Seattle's Stormwater Management Program

Introduction

The city of Seattle has an extensive stormwater management program designed to address issues of water quality and quantity associated with stormwater runoff. The purpose of the City's program is *to protect life, property, and natural resources from loss or damage caused by uncontrolled stormwater runoff.* To do this, the City has explicitly stated three primary goals for managing urban stormwater runoff:

- ❏ Minimize Risks Associated with Flooding
- ❏ Minimize Erosion and Sedimentation
- ❏ Minimize Environmental Degradation

The stated purpose and these goals, which are contained in the City's Stormwater Management Program (SWMP) developed under the provisions of the Clean Water Act (CWA), are directly transferable to protection of salmonid species in the context of the Endangered Species Act (ESA). Minimizing the risks of flooding by managing the surface water volume generated from stormwater runoff helps protect shorelines, riparian corridors, and lentic environments. Minimizing erosion and sedimentation by managing peak discharge rates and incorporating structural and non-structural best management practices (BMPs) protects spawning and rearing habitats. Minimizing environmental degradation caused by stormwater addresses the need to protect aquatic and riparian ecosystems.

In early 2002, SPU began a two-year project to update its 1995 Comprehensive Drainage Plan (CDP). When complete, the new CDP will chart a 20-year course for SPU's Drainage Program.

Historical Context of Stormwater Management

Drainage in the city of Seattle is managed by government and private entities through a mix of pipes and open channels located in both public rights-of-way and private property. At present, the system of storm and waste sewers consists of roughly one-third separated storm sewers, one-third combined sewer systems, and one-third partially separated sewers (where the street drainage is routed to separate storm sewers and the remaining drainage is conveyed in a combined system). This assortment of drainage systems is the result of various management decisions made during the City's history, beginning in the late 1880s. Seattle first built combined sewer systems at the end of the 19th century in response to typhoid and diphtheria epidemics. These systems were designed to convey both sewage and stormwater away from the populace and into local lakes and Elliott Bay. Much of the developing downtown areas continued to construct and rely on combined systems well into the 1960s. As the growing City annexed nearby areas to the north and south of downtown, it inherited whatever sewage and drainage systems (typically separated) that those small communities had constructed.

In 1958, a voter initiative created the Municipality of Metropolitan Seattle (Metro) to regionalize sewer services and improve the water quality of Lake Washington. In 1960, the City transferred responsibility for all its sewage treatment plants and all large trunk lines to Metro (now part of King County government), retaining only the local sewer and drainage systems. From that time on, Metro (King County) became responsible for all sewage treatment, as well as for enforcement of the pretreatment program required by its National Pollutant Discharge Elimination System (NPDES) permit for its sewage systems.

In the combined sewer system that Seattle retained, there are 110 combined sewer overflow (CSO) locations, of which 30 are associated with pump stations. Beginning in the early 1970's, the City developed and funded a program to control the wet weather overflows from its CSOs, concentrating first on those areas with the highest potential of human contact, such as along the beaches of Lake Washington and Puget Sound. In the beginning, the CSO Control Program focused on the separation of the existing combined system into separate sewer and storm drainage systems. However, in the late 1970s, the City began to question whether the separation of stormwater into a separate system was the correct approach, owing to the increased amount of stormwater related pollutants that would then be discharged into receiving water bodies from a separated system. As a result of decisions made at that time, the City now uses a mixture of large CSO storage facilities and a modified separation program that sends the dirtiest

stormwater to the sewer system to control CSOs. To date, the City has achieved substantial control at 95 of the 110 locations and is currently designing and building a $160,000,000 joint project with King County to control an additional nine City locations and two large County overflows. In addition to the City's program, King County also has a long-term program to address CSOs in the Seattle area.

The City has historically funded stormwater and wastewater programs in a number ways, including fees, bonds, and general fund sources. However, in 1958, Seattle formed a Sewer Utility and in 1988 adopted a stormwater fee that allowed the creation of the Drainage and Wastewater Utility. In 1997, the Drainage and Wastewater Utility became part of Seattle Public Utilities.

