

1 3-2-98  
WJ:dmsC24  
2 CLERK 3/5/98

3 MOTION NO. **10455**

4 A MOTION relating to the Lakes and Streams Monitoring  
5 Program; accepting the 1998 Lakes and Streams Monitoring  
6 Program prepared by the Water and Land Resources Division;  
7 and authorizing the King County Executive to implement the  
8 1998 Lakes and Streams Monitoring Program in order to  
9 continue to provide County policy makers with the water quality  
10 information necessary to develop sound decisions to ensure the  
11 quality of life for this region.

12 WHEREAS, the King County council adopted the 1998 Budget Ordinance 12926,  
13 Section 73, directing the Lakes and Streams Monitoring Program to remain at current 1997  
14 program and staffing levels and requiring the King County executive to submit a revised lakes  
15 and streams monitoring program no later than March 1, 1998, and

16 WHEREAS, the King County executive has submitted to the King County council the  
17 1998 Lakes and Streams Monitoring Program, which responds to the council's concerns by:

- 18 • Redesigning the integrated Stormwater and Wastewater Lakes and Streams monitoring  
19 to support the Fresh Water portion of the Water Quality Assessment Predictive Model;
- 20 • Including \$80,000 of Wastewater operating funds for Special Investigations related to  
21 Wastewater operations in lakes and streams; and
- 22 • Using Surface Water Management fund savings by this reallocation to reinstate non-  
23 Wastewater related programs to support the Surface Water Management Program at the  
24 1997 level, and

25 WHEREAS, the 1998 Lakes and Streams Monitoring Program includes further  
development of a water quality assessment predictive model, provisions for monitoring major  
lakes and ambient streams, assessing water quality at swimming beaches, and for special

1 investigations of unforeseen, short-term, or emergency water quality events (such as fish kills  
2 or toxic algae blooms) in the wastewater service area. The 1998 Lakes and Streams  
3 Monitoring Program also includes Water Resource Monitoring, Watershed-Specific  
4 Monitoring, Water Resource Project-Specific Monitoring and Small Lakes Volunteer  
5 Monitoring;

6 NOW THEREFORE, BE IT MOVED by the Council of King County:

7 The King County executive is authorized to implement the 1998 Lakes and Streams  
8 Monitoring Program, in substantially the same form as attached, for the purpose of continuing  
9 to provide the citizens of King County and their policy makers with water quality information  
10 necessary to develop sound decisions to ensure the quality of life in this region.

11 PASSED by a vote of 13 to 0 this 18<sup>th</sup> day of

12 May, 19 98.

13 KING COUNTY COUNCIL  
14 KING COUNTY, WASHINGTON

15 *Louise Miller*  
16 Chair

17 ATTEST:

18  
19 *J. Jensen*

20 Clerk of the Council

21 Attachments:

22 1998 Lakes and Streams Monitoring Program  
23  
24  
25

98-179

**10455**

**1998 LAKES & STREAMS MONITORING**  
**PROPOSED PROGRAM**

**King County Department of Natural Resources**  
Water and Land Resources Division  
March 1, 1998



King County Executive  
**RON SIMS**

March 2, 1998

The Honorable Louise Miller  
Chair, King County Council  
Room 1200  
C O U R T H O U S E

Dear Councilmember Miller:

I am pleased to transmit to you the recommendations for the 1998 Lakes and Streams Monitoring Program in the Water and Land Resources Division (WLR) as the final step in responding to a proviso attached to the 1998 Adopted Budget for this program. This Budget Proviso directed the Division to reinstate reductions made to the existing Lakes and Streams Monitoring Programs until a new monitoring program proposal had been completed and presented to the Council for approval by March 2, 1998. This transmittal contains the recommended program for 1998 and fulfills the requirements of the Proviso.

This proposal accomplishes the Proviso directive by:

1. Redesigning the integrated Surface Water and Wastewater Lakes and Streams monitoring to start the second phase support of the Fresh Water portion of the Water Quality Assessment Predictive Model being developed as part of Regional Wastewater Services Plan (RWSP);
2. Including \$80K of Wastewater operating funds for Special Investigations related to Wastewater operations in the Lakes and Streams (formerly called Trouble Call); and
3. Using Surface Water fund savings by this reallocation for Model support to reinstate non-Model (non-Wastewater) related programs to support the Surface Water Program at the level of the 1997 program.

A historic summary of the evolution of the Lakes and Streams Monitoring Program and an inventory of all monitoring programs taking place in King County were included in the previously proposed 1998 Lakes and Monitoring Program Packet distributed to Council members as part of the original 1998 Budget Proposal from the King County Executive.

This transmittal includes the following information:

- A summary of the overall response to the Budget Proviso (this cover letter);
- Summary of Proposed Revisions in the Lakes and Streams Monitoring Program (Table 1);
- Summary of Monitoring Program activities 1997 compared to 1998.(Table 2);
- Comparison maps of the 1996/97 and proposed 1998 Lakes and Streams Monitoring Programs (Appendix A);\*
- Description of the Major Lakes Monitoring Program, Ambient Streams Monitoring Program, Small Lakes Monitoring Program, and Water Resource Monitoring Program (Appendix A);\*
- A Draft Council Motion approving this recommended monitoring program.

The following provides a summary of the major components of the proposed revised program:

#### **Water Quality Assessment Predictive Model**

This new proposal for the Lakes and Streams monitoring program has been developed to provide additional support and information to the Wastewater Programs for the formulation, calibration, and validation of water quality assessment models that will evaluate the benefits and impacts of currently identified and future RWSP alternatives. These alternatives include options for the transport, treatment and discharge of additional wastewater flows, as well as potential reuse alternatives of that treated effluent. The work described in this proposal, for the most part, is the information that will be needed to determine and track baseline conditions during and after model development and the selection of wastewater treatment alternatives.

A majority of the Water Quality Assessment Model development and operation effort is funded by Wastewater Operating funds with a small percentage being funded by Wastewater Capital based on which work will likely be the ongoing operation of the model after initial development of the model. Although the work included in this Proviso provides initial support for development of the model, additional funding will be needed for development of this model over the next several years and is being developed as part of the Regional Wastewater Services Plan.

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\* These are intended to be inserted into their respective areas in the Lakes and Streams Inventory report that was transmitted to the Utilities and Natural Resources Committee at the end of March 1997. We designed the Inventory so that it could be revised and updated as needed and allow comparison of programs over time.

### Major Lakes

The proposed 1998 Major Lakes core monitoring program is essentially unchanged from the 1996-7 program and will provide sufficient data to manage these regional waters. This includes the location of 20 ambient stream sampling sites in the Cedar/Lake Washington and Sammamish watersheds, and an additional 10 in the Green-Duwamish watershed to monitor combined sewer overflows, pump stations, sewage pipes, and accidental overflows. The same data collected in this effort is also used to monitor the long-term environmental quality of these regional waters. The small increase in the program (approximately \$6,000 and 0.1 FTE—see Table 2) is recommended to address: (a) additional parameter analysis related to indirect reuse issues (b) additional north Lake Washington analysis to support RWSP, and (c) a significant backlog of lakes data analysis and report production. These reports provide basic data supporting water quality programs headed by the Wastewater Treatment Division and WLR watershed teams, as well as Seattle and the suburban cities.

### Ambient Streams

The recommended program is designed to monitor the larger streams in King County that can be impacted by the existing wastewater collection, conveyance and treatment system, and provide baseline data to assess impacts of the potential siting of new sewage transfer and treatment facilities. The stream program is very closely coordinated with the Large Lake Assessment Program and is used for the evaluation and differentiation of non-point source pollution and potential impacts of proposed wastewater facilities. Monitoring data from the stream influent to Lakes Sammamish and Washington are used to calculate nutrient and pollution loading to these lakes. These data are necessary for the development and operation of the proposed water quality assessment predictive modeling effort to describe in-lake water quality and to predict impacts from potential new sewage transfer and treatment facilities discharging to these waterbodies

Most of the stream sampling sites are located at the mouths of the streams, which is efficient in maximizing the geographic area monitored while minimizing the sampling costs and effort. The loss of information from reduced sampling in the upper portion of several watersheds will be off set by the new Special Investigations program. This program will provide an additional sampling effort that can be quickly applied in specific watersheds where water quality problems have been identified from the routine monitoring program.

### **Swimming Beach Assessment**

Bacteriological monitoring at public beaches on the large lakes will be continued. In addition to this, the monitoring of beaches where potential sewer-related impacts have been identified will continue, and remedial actions will be taken if necessary. Bacterial monitoring near sewer pipes and pump stations is recommended to continue at current levels, with no diminution in near-term or out-year programs. Although public health concerns at beaches are primarily the responsibility of the Health Department, DNR water quality monitoring programs will continue to work cooperatively with them to safeguard these resources.

