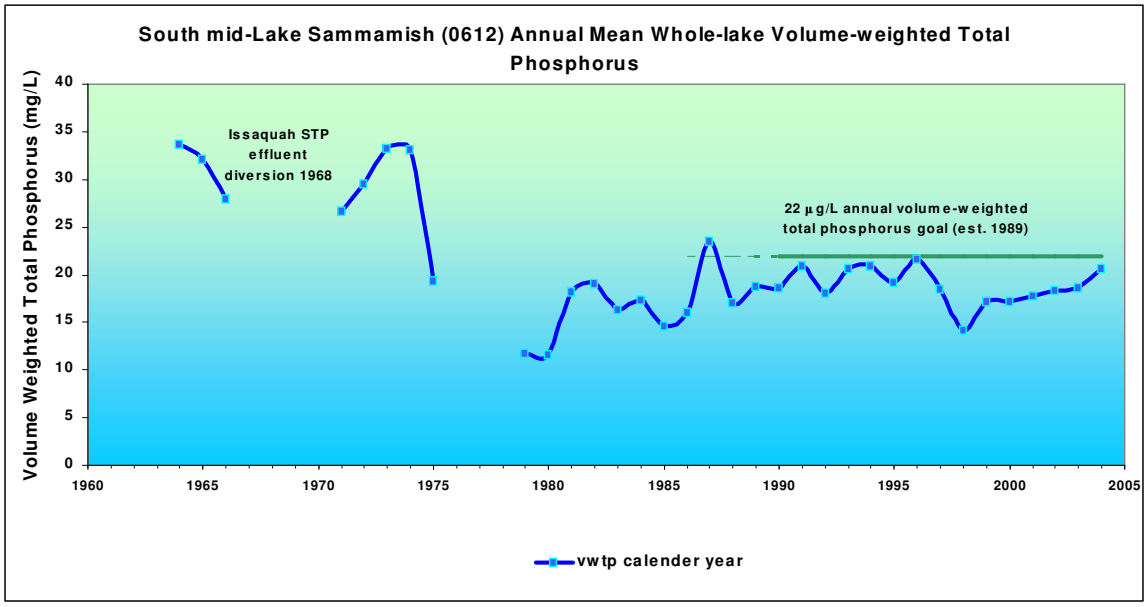
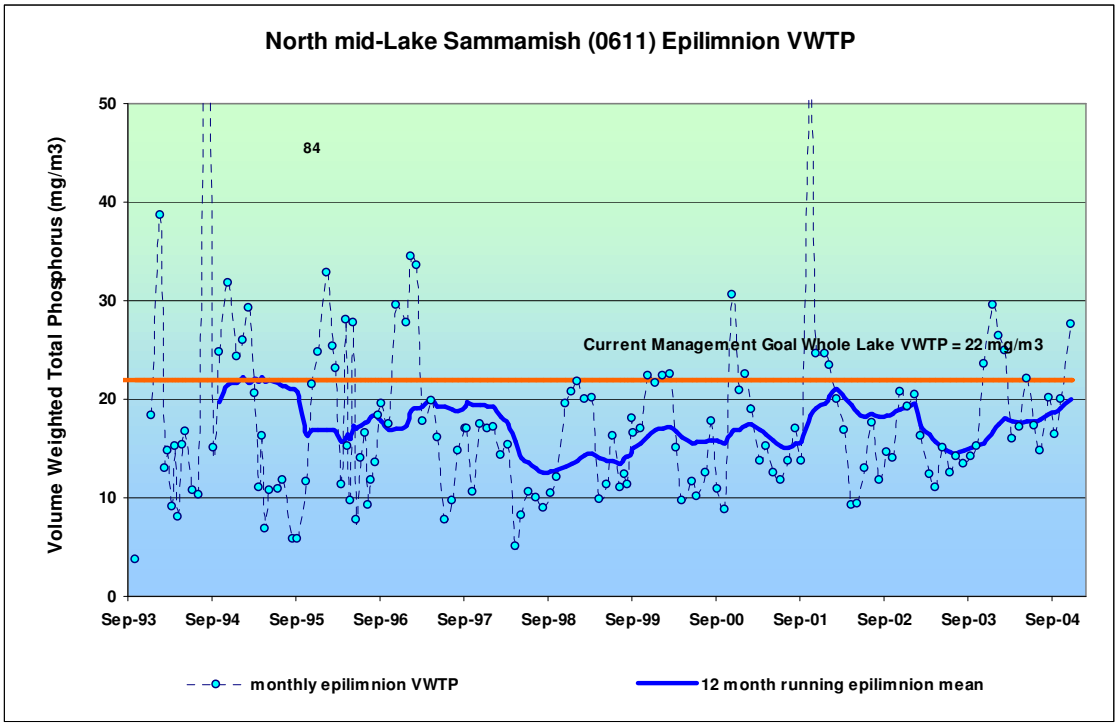