The 1972 federal Clean Water Act amendments require local governments to obtain *wastewater discharge* permits under NPDES program for all CSO outfalls. The City obtained such a permit in 1975. In 1991, the U.S. Environmental Protection Agency developed rules to regulate *municipal stormwater discharges*. In 1995, the state Department of Ecology issued the City an NPDES permit for discharges from its separated stormwater system. This permit required that the City develop a comprehensive stormwater management program (SWMP), which was submitted to and approved by Ecology in 1997. Thus, the City has two NPDES permits: one for CSO discharges and one for discharges from the City's separated storm drainage system.

Actions Conducted under the Stormwater Management Program

Stormwater Management Program Areas and Program Elements

Seattle's Stormwater Management Program uses a comprehensive regulatory and programmatic approach to protect aquatic life in adjacent water bodies by minimizing and controlling both the pollutant loading and high flow rates caused by urban stormwater runoff. The City's stormwater management plan includes six broad program areas:

1. Regulatory programs
2. Water quality programs
3. Public involvement and education programs
4. Operation and maintenance programs
5. Capital improvement program
6. Toxics control programs

All programs are implemented on a city-wide basis to address stormwater quality and quantity, thereby helping to minimize impacts to salmon migratory corridors in and adjacent to Seattle.

Regulatory Programs

Regulatory programs are designed to manage stormwater runoff quality and quantity through a combination of ordinances, codes, rules, and enforcement policies. The City institutes land use controls on development through application of the Stormwater, Grading, and Drainage Control Code and associated Director's Rules. These include requirements for stormwater detention, erosion and sedimentation control during construction, and permanent BMPs for controlling urban runoff contaminants and discharge rates. The City also administers the requirements of the State Environmental Policy Act (SEPA), the Shoreline Management Act (SMA), the Growth Management Act (GMA), and the City's Environmentally Critical Areas Ordinance.

In early 2000, the City revised its Stormwater, Grading and Drainage Control Code (Seattle Municipal Code 22.800-22.808) and associated Directors' Rules for Flow Control, Stormwater Treatment, Source Control, and Construction Stormwater Management. Now fully in effect, the Code and Directors' Rules can be viewed on the City's Website: **http://www.seattle/dclu/Codes/sgccode.htm**

Beginning in early 2002, Seattle Public Utilities, working in partnership with Seattle Department of Transportation (SDOT) and the Department of Design, Construction and Land Use, (DCLU), began identifying where changes in the City's 2000 Stormwater Code may be warranted in light of Ecology's newly issued Stormwater Management Manual for Western Washington (August 2001). The long-term goal of this project is to develop a revised set of technical standards and code requirements for stormwater flow control, treatment, construction and source control that account for Seattle's built environment and development patterns while, at the same time, taking advantage of Ecology's revised guidelines. This project is being conducted in conjunction with development

of SPU's Comprehensive Drainage Plan.

Water Quality Programs

The City has long recognized the importance of protecting water quality in all its water bodies. Water quality programs include monitoring activities designed to support the information needs of decision makers, and source control programs whose purpose is to improve water quality by reducing pollutants at their source. The City's monitoring program includes chemical, biological, habitat and visual data gathering. Source control programs include inspections of construction projects and of commercial and industrial areas to reduce potential sources of water pollution by encouraging the use of good housekeeping and other BMPs. The City's field investigators respond to water quality-related complaints from citizens (through a special, dedicated telephone line), and from other departments and agencies. At construction sites, the building and site inspectors inspect and enforce the erosion and sedimentation control requirements, and evaluate the effectiveness of BMPs. City inspectors also investigate reports of illicit discharges and improper disposal of materials to surface water.

Public Involvement and Education Programs

The City's public involvement and education programs work to increase awareness about behavior that can harm water resources and to inform the public about individual responsibility for protecting these resources. In this way these programs also serve as a form of source control. The City has established a citizens' advisory committee to review programs and emerging issues, and to forward recommendations on key policy matters. The City's public education programs include both city-wide programs and activities targeted to selected audiences by age and/or geographical location. Popular city-wide education programs include such home-based programs as:

- ❏ Green Gardening - educating the public about practices to reduce chemical use, toxic runoff and water use;
- ❏ Natural Lawns - demonstrating resource-efficient and less toxic methods of maintaining healthy turf;
- ❏ Green Cleaning - distributing lower toxicity cleaning products and simple recipes for common household cleaning jobs.

The City's targeted education programs include the Salmon-in-the-Classroom program and Storm Drain Stenciling Program. The City also distributes small grants through Grant Central Station to provide assistance to community groups interested in taking action to help protect and improve local waters.