### **Special Investigations**

The Special Investigations program is designed to address the water quality monitoring and analysis associated with unforeseen, short-term, or emergency events in the wastewater service area. This effort will evaluate the impacts of sewer spills and overflows on the surface waters, and impacts of transitory events such as fish kills and toxic alga blooms. Upkeep of spill response kits will be part of this effort. This program will also provide an additional sampling effort that can be quickly applied in specific watersheds where water quality problems have been identified from the routine monitoring program. In 1998, source tracking of bacterial contamination in the Juanita Beach area will be studied in an effort to control the high levels of bacteria identified in the routine lakes and streams and the beach monitoring programs.

### **Water Resource Monitoring**

The Water Resources Monitoring Program provides short and long-term evaluation of watershed health and watershed management efforts by collecting, synthesizing and evaluating physical, chemical and biological data coupled with landscape/land use data. The program provides requested policy, program and technical support services to County and state agencies; to identify regulations, programs, and capital projects that successfully protect aquatic resources from flooding and water quality/fish habitat degradation and to identify areas in need of remediation, protection or restoration. This program has six components: 1) water quantity - gauging and rainfall monitoring; 2) hydrologic modeling; 3) water quality (mostly stormwater sampling) monitoring; 3) macroinvertebrate and habitat monitoring; 4) fish monitoring; and 5) wetland monitoring.

### **Water Resource Monitoring (Cont.)**

Water Resources Monitoring will maintain core hydrological, ecological, water quality monitoring activities and analytical capabilities focused on unincorporated King County. A new focus for the program will be conducting work and providing monitoring data to evaluate the siting of a new Wastewater Treatment Plant and water-re-use alternatives. The Volunteer monitoring and stewardship, storm water monitoring, geological support, database maintenance and data distribution will be maintained with some re-arrangement in programs to reflect new priorities.

### **Watershed Specific Monitoring**

The purpose of the Watershed Specific Monitoring Program is to provide requested technical monitoring services to the Cedar/Lake Washington, Green, Sammamish, Snoqualmie and Puget Sound Watershed Teams and their cooperating agencies and jurisdictions; to evaluate the health of watersheds, water resources; to evaluate the success of watershed management planning and implementation activities; to identify regulations, programs, and capital projects that successfully protect aquatic resources from flooding and fish habitat degradation; and to identify areas in need of protection or restoration; and to provide volunteer monitoring data for cost effective management of watershed resources while educating citizens and volunteers about natural resources and fostering stewardship values.

The Watershed Specific Monitoring Program will maintain and enhance water quality, water quantity, habitat, biological and wetland monitoring activities and analytical capabilities focused on specific watersheds in unincorporated King County. A new focus for the program will be providing data from the Cedar, Green and Sammamish Watersheds for evaluating the siting of a new Wastewater Treatment Plant and water-re-use alternatives. Volunteer monitoring and stewardship, storm water monitoring, geological support, database maintenance and data distribution will be maintained with some re-arrangement in programs to reflect new priorities.

### **Water Resource - Project Specific Monitoring**

Project specific monitoring is composed of a variety of monitoring activities that evaluate the effectiveness of a specific program or project. These monitoring projects may be requested by the Division or Department and funding may be provided within or by outside organizations or agencies, from grants or staff may be loaned out to another group. Examples: 1) Hamm Creek Monitoring Project; 2) Agricultural Program Support; 3) Beaver Lake Support; 4) Master Planned Development Monitoring; 5) Capitol Improvement Projects.



The Honorable Louise Miller  
March 2, 1998  
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### **Water Resource - Project Specific Monitoring (Cont.)**

Monitoring that supports specific projects or programs will continue for projects that are still ongoing, for efforts that support other programs and for projects that provide revenues to support the monitoring.

### **Small Lakes Volunteer Monitoring Program**

The Small Lakes Volunteer Monitoring Program will remain at the 1997 level with the goal of monitoring the water quality of 43 small lakes throughout King County. Thirteen of these lakes are located in incorporated areas and therefore will be funded through Culver (Category III) funds. Any other apparent decrease in funding from 1997 levels is due to the inclusion of non-monitoring program elements in the 1997 budget figure. Small Lakes Volunteer Monitoring funding has remained status quo for 1998.

### **Conclusion:**

This program represents an additional integration and support emphasis above the 1996/7 level of effort. Some increases in workload are linked to the development of additional information necessary for assisting with decisions on implementation of RWSP recommendations.

In addition, recent developments in regional collaboration toward meeting surface water management needs indicate a consensus that some monitoring programs must be carried out on a regional basis to be effective for all the affected stakeholders. The new consolidated King County Government in the past has carried out much of this monitoring. We are challenged in our ability to design and implement the optimum program for Lakes and Streams monitoring that is needed for this region given constraints on available funding. Thus it is important to continue to foster a regional dialogue as to the roles, responsibilities, and ultimate funding of these more broad-based monitoring activities, especially on an ongoing basis.

The monitoring program recommended is designed to meet the mandate of the Council and Executive with a quality program which responds to our customers desires for good water quality within the budgets of the two funding utilities. The information developed by this program will continue to enable County policy makers to develop sound decisions to assure the quality of life for this region, and further national recognition of our protection of the region's environmental legacy.

The Honorable Louise Miller

March 2, 1998

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If you have questions or would like further clarification or a presentation of these recommendations, please contact Bob Swartz, Program Manager, Modeling Assessment and Analysis Unit, Water and Land Resources, at 206-296-8247.

Sincerely,

Ron Sims  
King County Executive

Enclosures

cc: King County Councilmembers  
ATTN: Steve Ohlenkamp, Chief of Staff  
Anne Norris, Clerk of the Council

1 2-13-98  
WJ:dmsC24

INTRODUCED BY \_\_\_\_\_

2 PROPOSED NO. \_\_\_\_\_

3  
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- 18 • Including \$80K of Wastewater operating funds for Special Investigations related to  
19 Wastewater operations in lakes and streams; and
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21 Wastewater related programs to support the Surface Water Management Program at the  
22 1997 level;

23 WHEREAS, the 1998 Lakes and Streams Monitoring Program includes further  
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25 lakes and ambient streams, assessing water quality at swimming beaches, and for special

1 investigations of unforeseen, short-term, or emergency water quality events (such as fish kills  
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5 Monitoring.

6 NOW THEREFORE, BE IT MOVED by the Council of King County:

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8 Monitoring Program, in substantially the same form as attached, for the purpose of continuing  
9 to provide the citizens of King County and their policy makers with water quality information  
10 necessary to develop sound decisions to ensure the quality of life in this region.

11 PASSED by a vote of \_\_\_\_\_ to \_\_\_\_\_ this \_\_\_\_\_ day of  
12 \_\_\_\_\_, 19\_\_\_\_.

13 KING COUNTY COUNCIL  
14 KING COUNTY, WASHINGTON

15 \_\_\_\_\_  
16 Chair

17 ATTEST:

18 \_\_\_\_\_  
19 Clerk of the Council

20 Attachments:  
21 1998 Lakes and Streams Monitoring Program  
22  
23  
24  
25

# Summary of Proposed Revisions in the Lakes and Streams Monitoring Program

## Table 1

### ***Water Quality Assessment Predictive Model***

This new proposal for the Lakes and Streams monitoring program has been developed to provide additional support and information to the Wastewater Programs for the formulation, calibration, and validation of water quality assessment models that will evaluate the benefits and impacts of currently identified and future RWSP alternatives. These alternatives include options for the transport, treatment and discharge of additional wastewater flows, as well as potential reuse alternatives of that treated effluent. The work described in this proposal, for the most part, is the information that will be needed to determine and track baseline conditions during and after model development and the selection of wastewater treatment alternatives.

#### *New Proposed 1998 Program:*

- New program element in 1998.
- Provide baseline data for preliminary development of a Predictive Model to evaluate RWSP alternatives.
- Identify additional parameters and sampling effort required to develop, implement, and operate the Predictive Model selected by the RWSP alternatives team.

### ***Major Lakes Monitoring***

The Major Lakes Monitoring program is designed to protect the significant investment in water quality improvement and protection made by the people of King County over the past 3 decades. The primary focus of this program is to detect any problems or failures associated with the conveyance and operation of the sewage treatment system, and to prevent any adverse impact on Lakes Washington, Union, and Sammamish.

#### *New Proposed 1998 Program:*

- Support development and on-going operation of freshwater water quality assessment model.
- Maintain long term trend monitoring stations in Lakes Sammamish, Washington and Union.
- Sewage spill response and reporting.
- Concentration of special efforts in the Kenmore/North Creek overflow project area
- Influent stream characterization.
- Wastewater Facility operation continuity verification and CSO impact evaluation.

#### *Summary of Changes from the 1997 Program:*

- All other program elements kept at the current levels.
- Addition of parameters associated with in-direct reuse.

### ***Ambient Streams Monitoring***

The Ambient Streams program is designed to monitor the larger streams in King County that can be potentially impacted by the wastewater collection, conveyance and treatment system. It is very closely coordinated with and supports the objectives of the Major Lake Assessment Program, including Water Quality Assessment.

#### *New Proposed 1998 Program:*

- Concentrate sample stations at sites adjacent to wastewater facilities and pipe crossings of streams.
- Sample mouths of streams entering into major lakes.
- Support of WQ Assessment modeling.