Figure 1. Mean annual volume weighted total phosphorus (VWTP) concentrations at the south mid-lake sampling station (0612).

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.



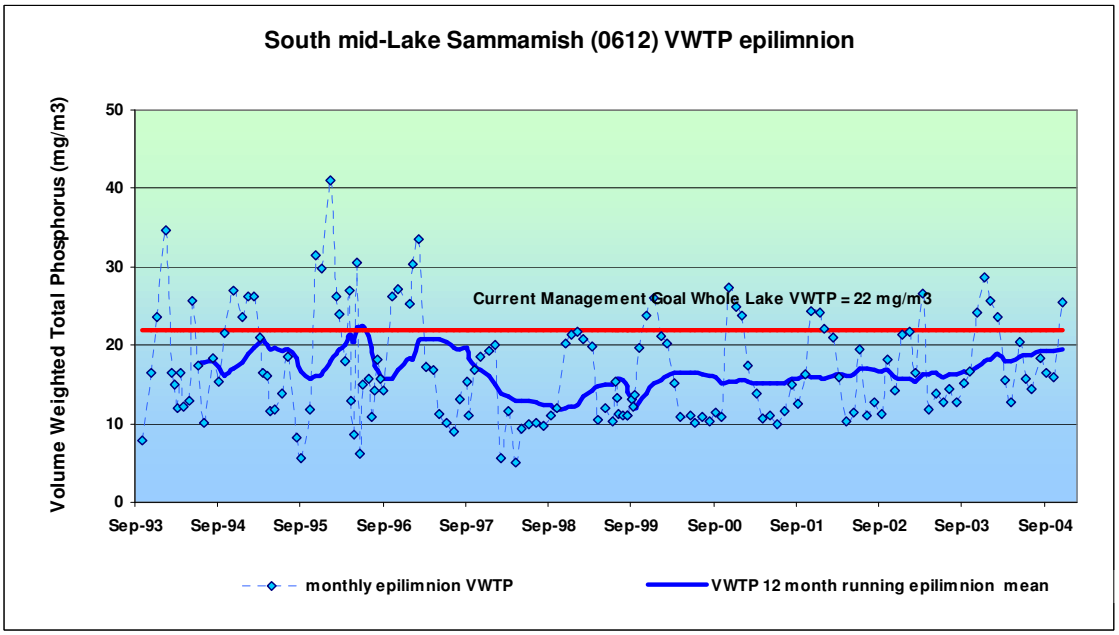


Figure 2. The dashed lines indicate monthly epilimnion VWTP concentrations for north and south lake for 0612 (diamonds) and 0611 (circles). The solid line is a 12-month VWTP running mean for the epilimnion. A running mean de-seasonalizes data to show long-term trends. During winter mixed conditions, 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/m^3, while in all other years the summer mean chlorophyll-*a* concentrations exceeded the goals (Table 1). Secchi disk transparency for all six 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-*a* (mg/m^3) June-Sept	Summer Secchi Depth (meters) June-Sept
Goals*	≤ 22		≤ 2.8	≥ 4.0
1998	15	10	2.7	5.7
1999	18	12	3.6	4.2
2000	18	11	4.0	4.6
2001	19	12	2.5	6.8
2002	19	14	3.0	5.1
2003	19	13	3.3	5.7
2004	21	17	3.3	5.2

Station 611	Mean Annual Whole Lake Volume Weighted Total Phosphorus (ug/L) Calender year	Mean Summer Epilimnetic Total Phosphorus (ug/L) June-Sept	Summer Chlorophyll-*a* (mg/m^3) June-Sept	Summer Secchi Depth (meters) June-Sept
Goals*	≤ 22		≤ 2.8	≥ 4.0
1998	15	9	2.3	6.3

1999	19	13	3.9	4.0
2000	17	13	4.5	4.8
2001	20	14	2.7	6.2
2002	18	13	3.1	4.6
2003	17	14	3.4	5.4
2004	23	19	3.7	5.0

*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, and 2004 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 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 summer of 2003 was one 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.

