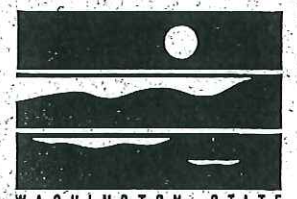

Elliott Bay Action Program

Environmental Clean-up Activities in Elliott Bay and the Duwamish Waterway

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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office, 3190 - 160th Ave S.E. • Bellevue, Washington 98008-5452 • (206) 649-7000

March 31, 1995

Dear Recipient:

The enclosed report is the final product of the Department of Ecology's Elliott Bay Action Team. When we started this project in 1993, our intent was to update the 1988 Elliott Bay Action Plan and develop a work plan and priorities for environmental clean-up actions in Elliott Bay and the Duwamish. As we proceeded, it became clear that the Elliott Bay Action Team coordination was no longer central to the multitude of water quality, clean-up and habitat restoration activities occurring in Elliott Bay. This realization together with staff cuts lead to the decision to refocus Ecology's Northwest Regional Office Urban Bay Action Team efforts on Port Gardner Bay (Everett) and Bellingham Bay.

With our efforts focused elsewhere, completion of the action plan became a lesser priority. However, we did not want our work and the work of those who responded to our information requests to be wasted. The result is this compendium of environmental clean-up activities in Elliott Bay and the Duwamish Waterway, which we hope will provide useful background information to those who continue to be active in the area. We are confident that we left the environmental future of Elliott Bay and the Duwamish in good hands.

If you have any questions about this document, please call Joanne Polayes-Wien, (206) 649-7233, or Martha Turvey (206) 649-7208. Thank you for your interest.

Sincerely,

Joanne Polayes-Wien

Martha Turvey

Joanne Polayes-Wien
Martha Turvey
Elliott Bay Action Team

PREFACE

This report was prepared in 1993 and revised during the first half of 1994. Every attempt was made to ensure accuracy when it was written. Review copies were sent to each agency included in the report, and agency comments were incorporated.

It is often said that change is the only constant. Accordingly, this document should be considered a snap-shot in time, reviewing the status of environmental cleanup activities in Elliott Bay *at the time of writing*. Since activities are on-going, many changes have certainly occurred between the time of writing and the date of publication. One change in particular is that the Department of Ecology no longer has an Elliott Bay Action Team, as such. Staff still are working on various projects in Elliott Bay, but cuts in the Urban Bay Action Teams in the Northwest Region have led to the decision to focus our efforts on Bellingham and Port Gardner Bays. Despite these changes, we hope that this report will still be of some value as background for anyone wishing to become more familiar with efforts to improve environmental quality in Elliott Bay. By providing such background, we hope that the information will be of value in planning future cleanup and restoration efforts.

We would like to acknowledge the time and efforts of the following agency staff who provided information and reviewed the draft document. This compilation would not have been possible without their efforts.

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Joan McGilton, The Boeing Company
Teresa Michelsen, Department of Ecology

Authors: Joanne Polayes-Wien
Martha Turvey
Elliott Bay Action Team

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INTRODUCTION

In response to widespread concern over the environmental health of Puget Sound, the Washington Department of Ecology (Ecology), U.S. Environmental Protection Agency (EPA), and the Puget Sound Water Quality Authority (PSWQA) joined forces in 1985 to initiate the Puget Sound Estuary Program (PSEP). A primary objective of this program is to minimize toxic chemical contamination of the sound and protect its living resources, such as fish, shellfish, and wildlife. Because of their poor flushing characteristics, inner harbors and waterways of Puget Sound are easily contaminated by toxic chemicals released into the sound or its drainage basin as a result of human activities. For example, localized areas of high contamination and associated biological effects have been found near discharges from industrial facilities, sewage treatment plants, and urban storm drains.

As an element of PSEP, the Urban Bay Action Program focuses on identifying and reducing contaminant releases through a series of coordinated actions by government agencies and responsible private parties (e.g., industries and businesses). Pollution control activities may include: improvement of drainage or treatment systems for stormwater and sewage, development of stricter permit conditions for wastewater dischargers, enforcement of hazardous materials regulations, initiation of best management practices, and initiation of cleanup measures at sites of concern.

The 1988 Action Plan listed the corrective actions developed for specific sites within the Elliott Bay project area by drainage basin. For each priority problem area and associated contaminant source, the plan specified the recommended corrective actions, the agencies responsible for implementing those actions, and approximate implementation schedules. This revision of the plan includes information on actions taken since 1988, as well as on-going and planned activities. The remainder of this introduction provides background information on the project area and a description of the Elliott Bay Action Program. For more information on the technical approach used to evaluate priority problem areas and contaminant sources, see the 1988 Action Plan.