#### *Summary of Changes from 1997 Program:*

- Modifications are in support of in-direct reuse and water resource issues associated with WQ Assessment Model development.

### ***Swimming Beach Assessment***

The beach program is designed to locate specific sources of bacterial pollution that impact public swimming beaches in Lake Sammamish and Washington, so these pollution sources can be corrected. This project addresses a direct public health concern to citizens of the county. This information will provide baseline information for the evaluation of human health risks associated with potential water reuse or indirect potable water supply projects in Lakes Sammamish, Washington and Union and support the Water Quality Assessment modeling efforts.

#### *New Proposed 1998 Program*

- Provide current bacterial data to health and local park departments.
- Provide data for human and ecological risk assessment for the RWSP efforts.

#### *Summary of Changes from 1997 Program:*

- Program was planned to be eliminated in 1997 budget.

### ***Special Investigations***

This program is designed to address the water quality monitoring and analysis associated with unforeseen, short-term, or emergency events in the wastewater service area. This effort will evaluate the impacts of sewer spills and overflows in the surface waters, and events such as fish kill and toxic algae blooms.

#### *New Proposed 1998 Program*

- Response to short-term or unforeseen or emergency events in the service area.
- Provide additional effort in specified watersheds for support of Water Quality Assessment modeling.

***Water Resource Monitoring Program:***

The Water Resources Monitoring Program will maintain core hydrological, ecological, water quality monitoring activities and analytical capabilities focused on unincorporated King County. A new focus for the program will be conducting work and providing monitoring data to evaluate the siting of a new Wastewater Treatment Plant and water-re-use alternatives. Volunteer monitoring and stewardship, storm water monitoring, geological support, database maintenance and data distribution will be maintained with some re-arrangement in programs to reflect new priorities.

*New Proposed 1998 Program:*

- Core efforts increased to provide data to WTD
- Volunteer efforts focused on key information need to address priority issues, e.g., ESA and collaborative watershed efforts - RNA.
- Storm water and event-specific monitoring will be performed as needed via the Special Investigations Program.
- Geological support, database maintenance and data distribution / interpretation will be maintained and in some cases increased to address and evaluate human health and environmental risks, ecosystem health, ESA, NPDES permits, effluent discharges and water re-use alternatives, as well as used to develop new policies for water quality and quantity within the region.

*Summary of Changes from 1997 Program:*

- Core efforts increased to provide data to WTD
- Volunteer efforts focused on key information need to address priority issues, e.g., ESA and collaborative watershed efforts - RNA.
- Storm water and event-specific monitoring will be performed as needed via the Special Investigations Program.
- Geological support, database maintenance and data distribution / interpretation will be maintained and in some cases increased to address and evaluate human health and environmental risks, ecosystem health, ESA, NPDES permits, effluent discharges and water re-use alternatives, as well as used to develop new policies for water quality and quantity within the region.

***Watershed Specific Monitoring***

The Watershed Specific Monitoring Program will maintain and enhance water quality, water quantity, habitat, biological and wetland monitoring activities and analytical capabilities focused on specific watersheds in unincorporated King County. A new focus for the program will be providing data from the Cedar, Green and Sammamish Watersheds for evaluating the siting of a new Wastewater Treatment Plant and water-re-use alternatives. Volunteer monitoring and stewardship, storm water monitoring, geological support, database maintenance and data distribution will be maintained with some re-arrangement in programs to reflect new priorities.

## **Watershed Specific Monitoring (Cont.):**

### *New Proposed 1998 Program:*

- Provide information necessary within watersheds for Water Quality Assessment model.
- Maintain and enhance core hydrological, ecological water quality and analytical capabilities and monitoring array focused on unincorporated King County.
- Provide support for the Snoqualmie and Puget Sound Teams.
- Concentrate major part of support in unincorporated areas.
- Continue support of incorporated areas and instigate/encourage programmatic and budgetary partnerships in appropriate jurisdictions.

### *Summary of Changes from 1997 Program:*

- Maintain and enhance water quality, water quantity, habitat, biological and wetland monitoring in watersheds in unincorporated areas to support WTD in evaluating the siting of the Wastewater Treatment Plant and water re-use alternatives.
- Concentrate the major part of support in unincorporated areas, yet continue support in incorporated areas and initiate / encourage programmatic and budgetary partnerships in appropriate jurisdictions.
- Perform storm water and site-specific sampling via the Special Investigations Program prioritizing requests and coordinate with other groups
- Provide service to the Snoqualmie and Puget Sound Teams
- Refocus storm water or event-oriented monitoring, geological support, database maintenance and data distribution / interpretation as described above to enhance our abilities to provide data and decision making support to Forums and jurisdictions and to address and evaluate human health and environmental risks, ecosystem health, ESA, NPDES permits, effluent discharges and water re-use alternatives, as well as used to develop new policies for water quality and quantity within the region.
- Enhanced monitoring efforts will be undertaken to support the implementation of the May Creek Basin and to support water quality evaluation of the Green River, Sammamish and Lake Washington Basins for WTD.

## **Project Specific Monitoring**

Monitoring that supports specific projects or programs will continue for projects that are still ongoing, for efforts that support other programs and for projects that provide revenues to support the monitoring.

### *New Proposed 1998 Program:*

- Continue Capital Improvement Program evaluation/effectiveness and support to the Rivers Program
- Continue project-specific support (revenue backed efforts), e.g., Hamm Creek, Beaver Lake, etc.



### ***Project Specific Monitoring (Cont.):***

#### *New Proposed 1998 Program (Cont.):*

- The Special Investigations Program will be developed to address emergency project needs, e.g., sewage spills, floods, etc.

#### *Summary of Changes from 1997 Program:*

- Continue Model Horse Farm Project and complete grant project
- Continue Capital Improvement Program evaluation/effectiveness
- Continue support to the Rivers Program
- Continue Hamm Creek Support, Beaver Lake support and other revenue backed programs
- Continue to look for funding to undertake Council-mandated monitoring program to evaluate the effectiveness of the County Livestock Ordinance due to take effect in 1998.
- Initiate monitoring programs for Blakely and Northridge Master Plan Developments.
- The Special Investigations Program will be developed to address emergency project needs, e.g., sewage spills, floods, etc.

### ***Small Lakes Stewardship Program***

*The Small Lakes Volunteer Monitoring Program will remain at the 1997 level with the goal of monitoring the water quality of 43 small lakes throughout King County. Thirteen of these lakes are located in incorporated areas and therefore will be funded through Culver (Category III) funds. Any other apparent decrease in funding from 1997 levels is due to the inclusion of non-monitoring program elements in the 1997 budget figure. Small Lakes Volunteer Monitoring funding has remained status quo for 1998.*

#### *New Proposed 1998 Program:*

- Continue monitoring program for all 43 lakes, including the 30 presently monitored in unincorporated King County.
- Complete lake restoration programs and special projects implemented in past years.
- Continue monitoring small lakes in incorporated areas and instigate/encourage programmatic and budgetary partnerships in appropriate jurisdictions.

#### *Summary of Changes from 1997 Program:*

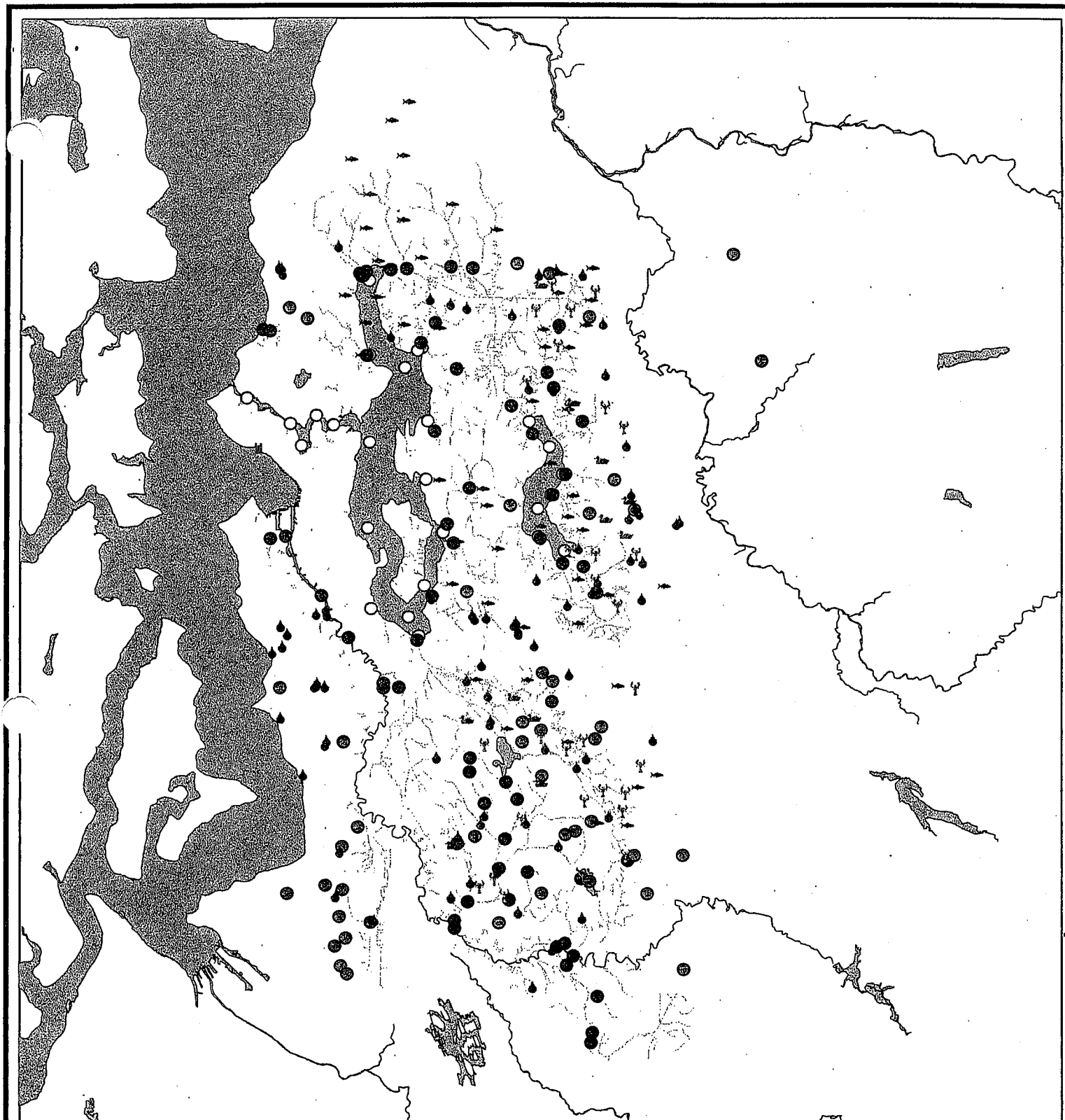
- Completion of one-time capitol project in Lake Desire
- Maintain monitoring at current levels