Operation and Maintenance Programs

Drainage and Road Maintenance programs provide routine and corrective maintenance of the sewer and stormwater system in order to ensure proper operation and prolong the useful life of the system. This maintenance requires that storm drains, detention systems and combined sewers be maintained at least annually to reduce contamination from street runoff. The City performs maintenance on a routine basis for catch basins, inlets, sand boxes, ditches and other facilities that accumulate sediment, and monitors the facilities to determine when cleaning is needed. The City's roadway personnel assist with storm drain maintenance. Public streets and roads are swept on a regular schedule; industrial and commercial areas are swept on a rotating basis; and bike paths are cleaned monthly. The City also inspects private stormwater detention systems to ensure they are maintained as required in the Stormwater, Grading and Drainage Ordinance.

In January 2002, the National Marine Fisheries Service (NMFS) published the Regional Road Maintenance ESA Guidelines (Guidelines) in the Federal Register. These Guidelines are the product of a lengthy collaborative effort between local government agencies, NMFS, the United States Fish and Wildlife Service (USFWS), and other interested parties. The Guidelines provide a set of road maintenance policies and practices that will meet the dual goals of contributing to the conservation of ESA listed species while meeting critical roadway safety and maintenance needs. While not formally applying to NMFS for program approval, Seattle's Department of Transportation, SPU, and Parks are now incorporating many of these road maintenance best management practices (BMPs) and in-depth workforce training guidelines into their programs.

Capital Improvement Program

The City's Capital Improvement Program includes funds for the reduction of combined sewer overflows, reduction of flooding, restoration of creeks including barrier removal, in-stream flow control mechanisms, and habitat improvements, habitat acquisition and restoration in both the creeks and major water bodies, major stormwater detention facilities, new sewers, storm drains, and restoration of existing facilities. The City has completed extensive work (representing approximately a $350 million investment) to bring a majority of CSO locations substantially under control. The City's capital programs relating to wastewater and stormwater provide a substantial improvement to the existing conditions that salmon find within the city of Seattle.

Seattle Public Utilities has developed a "Natural Systems" approach to managing stormwater in those basins whose drainage systems are based on ditches and culverts. This approach uses swales, infiltration, and landscaping techniques to reduce stormwater runoff, lower pollutant levels, and in many instances, improve general neighborhood quality.

Two pilot natural systems projects were constructed in 2000/2001 in the 2.9 square mile Pipers Creek Watershed located in northwest Seattle. Preliminary results indicate that both facilities provide measurable reduction in peak flows and volumes before the runoff is discharged into Pipers Creek.

Toxics Control Programs

Discharge into the storm drain system of anything other than stormwater is strictly prohibited. As noted above in the discussion of water quality programs, the City investigates illicit discharges and improper disposal of materials. In addition, the City carries out programs to control toxic materials and hazardous wastes and prevent their introduction into the environment. These programs include technical assistance and providing collection facilities. Collecting these materials keeps them out of the storm drains and serves to educate the public about the impacts on water quality. Educational displays and brochures are available at the collection sites, and facility staff are active community educators on-site and at public events.

Financial Commitment

The City has invested and will continue to invest millions of dollars to provide environmental benefits to salmon within the city limits. Projects conducted in urban creek watersheds are designed to enhance aquatic ecosystems in these metropolitan settings, and projects conducted along the Duwamish and Lake Union corridors are designed to facilitate passage of salmon in their transit to and from spawning and rearing habitats located further upstream. Additionally, the City is committed to continuing its various stormwater management programs in order to address stormwater impacts on the receiving environment.

Owing to the range of programmatic endeavors conducted by at least four City Departments, estimating the financial investments Seattle makes each year in stormwater runoff management cannot be done with precision. Analysis of costs incurred in 2001 indicated that Seattle spent approximately $9,327,000 on the storm-water management programs conducted primarily by SPU and SDOT as part of the City's NPDES Municipal Stormwater Permit. This figure does not include capital projects, and many of the costs incurred for other stormwater-related actions and programs conducted throughout the city were not captured in this estimate. Throughout the city, overall stormwater management program costs are not expected to decrease in the near-term future.