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/m^3 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 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, or 2004. 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. Microcystin concentrations in 2003 were all at or near detection. In 2004 there were a few samples with measurable concentrations of microcystins, though concentrations were still very low (e.g., < 0.25 µg/L) (Figure 3).

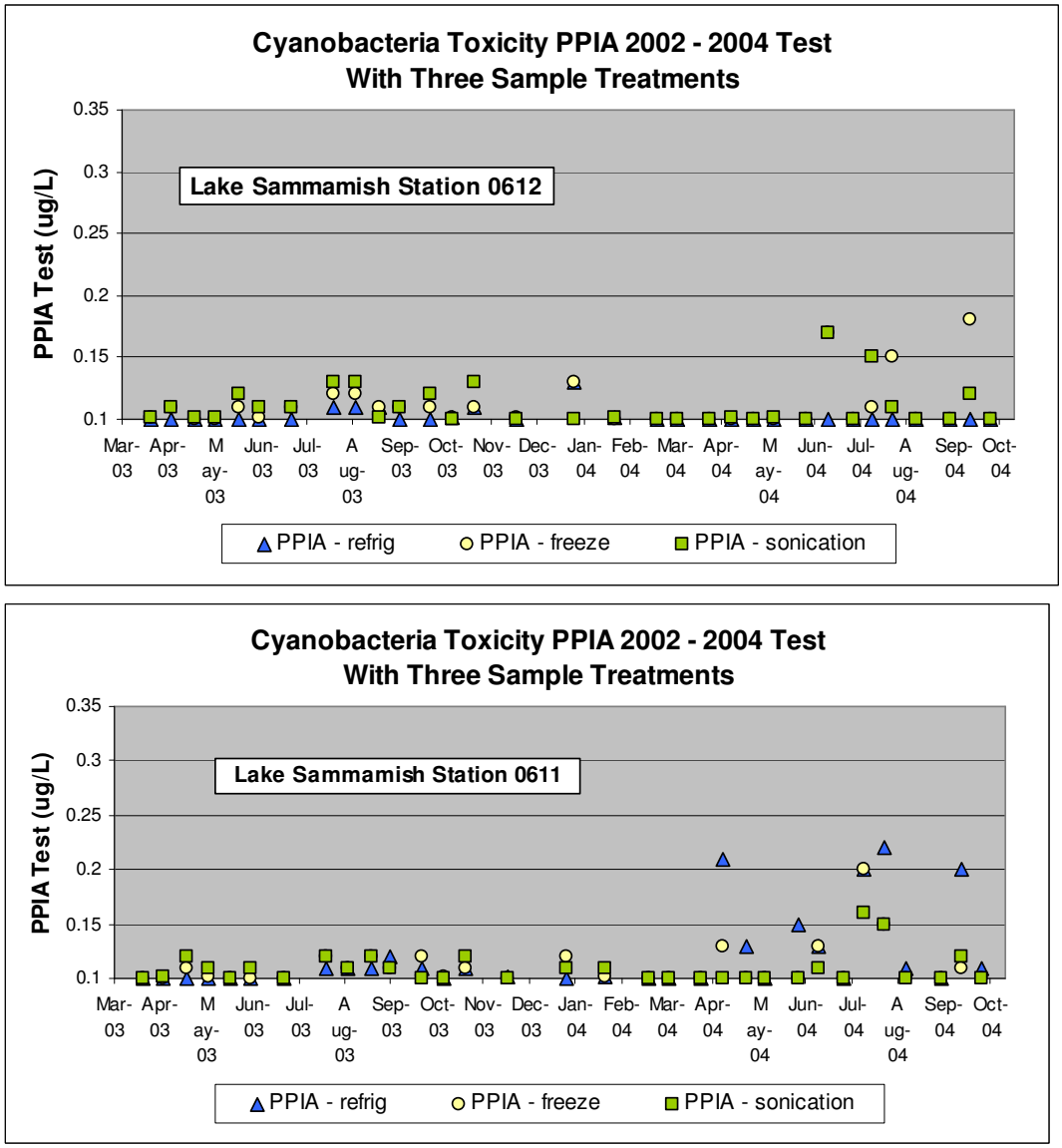


Figure 3. Microcystin concentrations measured at the north (0611) and south (0612) stations in Lake Sammamish in 2003 and 2004.