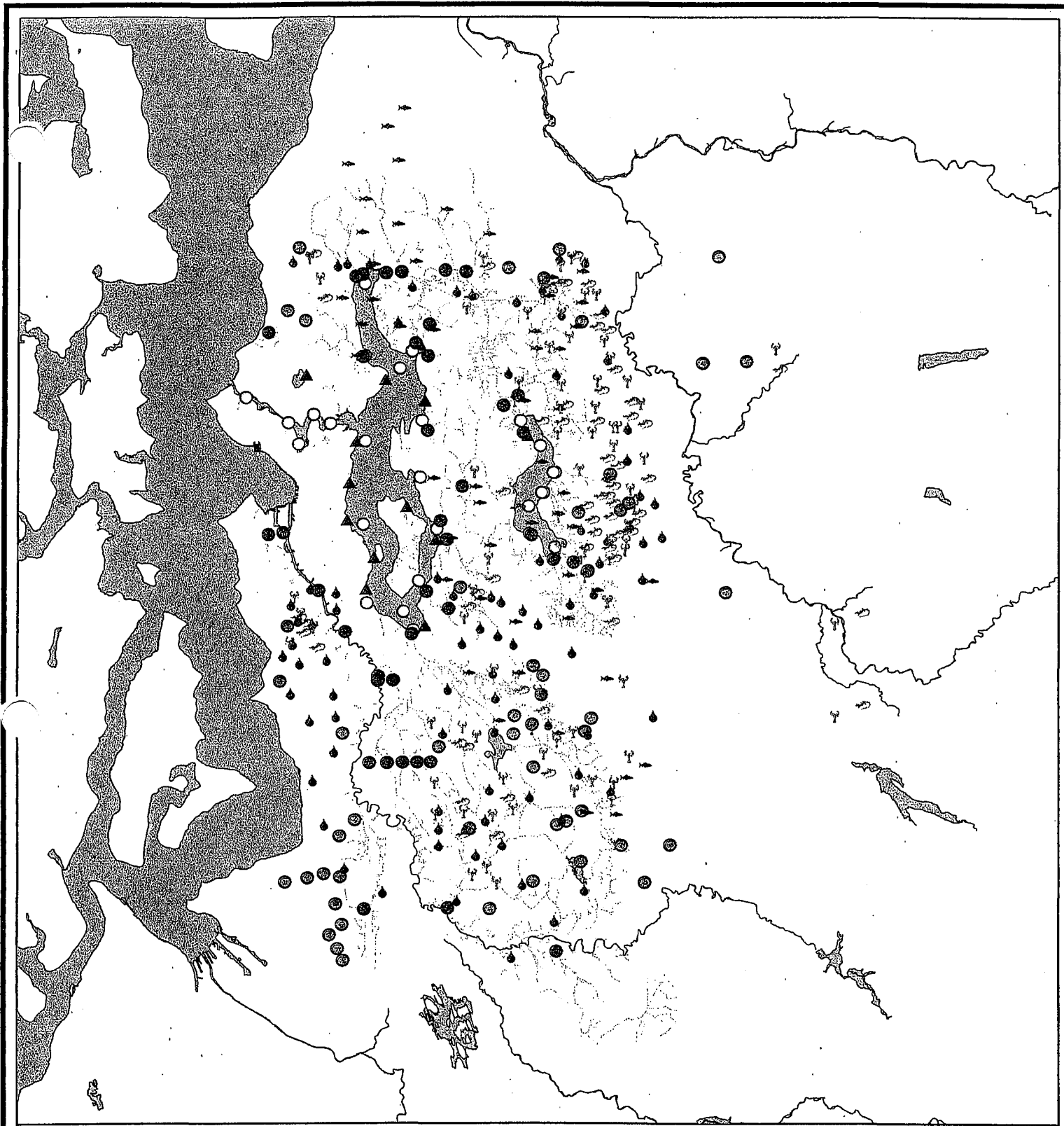
Summary of 1998 Proposed Monitoring Program by Funding Source  
Table 2

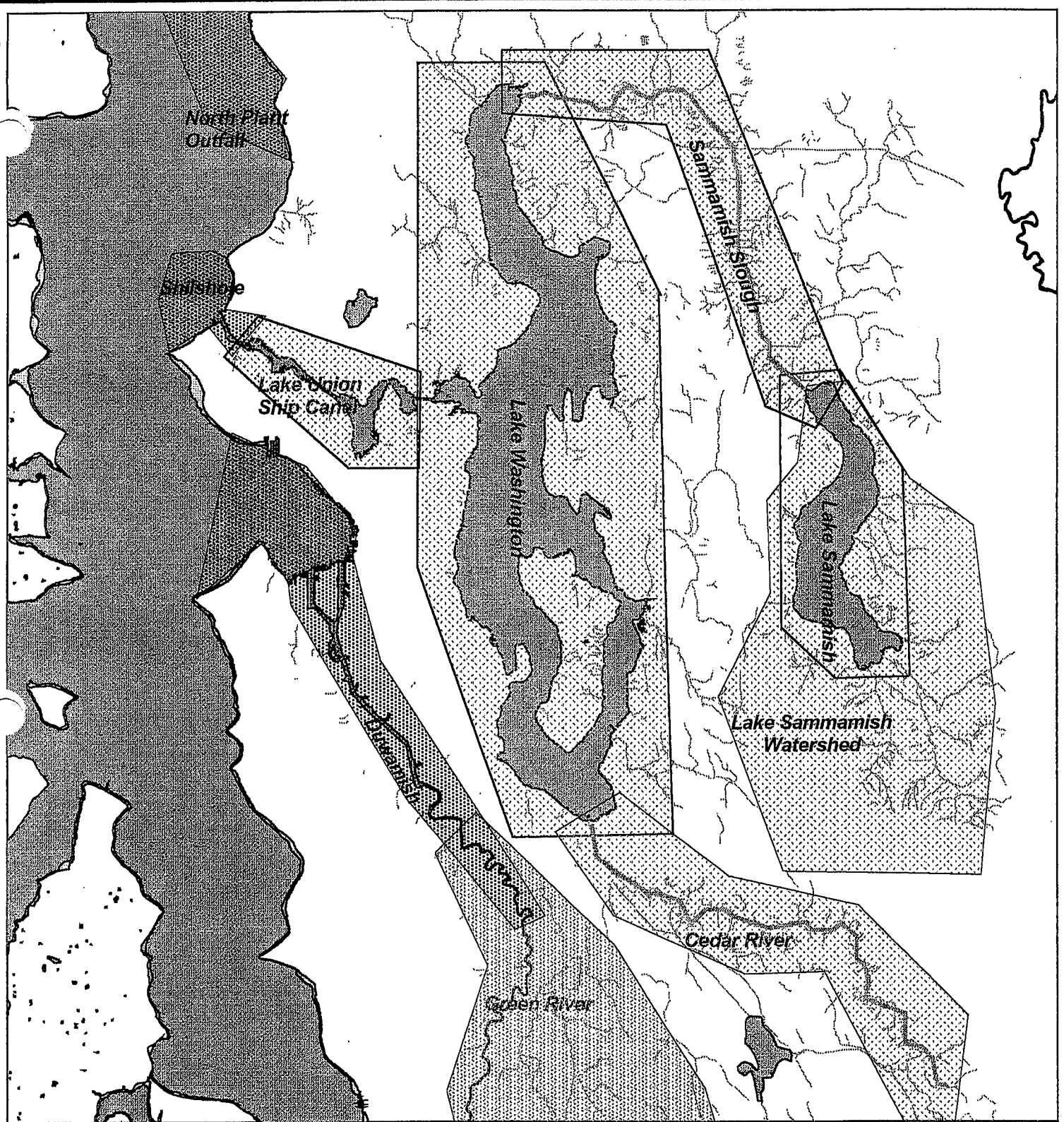
	Propviso 1997				Executive Proposed 1998				Proposed 1998					
	Surface Water		Wastewater		Surface Water		Wastewater		Surface Water		Wastewater		Surface Water	
	\$	FTE	\$	FTE	Op \$	FTE	Op \$	FTE	Op \$	FTE	Op \$	FTE	Op \$	FTE
Large Lakes Monitoring	0	0.0	280,625	4.5	0	0.0	291,100	4.6	0	0.0	0	0.0	0	0.0
Ambient Streams ①②	0	0.0	95,680	1.6	0	0.0	55,744	1.0	0	0.0	0	0.0	0	0.0
Muckleshoot Streams	0	0.0	35,880	0.6	0	0.0	23,920	0.4	0	0.0	0	0.0	0	0.0
Swimming Beach Assessment	0	0.0	23,920	0.4	0	0.0	0	0	0	0.0	0	0.0	0	0.0
Special Investigations (TC)	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Subtotal	0	0.0	436,105	7.1	0	0.0	370,764	6.0	0	0.0	0	0.0	0	0.0
Water Resource Monitoring ③	353,299	4.0	14,950	0.3	250,589	3.0	0	0.0	188,089	3.0	0	0.0	188,089	3.0
Watershed Specific Efforts ④	331,397	4.4	0	0.0	282,209	5.4	0	0.0	219,709	5.4	0	0.0	219,709	5.4
Project Specific Monitoring ⑤	69,753	2.3	0	0.0	42,799	1.5	0	0.0	42,799	1.5	0	0.0	42,799	1.5
Small Lakes Monitoring ⑥	131,755	1.3	0	0.0	100,866	.9	0	0.0	100,866	.9	0	0.0	100,866	.9
Lake Stewardship/Lake Restoration	585,768	2.0	0	0.0	249,704	2.4	0	0.0	234,996	2.0	0	0.0	234,996	2.0
Subtotal	1,471,972	13.7	14,950	0.3	968,966	13.2	0	0.0	786,459	12.8	0	0.0	786,459	12.8
Total Freshwater Monitoring ⑦	1,471,972	14.0	451,055	7.4	968,966	13.2	370,764	6.0	786,459	12.8	370,764	6.0	786,459	12.8