Summary - How the City's Stormwater Programs Protects Salmon

The very nature of stormwater runoff requires its adverse impact be address broadly, through both a series of capital projects *and* multiple programs operating concurrently and continuously to address ongoing needs. Such a programmatic approach has been the stalwart management tactic approved by EPA, state regulatory authorities, and jurisdictions nationwide. The City's approach to stormwater management includes capital and programmatic aspects, and the stated goals of its program directly support the protection of salmon and salmon habitat. Stormwater and wastewater programs in the city contribute to the protection salmon and salmon habitat by:

Reducing Contaminants Entering the Environment

The City has regulatory, inspection and enforcement, source control, maintenance, and CSO Control programs, to name a few, that serve to reduce the amount of pollutants entering both water and sediments used by salmon.

Reducing the Impacts of High Peak Flows

The City's ordinances and design specifications limit peak flows following development. In addition, capital projects have been constructed to absorb large peak flow during rainfall events in order to protect creeks.

Enhancing and Improving Salmon Habitat Areas

The City has constructed, and will continue to build, projects aimed at improving creeks and other aquatic areas that have a direct benefit to Chinook salmon.

Protecting Viable Salmon Habitat Areas

The City is actively participating in habitat acquisition projects, the intent being to acquire critical habitat areas before degradation occurs.

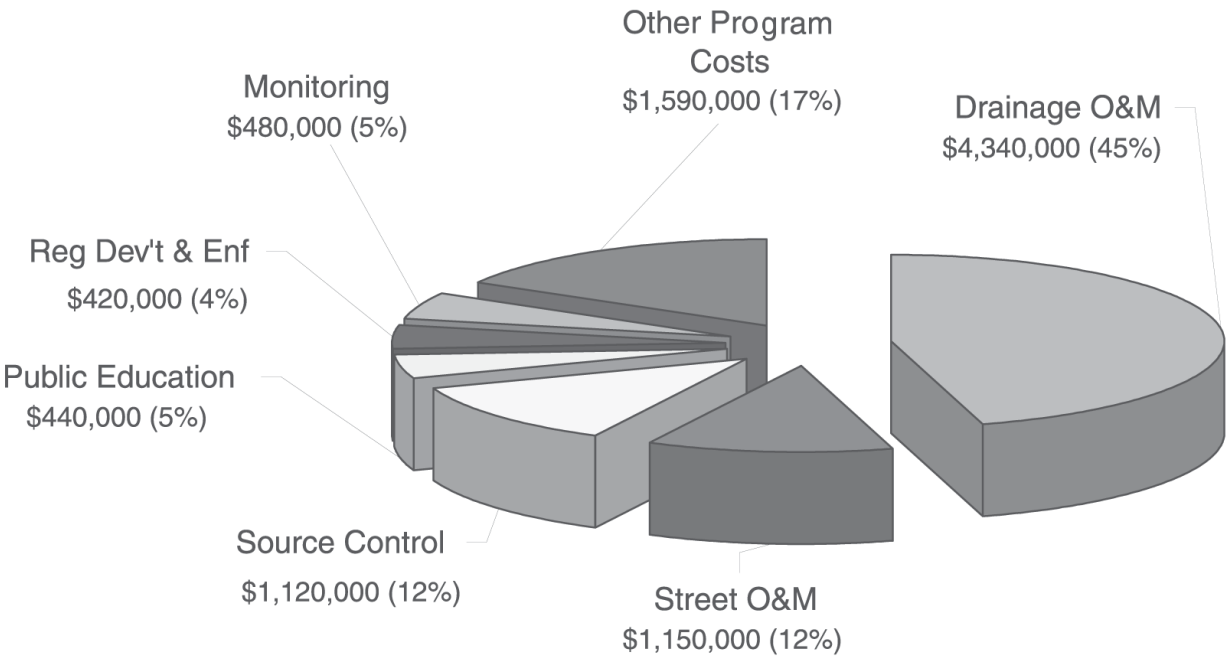
Educating and Involving the Public

The City's education and public involvement programs are aimed at vesting in people an environmental ethic and sense of stewardship.

Adjusting Management Strategies

The City is involved in various research, monitoring and pilot program studies designed to evaluate better ways to address stormwater runoff and salmonid protection. As information gaps are filled and new technologies and techniques emerge, the City will adjust its management programs accordingly.

2001 Stormwater Expenditures



Total Stormwater Program Expenditures for 2001: $9,182,000

(2002 figures not yet available) *(Does not include capital projects)*