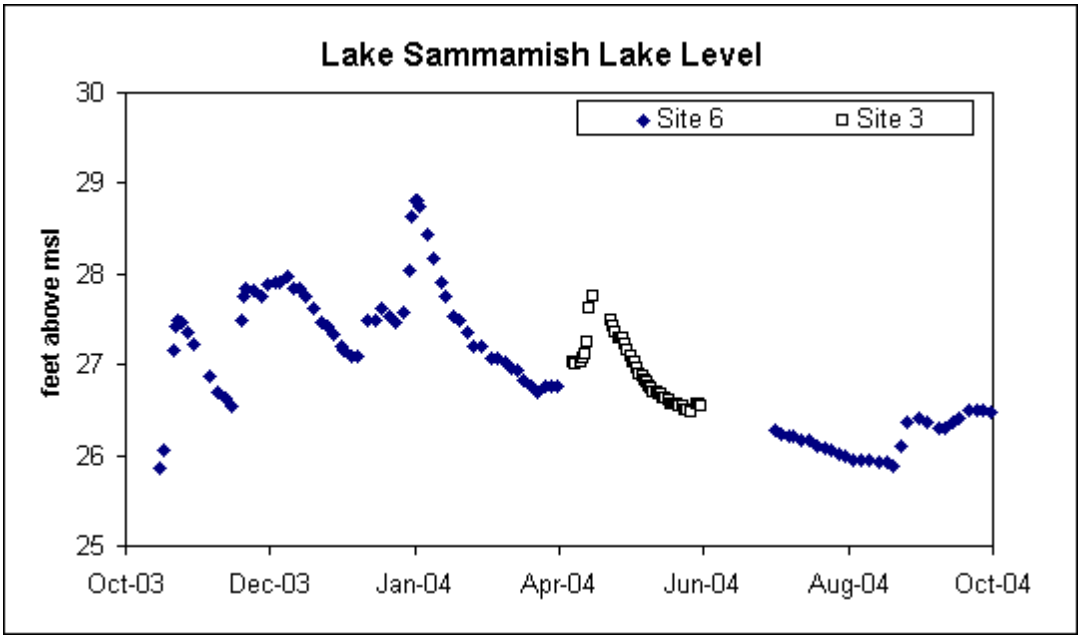
In 1998 it was hypothesized that *el Niño* was influential in the excellent summer water quality. Summer primary productivity is dependent on addition of phosphorus to the stable upper photic zone of the lake (i.e., epilimnion) by a combination of external loading during storm events and internal loading 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, and 2003 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. The winter and spring of 2004-5 has been one of the warmest and driest on record, it remains to be seen if the low phosphorus concentrations observed in 1998 will be repeated, or if another pattern develops.

Large Lakes 2004 Volunteer Program Summary

Volunteers have 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*. These data augment data previously collected at seven sites on Lake Sammamish by the County through the Major Lakes Ambient Monitoring Program. In 2004, a volunteer living on Lake Union also contributed information. Parameters monitored by volunteers include lake level, precipitation, Secchi disk measurements, and water temperature. The volunteers monitor Secchi depth and temperature from their docks. Volunteers also collected lake use information including the presence of boats, swimmers, birds, wildlife, and algal blooms. The program was discontinued before the end of the year due to lack of funding.