Notes:

- 1 MAA streams costs are included under Large Lakes, above.
- 2 Ambient streams sampling includes storm sampling
- 3 Water Resource monitoring includes (1) water quantity monitoring (stream gauging), (2) benthic/habitat monitoring, (3) fish monitoring, (4) biological/habitat monitoring, and storm sampling
- 4 Watershed Specific includes services for the Cedar, Green, Sammamish and Puget Sound Watershed Teams, including an interlocal agreement with Puget Sound jurisdictions.
- 5 Project specific monitoring includes projects funded from different sources (\$52,000), from grants (\$3,348), and out-side revenues (\$13,866)
- 6 The 1997 WQ Freshwater monitoring budget contained \$95,778 of Culver Category III funds; the 1998 allocation contains \$43,708 of Culver Category III funds.
- 7 Model Development and operation. Staffing will be provided through contracts, consultants, or new employees.
- 8 Small Lakes Monitoring was Lake Stewardship in 1997. 1997 43 Small Lakes (33 unincorporated and 10 incorporated.) Proposed 1998 43 Small Lakes (33 unincorporated and 10 incorporated.) Proposed 1998 43 Small Lakes (33 unincorporated and 10 incorporated.)
- 9 Non-Monitoring program elements. Includes discrepancies for Watershed Specific Efforts (\$44,585) and Project Specific Monitoring (\$42,799).
- 10 Includes FTE and Extra Help







# WLRD/WTD Modeling Efforts






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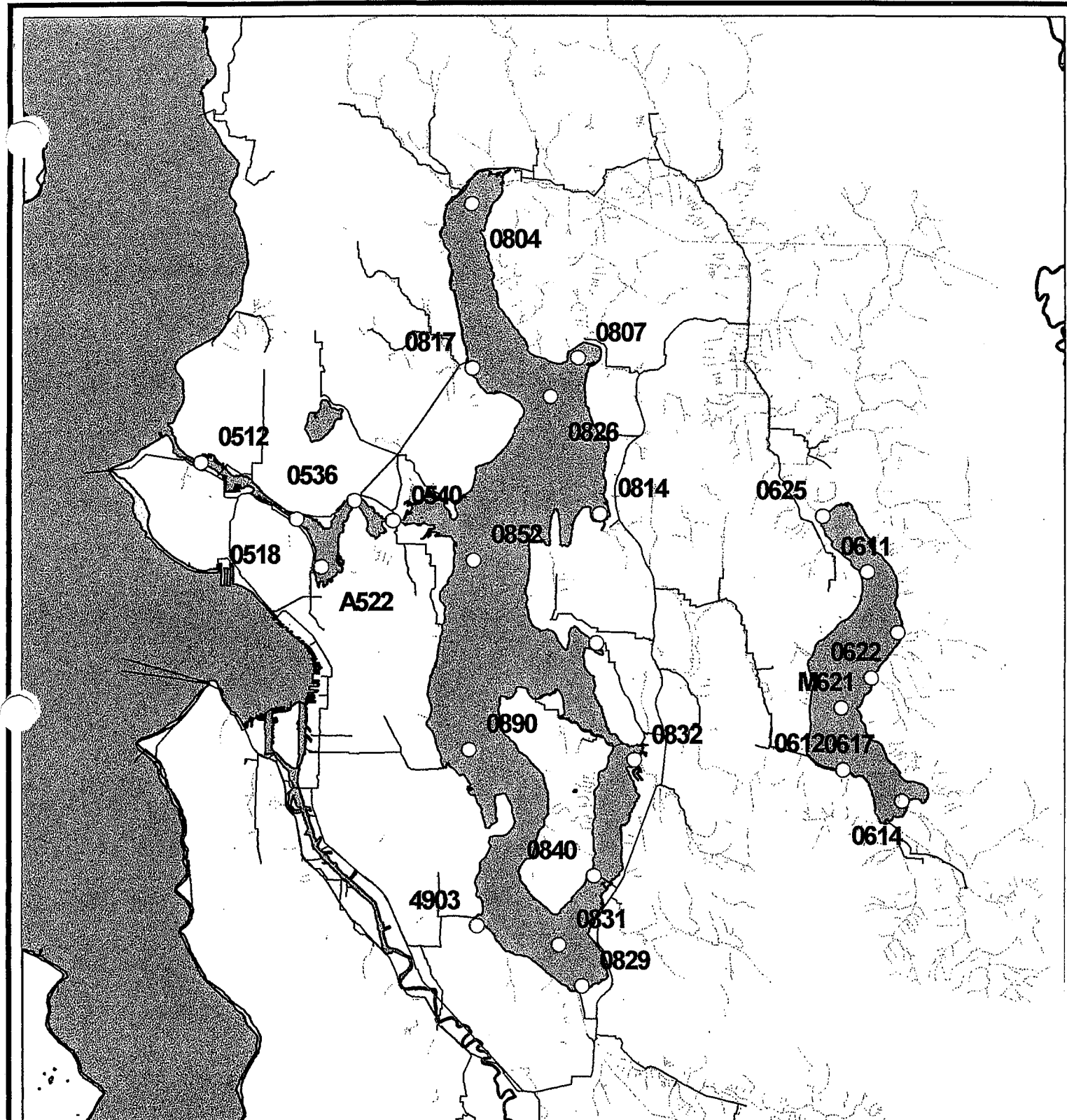
0.5 0 0.5 1 1.5 2 2.5 Miles