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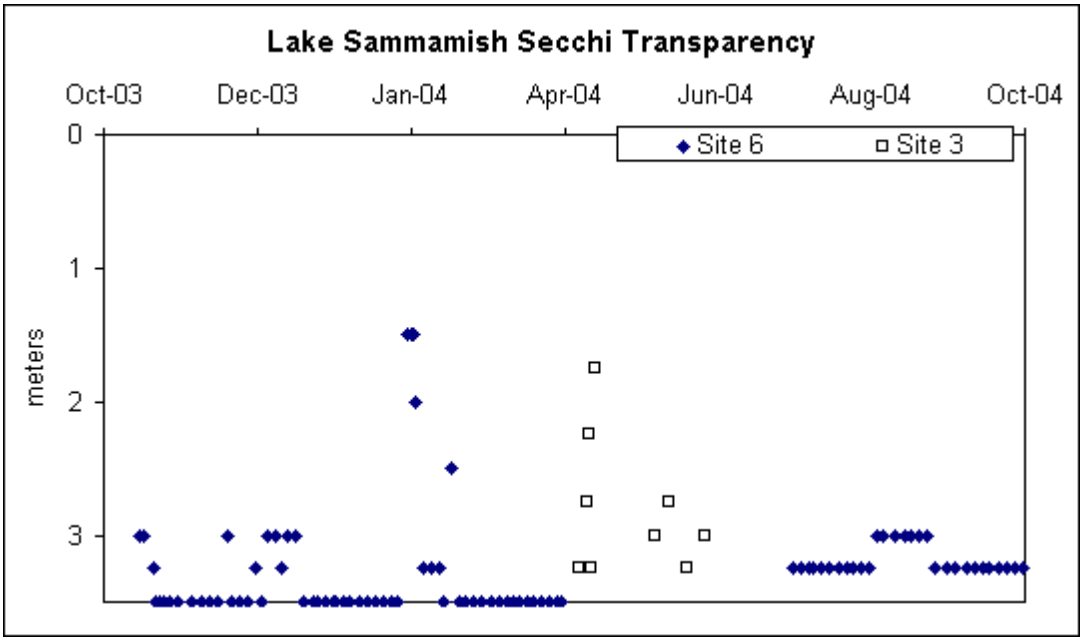

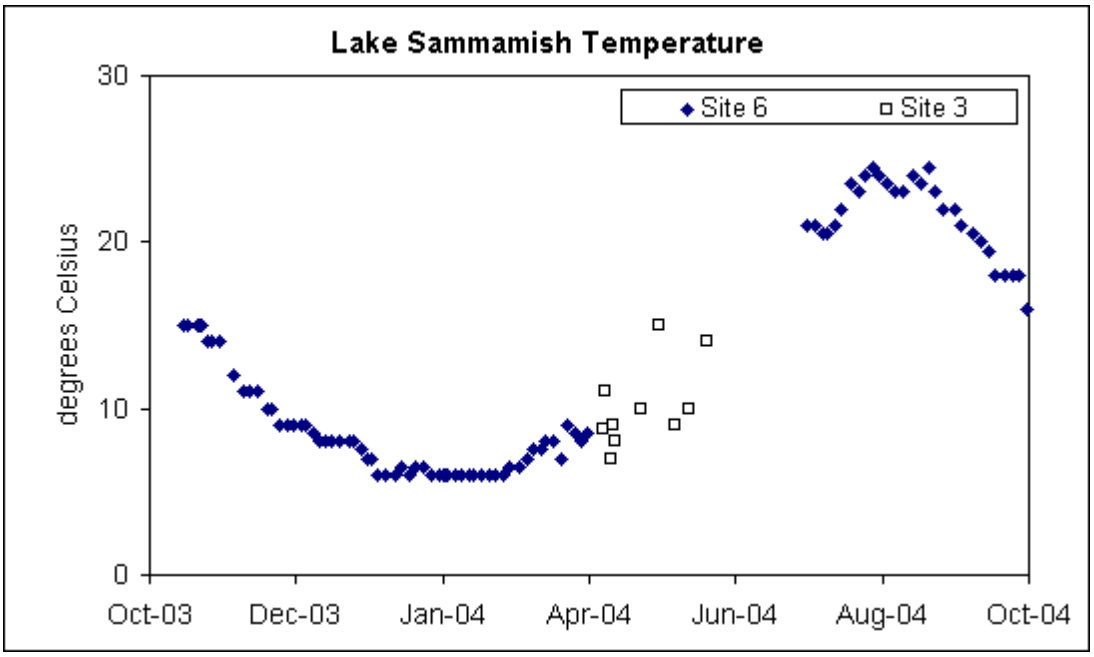

Beach Monitoring Program

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. 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 at nearly all the beaches monitored were within acceptable ranges and did not warrant swimming beach closures. Matthews Beach in the City of Seattle and Meydenbauer Bay Beach were the only beaches closed during the summer of 2004. Matthews Beach was closed due to high bacteria stormwater inflow from Thornton Creek and was reopened after the streamflow deminished. The bacterial monitoring at Meydenbauer Bay Beach detected a previously unknown sewer line break immediately adjacent to the swimming area in the park. This beach was reopened after emergency sewerline repairs carried out by the City of Bellevue.

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

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” according to 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 2004 and are planned for 2005. 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 2004. There are not sufficient resources to perform these surveys in 2005 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 2004 and is planned for these waterbodies in 2005. 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 and are not planned for 2005. King County biologists did continue to monitor water quality in 2004 in Soos, Bear, and Issaquah Creeks, East Lake Sammamish, and the Cedar River, and plan to conduct water quality monitoring in these waterbodies in 2005.

Although benthic macroinvertebrate monitoring has taken place in the past at sites in Bear Creek, Soos Creek, Cedar River, Issaquah Creek, and in Shinglemill Creek on Vashon Island, these sites were not monitored in 2004 because of lack of funding and staff. However, benthic macroinvertebrate monitoring is planned for 2005.

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 2004, and is planned for 2005. Wetland monitoring activities at the UPDs include vegetation and amphibian surveys. However, wetland monitoring did not take place in 2004 and is not planned for 2005 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 2003, King County implemented the Lake Sammamish Management Program as follows:

1. Forest Conservation Program – This program was integrated into the King County forestry program and will continue to be implemented by the County's Department of

Natural Resources, Resource Lands Section, and the Department of Development and Environmental Services. 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 2004.

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 King County Surface Water Design Manual. 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 study was published and a new scope of work was developed for the unexpended grant funds. The new scope of work outlines a process to determine the treatment effectiveness of water quality facilities in the Lake Sammamish basin built in compliance with the Lake Protection Standards. The study will be completed in early April, 2005. Their phosphorous removal goal is implemented through stormwater treatment facilities, including wetponds and sand filters and the study will try to determine if these treatment facilities actually achieve the goal.

6. Public Ownership and Shoreline Access – King County has purchased and is developing the East Lake Sammamish Trail. Portions of the interim trail on the former railbed have been developed recently in the Cities of Redmond and Issaquah. The County is currently in the process of obtaining a permit to construct the interim trail within the City of Sammamish. The interim sections in Issaquah and Redmond opened in March 2004. King County, the King County Land Trust, and citizens continue to evaluate other possible shoreline parcel acquisitions in conjunction with the 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. Three are now under the jurisdiction of the City of Issaquah (Kelly Ranch, and the Bianca and Interpace Mines). 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 fifth year and all jurisdictions are continuing to participate.

In WRIA 7, the final version of the Snohomish Basin Near Term Action Agenda (NTAA) was approved in 2001, which included guidance for local governments in updating local policies and regulations while a more detailed salmon conservation plan is developed. In 2002, the joint review of local planning policies and regulations was completed. In addition, the Forum approved a proposal to develop model language for jurisdictions that would meet the guidance of the NTAA. In addition, scoping and workplan development for the Multi-Species Salmon Conservation Plan was completed in 2002. The WRIA 7 is complete and is currently being considered for ratification by local Councils.

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 as well as work on the Strategic Assessment. The Strategic Assessment will provide 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 WRIA 8 Plan is completed and a draft is being reviewed by the WRIA 8 Forum. Forum review will be completed Spring 2005 and local ratification will follow.

The draft Near Term Action Agenda for WRIA 9 was completed at the end of 2001 and is based on findings in the WRIA 9 Reconnaissance Report. As with the other NTAAs, it contains actions that can be taken in the next 2-3 years while more detailed conservation planning is underway. In 2002, work on the Strategic Assessment proceeded the detailed scoping and workplan for the Comprehensive Salmon Conservation Plan was completed. In 2003 and 2004, work on the Strategic Assessment was completed. The WRIA 9 plan is in public review with the plan scheduled to go to the WRIA 9 Forum in July 2005. Local ratification is scheduled for Fall 2005.

While not part of the ILA structure, King County continues to participate in planning for WRIA 10 under Pierce County's lead. The WRIA-10 group completed its recovery plan in September

2003. The plan 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.

CONCLUSION

The County's SWMP continues substantially as planned and disclosed in our approved submittal, although the emphasis of our management activities has shifted to addressing threats to the survival of salmonids and to making the water quality improvements (including improved habitat elements--not just water chemistry) necessary to assure that salmonids can thrive in our waters.