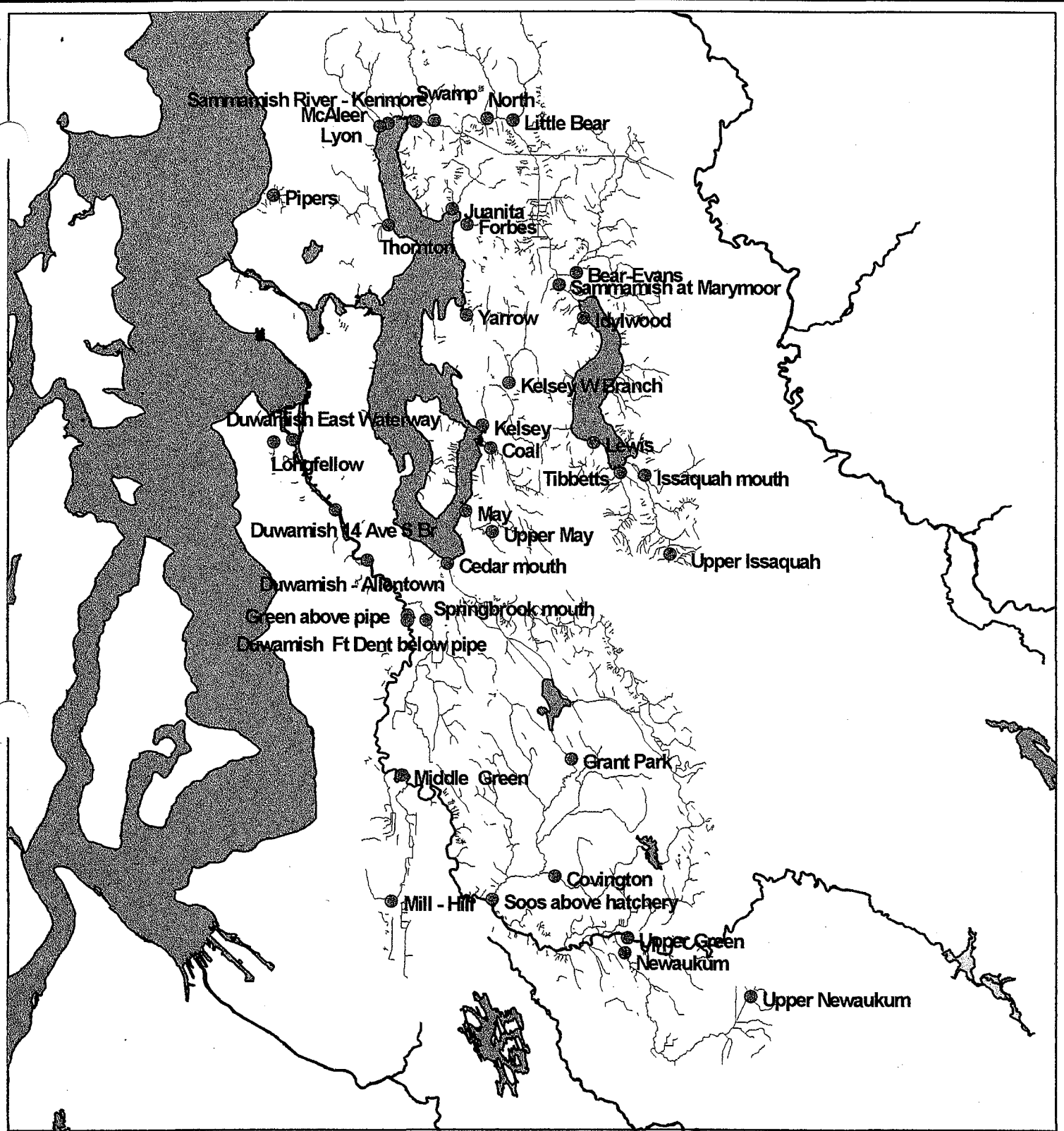


January 22, 1998

## Legend

-  misc. waters
-  wetlands
-  beaches, tide flats
-  water bodies
-  land





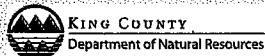
# Stream Monitoring Sites

## 1998

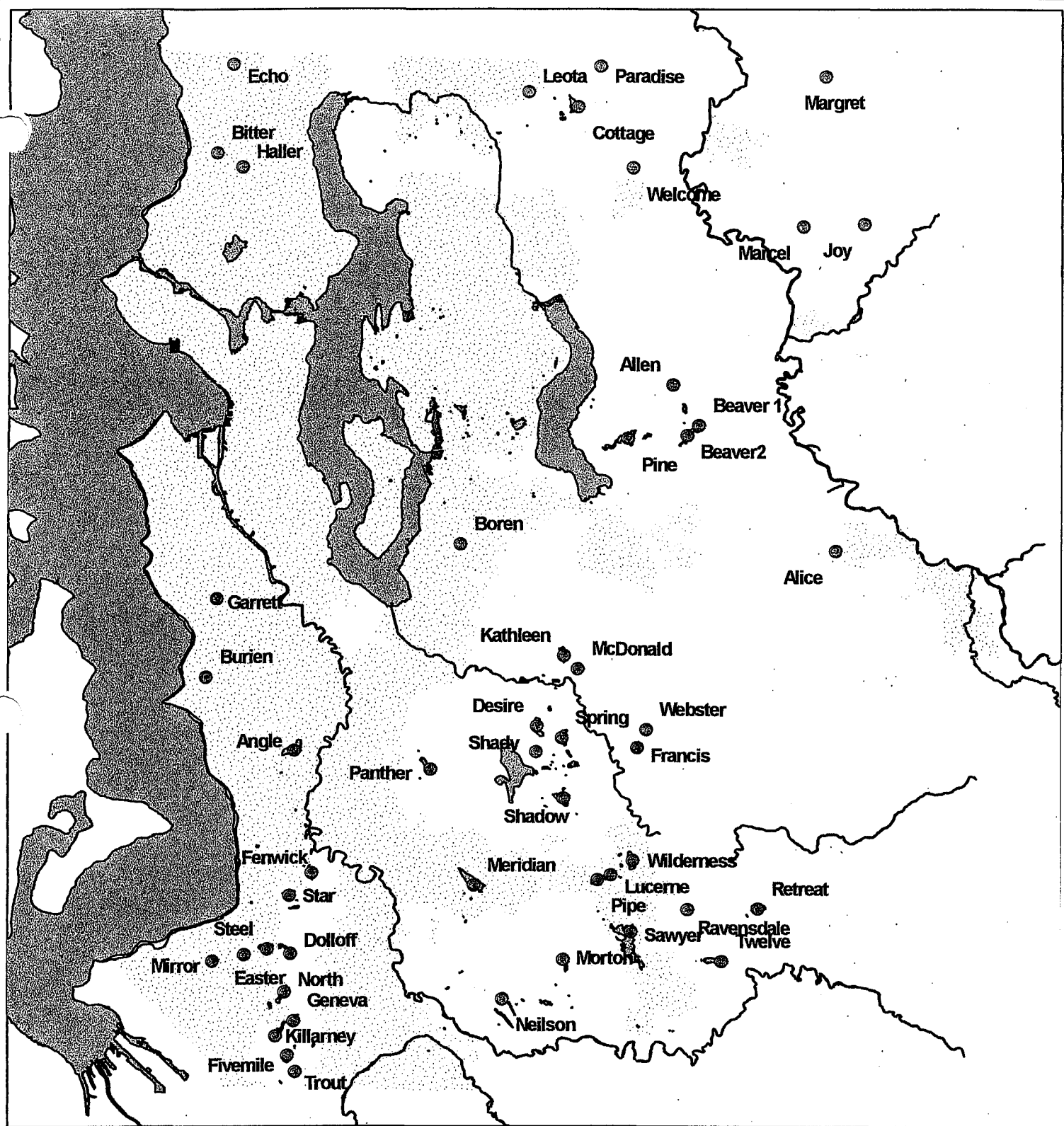
**Legend**

- Stream Sampling Sites
- ▨ misc. waters
- ▩ wetlands
- ▤ beaches, tide flats
- ▧ water bodies
- land
- ~ streams

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May 5, 1998



# Small Lake Monitoring

## 1998

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0 1 2 3 4 5 Miles



### Legend

- small lake sites
- ▭ misc waters
- ▭ wetlands
- ▭ beaches, tide flats
- ▭ water bodies
- ▭ land
- ▭ incorporated areas





# King County

## Water and Land Resources Division

### Freshwater Monitoring

Program  
Name

**MAJOR LAKES MONITORING**

Work Unit

**Modeling, Assessment, and Analysis**

Program  
Description

The Major Lakes Monitoring program is designed to protect the significant investment in water quality improvement and protection made by the people of King County over several years. Several sewage pump stations are on or near the shore and several miles of sewer pipelines lie on the bottom of these lakes. Most streams that enter the lakes are crossed by one or more sewer pipelines. The primary mission of the monitoring program is and has been to ensure the sewer system, which was originally designed to clean up the lakes, does not adversely impact these regional waters. Sampling sites are distributed around the lakes and streams to monitor both the pump stations and pipe systems. The same data collected in this effort is used to monitor the long-term environmental quality of these waters. Both of these regional efforts will be maintained under the current program.

Several current, interrelated issues are directly associated with the water quality efforts addressed in the WLRD lake and stream monitoring program; the potential siting of new sewage transfer and treatment facilities, future indirect links to drinking water supply, the interrelationship of wastewater NPDES activities and the NPDES Stormwater Permit, and potential implications of the Endangered Species Act (ESA), to all of these activities. The lakes program is being modified to provide additional predictive modeling capability for the decision process associated with these efforts. The most significant changes to the program in 1998 are the inclusion of additional parameters associated with effluent discharge and indirect potable water supply. As part of the human health and environmental risk assessment and in response to the desires of SKCPHD and other local governments, the swimming beach monitoring program in the lakes will be continued.

In lakes Sammamish, Washington, and Union sampling stations are located in the deep central basins of the lakes, where the influence of the shoreline is muted by the surrounding water and mixing action of wind and waves. Changes observed over time at these sites reflect broad, large scale, or landscape scale changes in the watershed and response of the lake. Other sampling stations are distributed around the shoreline of the lake. Monitoring efforts in the influent streams is directly coupled with the lakes program, and is used to evaluate and differentiate point source inputs from the sewer system and non-point loading related to landuse in the watershed. The current stream monitoring program will have sufficient sampling locations to model these loadings. The lake and stream data are the baseline information needed to evaluate potential environmental impacts associated with potential water reuse and tertiary effluent discharge proposals.

## Management Issues Addressed in the Large Lake Program:

### *evaluation of operations and maintenance of the King County sewer system on regional water quality*

- there are sufficient lake sites to monitor most of the sewage system
- sewage spill response will be coordinated with the monitoring programs
- monitoring of the large lakes is coordinated with the ambient streams program
- This level of effort will be increased in support of RWSP

### *collection of baseline data for planning sewer/reuse system*

- a sufficient geographic spread of baseline data will be maintained in order to develop predictive modeling capability for the watershed.
- the Kenmore/North Creek Overflow Project in the north end of Lake Washington and the Sammamish River are evaluated as part of the recommended program
- areas with proposed in-lake pipeline parallels will continue to be sampled

### *potential drinking water supply*

- the program will collect sufficient data and monitoring stations to evaluate the large lakes as a potential future water supply

### *human health*

- bacterial monitoring of lakes designated as overflow receiving waters (in the Off Site Facility Manual) will continue
- public swimming beach bacterial monitoring is scheduled to be continued

### *long term ecological trend analysis*

- water quality data collected to monitor the operation, maintenance and potential expansion of the sewage collection and treatment system will continue to be used to analyze long term ecological trends in the watershed where King County may construct and operate facilities

### *ESA issues: salmon recovery / spawning*

- use of water quality and limnological data will continue to be coordinated through the Lake Washington Ecological Study Program.
- invertebrate samples in lakes Washington and Sammamish will be collected during routine sampling runs, and analysis coordinated with the Lake Washington Ecological Study Program
- lake data will be provided to citizen volunteers, educators, consultants, basin stewards and other jurisdictions
- effluent re-use at the Chittenden locks and impacts to salmonid migration will be evaluated as part of the monitoring program

### *stormwater*

- data will be used to evaluate compliance with the NPDES Wastewater permit NPDES Stormwater permit
- sewer spill response is coordinated with the water quality monitoring program

**development mitigation/impacts**

- non-point pollution and development impacts will be evaluated from data collected to monitor the sewage collection and transfer system
- data will continue to be available to citizens, government agencies, and businesses involved in development and oversight activities

**research**

- all data collected is public access information and is available to the public
- we will cooperate with research efforts that provide information that supports the mission of the Division
- samples of cyanobacteria will be collected and sent to Pacific Lutheran University to evaluate toxicity

**education**

- education of the public will remain one of the highest priorities of this program

**basin plans**

- data collection and analysis will be used to support the basin plans

**National Water Quality Assessment**

- data is shared with this USGS effort at no additional expense to our program



Reporting of water quality data is planned to be in Watershed Reports

Electronic data will continue to be available as public access information

Use of the King County Internet site will be increased

<http://waterquality.metrokc.gov/waterres/lakes/index.htm>

Lakemont Blvd. EIS, Lake Sammamish Water Quality Mgt. Plan 1996,  
Total Phosphorus Model 1996, Swimming Beach Bacteria Survey  
1996, U-Regulator Study 1996, 303(d) lists

Public Education - limnology education program with Seattle Public  
Schools

Public speaking

Electronic data distribution to consultants/universities/public



## *Freshwater Monitoring*

**Program  
Name**

**AMBIENT STREAMS MONITORING**

**Work Unit**

Modeling, Assessment, and Analysis

**Program  
Description**

This program is designed to monitor the larger streams in King County that can be impacted by the existing wastewater collection, conveyance and treatment system, and provide baseline data to assess impacts of the potential siting of new sewage transfer and treatment facilities. The stream program is very closely coordinated with the Large Lake Assessment Program. Sampling sites are primarily located in streams identified as the emergency overflow sites for King County Wastewater Facilities, which are typically located at the mouths of the streams. Storm sampling conducted as part of this program provides the receiving water baseline data used to evaluate and report sewage spill impacts. Evaluation of sewage-related impacts and loading to the major lakes are the primary purposes of the program.

The stream water quality data is also used to evaluate and differentiate non-point source pollution and potential wastewater impacts. Most of the sampling sites are located at the mouths of the streams, which is efficient in maximizing the geographic area monitored while minimizing the sampling costs and effort. Monitoring data from the streams influent to lakes Sammamish and Washington are used to calculate nutrient and pollution loading to these lakes. This data is necessary for the development and operation of the proposed predictive modeling effort to describe in-lake water quality and predict impacts of the potential siting of new sewage transfer and treatment facilities discharging to these waterbodies. Sampling in the upper Green River watershed is used to evaluate the relative contribution of upriver pollutants to contributions from combined sewer overflows or proposed emergency bypass flows to the Duwamish River and Elliot Bay.

Routine monitoring data is provided to the Green/Duwamish, Cedar/Lake Washington and Sammamish watershed teams for Watershed Team activities and provide data used in compiling the 303(d) list for the Washington Department of Ecology. Data is also provided to the Lake Washington Ecological Studies group as part of the effort to protect and enhance salmon. This program provides effective guidance, expertise and laboratory support to the projects supported by Referendum 39 grants to King County WLRD. This project provides technical assistance and education to businesses and the general public to encourage environmental stewardship.

**Use of Data  
Decisions**

## **Management Issues Addressed in the Ambient Streams Program:**

### ***evaluation of operations and maintenance of the King County sewer system on regional water quality***

- there are sufficient stream sites to monitor most of the sewage system
- sewage spill response and reporting will be coordinated with the monitoring programs
- the proposed monitoring plan relies primarily on sites at the mouths of streams- while this decreases the size of the program, upstream data will be collected in targeted watersheds utilizing the Special Investigations Program. This level of effort will be increased in support of RWSP
- sewerage areas that do not have King County owned and operated pipes will not be monitored as part of the Special Investigations Program
- monitoring in the upper Green River watershed is designed to provide necessary information for the Duwamish CSO programs and evaluation of the proposed wet weather emergency overflow from the Renton STP to the Duwamish River

### ***provide nutrient and pollutant loading for predictive modeling and planning of wastewater and reuse facilities***

- parameter selection, sample collection and timings are designed to provide the necessary influent data to the large lakes for modeling and evaluation of current and future water quality and to analyze long term ecological trends in the watershed where King County constructs and operates facilities
- sampling is designed to provide necessary baseline data to predict impacts of the potential siting of new sewage transfer, sewage treatment facilities and water reuse projects
- provide water quality data to evaluate interrelationship of wastewater NPDES activities and the NPDES Stormwater Permit
- evaluate future trends in water quality as part of the adaptive management of Lake Sammamish
- identify sub-watersheds where remedial actions may be required to meet in-lake water quality goals
- areas within the UGB but not currently sewerage will be monitored based on potential siting of wastewater treatment and effluent discharge facilities
- monitoring effort in the Kenmore/North Creek Overflow area is maintained at current levels

### ***salmon recovery / spawning***

- use of water quality and limnological data will continue to be coordinated through the Lake Washington Ecological Study Program
- provide water quality data to evaluate potential implications of the Endangered Species Act
- stream data will be provided to citizen volunteers, educators, consultants, basin stewards and other jurisdictions

### **human health**

- bacterial monitoring of streams designated as overflow receiving waters (in the Off Site Facility Manual) will continue
- bacterial monitoring of streams associated with high bacterial contamination at public swimming beaches will continue

### **stormwater**

- storm samples from a subset of stream sites will be collected
- sewer spill response (Trouble Call) will be coordinated with the water quality monitoring program
- all data collection and analysis will be coordinated with stormwater utility programs

### **development mitigation/impacts**

- non-point pollution and development impacts will be evaluated from data collected to model and monitor the sewage collection and transfer system
- data will continue to be available to citizens, government agencies, and businesses involved in development and oversight activities

### **research**

- all data collected is public access information and is available to the public
- we will cooperate with research efforts that provide information that supports the mission of the Division

### **education**

- education of the public will remain one of the highest priorities of this program

### **Watershed Teams / basin plans**

- data collection and analysis will be used to support the watershed teams and the implementation and evaluation of basin plans

### **National Water Quality Assessment**

- these efforts will continue and add no additional effort or expense to our programs

### **Reporting**

Reporting of water quality data is planned to be in Watershed Reports

Electronic data will continue to be available as public access information

Use of the King County Internet site will be increased

<http://waterquality.metrokc.gov/waterres/lakes/index.htm>

Lakemont Blvd. EIS, Lake Sammamish Water Quality Mgt. Plan 1996,

Total Phosphorus Model 1996, 303(d) lists

Muckleshoot Water Quality Study Newawkum Creek

Electronic data distribution to consultants/universities/public

# **King County** **Water and Land Resources Division**

## *Freshwater Monitoring*

### **Program Name**

**PUBLIC SWIMMING BEACH BACTERIA MONITORING**

### **Work Unit**

**Modeling, Assessment, and Analysis**

### **Program Description**

The beach program is designed to locate specific sources of bacterial pollution that impact public swimming beaches in lakes Sammamish and Washington, so these pollution sources can be corrected. This project addresses a direct public health concern to citizens of the county. Some of the suspected sources of pollution are the leaking septic tanks, local sewer lines, and the King County sewage system. Many of the impacts are located in King County Parks. The identification and elimination of these pollution sources protects public health, water quality and operational integrity of the sewage infrastructure. Currently, Juanita Beach Park is being investigated for human health risk due to high bacterial levels identified in the beach and WLRD stream monitoring efforts.

The bacterial monitoring data is analyzed along with bacterial data collected as part of the ambient streams and major lakes program. This information will provide baseline information for the evaluation of human health risks associated with potential water reuse or indirect potable water supply projects in lakes Sammamish, Washington, and Union.

### **Use of Data Decisions**

- Monitor bacterial levels at selected public swimming beaches and disseminate this information to local jurisdictions through the Seattle/King County Public Health Department
- Identify and locate specific sources of bacterial pollution at the public swimming beaches.
- Develop and implement activities to eliminate sources of bacterial pollution.
- Work cooperatively with the King County Parks Departments, Seattle Parks, suburban cities parks and the Seattle King County Public Health Departments to ensure the waters of the county do not pose a pollution or public health threat.
- Determine impact of waterfowl on beach water quality
- Evaluate current public health risk at public swimming beaches and estimate changes to this risk associated with potential water reuse or effluent discharge projects

### **Reporting**

Swimming Beach Bacteria Survey 1996-7  
Public speaking  
Electronic data distribution to consultants/universities/public  
Coordination with SKCPHD, parks departments, and local jurisdiction



# King County

## Water and Land Resources Division

### Freshwater Monitoring

**Program Name**

Special Investigations (TC)

**Work Unit**

Modeling, Assessment, and Analysis

**Program Description**

This program is designed to address the water quality monitoring and analysis associated with unforeseen, short-term, or emergency events in the wastewater service area. This effort will evaluate the impacts of sewer spills and overflows in the surface waters, and events such as fish kill and toxic algae blooms. Upkeep of spill response kits will be part of this effort.

This program will also provide an additional sampling effort that can be quickly applied in specific watersheds where water quality problem have been identified from the routine monitoring program. In 1998, source tracking of bacterial contamination in the Juanita Beach area will be studied in an effort to control the high levels of bacteria identified in the routine lakes and streams and the beach monitoring programs.

**Use of Data Decisions**

- Identify and locate pollution sources in targeted watersheds
- Develop and implement activities to eliminate sources of pollution.
- Work cooperatively with local governments and the public to ensure the waters of the county do not pose a pollution or public health threat.
- This work will be used to support the RWSP efforts

**Reporting**

Data transfer with local governments and public WDOE spill reports





**King County**

**Water and Land Resources Division**

## **Freshwater Monitoring**

**Program Name**

**WATER RESOURCES MONITORING PROGRAM**

**Work Unit**

**Modeling, Assessment, and Analysis**

**Program Description**

The Water Resources Monitoring Program provides short and long-term evaluation of watershed health and watershed management efforts by collecting, synthesizing and evaluating physical, chemical and biological data coupled with landscape/land use data. The program is organized into three main parts:

**Use of Data, Decisions**

**Water Resources Monitoring.** This program seeks to evaluate the overall health of King County water resources; to provide requested policy, program and technical support services to County and state agencies; to identify regulations, programs, and capital projects that successfully protect aquatic resources from flooding and water quality/fish habitat degradation and to identify areas in need of remediation, protection or restoration. This program has six components: 1) water quantity - gauging and rainfall monitoring; 2) hydrologic modeling; 3) water quality (mostly stormwater sampling) monitoring; 3) macroinvertebrate and habitat monitoring; 4) fish monitoring; and 5) wetland monitoring.

### **Water Resource Monitoring to Support the Watershed Teams.**

The purpose of the programs is to provide requested technical monitoring support services to the Cedar/Lake Washington, Green, Sammamish, Snoqualmie and Puget Sound Watershed Teams and their cooperating agencies and jurisdictions; to evaluate the health of watersheds, water resources; to evaluate the success of watershed management planning and implementation activities; to identify regulations, programs, and capital projects that successfully protect aquatic resources from flooding and fish habitat degradation; and to identify areas in need of protection or restoration; and to provide volunteer monitoring data for cost effective management of watershed resources while educating citizens and volunteers about natural resources and fostering stewardship values. Volunteer program components include:

- Amphibian Monitoring Program,
- Lake Sammamish Kokanee Spawner Survey program,
- Salmonid Interagency Volunteer Monitoring project (Bellevue, WDFW, Muckleshoots, Snohomish Co., other Lake Washington jurisdictions.)
- Wetland Community Link Monitoring Program.

### **Project Specific Monitoring**

Project specific monitoring is composed of a variety of monitoring activities that evaluate the effectiveness of a specific program or project. These monitoring projects may be requested by the Division or Department and funding may be provided within or by outside organizations or agencies, from grants or staff may be loaned out to another group. Examples: 1) Hamm Creek Monitoring Project; 2) Agricultural Program Support; 3) Beaver Lake Support; 4) Master Planned Development Monitoring; 5) Capitol Improvement Projects.

### **Management Issues Addressed in the Water Resources Monitoring Program:**

- Health and "usability" (use attainment) of aquatic resources, e.g. status of King County streams.
  - Facility performance and management, CIP performance.
  - Monitor the efficacy and impacts of the King County owned sewage collection and transfer system on regional water quality
  - Provide technical assistance to the King County Wastewater Treatment Division
  - Program and project assessment and evaluation, e.g., watershed management programs and projects.
  - Identification, prioritization and solution of problems, e.g., watershed management programs and projects.
  - Regulatory compliance and permit negotiation, e.g., NPDES permit, DDES permits.
  - Hydrologic simulations of land uses and development scenarios.
  - Facility siting, e.g., CIP, habitat restorations.
  - Policy development and evaluation, e.g., data for SAO, development and evaluation of watershed management plans.
  - Public education and stewardship
  - Agency credibility and accountability
  - Grant requirements, Ecology Nonpoint Action Plans (Centennial Grants)
- Public health and safety



### ***Products***

- Monitoring (long term) reports, survey (short term) reports
- Watershed reports for watershed teams
- Raw data and data compilations provided to customers by request, e.g., watershed teams
- Issue papers or recommendations for management and internal/external customers
- Electronic data summaries and reports on line
- Maps and educational monitoring materials such as manuals, methodologies and databases for storing volunteer based data.
- Grant proposals to fund collaborative monitoring efforts.



**King County**

**Water and Land Resources Division**

## **Freshwater Monitoring**

**Program Name**

**LAKES STEWARDSHIP PROGRAM**

**Work Unit**

**Regional Water Resources Services**

**Program Description**

The Volunteer Lake Monitoring Program provides short and long-term evaluation of lake health by collecting, synthesizing and evaluating physical, chemical and biological data coupled with landscape/land use data.

### ***Objectives of the Program:***

- To gather baseline data and assess long-term water quality trends in King County lakes.
- To assess seasonal and water column variability.
- To identify water quality problems and propose further investigation and/or direct solutions.
- To educate lake residents, lake users, and policy makers regarding lake water quality and its protection.
- To provide a foundation for the long-term stewardship of King County lakes.

### ***Management Issues Addressed in the Small Lakes Stewardship Program:***

- Health and "usability" (use attainment) of aquatic resources, e.g. status of King County streams.
- Facility performance and management, CIP performance.
- Program and project assessment and evaluation, e.g., watershed management programs and projects.
- Identification, prioritization and solution of problems, e.g., watershed management programs and projects.
- Regulatory compliance and permit negotiation, e.g., NPDES permit, DDES permits, 303 (d) list.
- Facility siting, e.g., CIP, water quality mitigation.
- Policy development and evaluation, e.g., data for state lake standards, development and evaluation of watershed management plans.
- Public education

- Agency credibility and accountability
- Grant requirements, Ecology Centennial Clean Water Fund application
- Public health and safety, toxic algal blooms,
- Identification of noxious aquatic plant species

## Reporting

### *Products*

- Training manual and program including quality assurance guidelines.
- Daily, weekly, and monthly data collection for various water quantity and quality parameters.
- Quarterly data reports via the *Lake Steward* newsletter.
- Lake maps.
- Annual monitoring report.
- Additional educational materials based on monitoring.
- Grant proposals to fund expanded or investigative monitoring efforts