Overview of Elliott Bay, Toxic Contamination and Habitat Loss

Elliott Bay, located on the eastern shore of central Puget Sound at Seattle, covers a 30-square-kilometer area with water depths up to approximately 180 meters. The Duwamish/Green River system, which flows into the southern portion of inner Elliott Bay, is the primary source of fresh water to the bay. The river channel is actually a salt-wedge estuary, influenced by tidal action over its lower 16 kilometers, including all of the riverine portions of the project area. Harbor Island divides the lower reaches of the Duwamish River into the East and West Waterways. The majority of the river flow enters the bay through the West Waterway.

The project area includes Elliott Bay east of a line between Alki Point and West Point, the East and West Waterways, and the lower 10 kilometers of the Duwamish River upstream to the head of navigation.

The drainage basin contains extensive industrial development and one of the largest container ports in the nation. Historical as well as recent industrial activities have centered largely on Harbor Island, the eastern shore of the inner bay, and areas along the dredged Duwamish waterway.

Natural resources of the bay include fish and shellfish, such as salmon, flounder, shrimp, squid, and clams; marine mammals, such as harbor seals; and numerous species of birds including great blue heron, cormorants, king fishers, grebes, and various ducks and geese. The Duwamish/Green River system supports commercial and recreational salmon and steelhead fisheries valued at $10 million annually.

The lower Duwamish River originally meandered through marshes and forested wetlands, discharging to an extensive mudflat in Elliott Bay. In the course of industrial development of this area, 99 percent of the original wetland and intertidal habitat were destroyed due to dredging, filling, and channelizing of the Duwamish Waterway.

As a result of urban and industrial influences, localized areas of nearshore Elliott Bay and the lower Duwamish River have been extensively contaminated by toxic chemicals. Investigations by EPA, the Municipality of Metropolitan Seattle (Metro), and the National Oceanic and Atmospheric Administration (NOAA) during the 1970's revealed high concentrations of toxic chemicals in sediments on the bottom of the bay and river. Inputs from discrete pollutant sources have resulted in a patchwork of toxic sediments that include some of the most contaminated areas in Puget Sound. The contaminants include potential carcinogens, such as polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs), and toxic metals, such as arsenic and lead. Cancerous liver tumors were found in up to 16 percent of the English sole (a bottom-dwelling fish) caught in contaminated areas of the bay and river, whereas these lesions are usually absent in fish caught in relatively uncontaminated areas of the sound. In addition, populations of invertebrate animals living in the bottom sediments were severely reduced in highly contaminated areas.

Identification of Potential Contaminant Sources

Potential sources of contamination in the lower Duwamish River and Elliott Bay include municipal wastewater treatment plants, combined sewer overflows, surface runoff, contaminated groundwater, industrial discharges, atmospheric deposition, and accidental spills. Previous source control efforts of EPA, Ecology, Metro, and the City of Seattle have eliminated most known direct industrial discharges to the bay and river by routing them to municipal wastewater treatment plants. In addition, effluent from Metro's Renton municipal wastewater treatment plant was diverted from the Duwamish River to Puget Sound (off Duwamish Head) in early 1987. Overflows from most combined sewers have been reduced by Metro and City of Seattle, in accordance with state requirements.

Ongoing contaminant sources include contaminated groundwater, storm drains, uncontrolled CSOs, and unidentified direct discharges. Storm drains and the remaining uncontrolled CSOs are probably the most significant ongoing contaminant sources in the project area because they collect and discharge stormwater runoff, thereby transporting contaminants from most of the nonpoint sources in the project area.

In addition, during wet-weather, high-flow conditions, CSOs discharge municipal sewage that may contain industrial effluent. In addition, there still may be unknown direct discharges that need to be identified, characterized, and abated.

Elliott Bay Action Program

In October 1985, PSEP member agencies initiated the Elliott Bay Action Program. This program was built partly on the past and continuing environmental programs of Ecology, Metro, the Port of Seattle, and others. Through a process of interagency coordination, local government support, and public participation, the Elliott Bay Action Program has focused new and continuing pollution control efforts on the priority problem areas within the bay and river. The program's objectives have been as follows:

* Identify specific toxic areas of concern in the bay and river based on chemical contamination and associated adverse biological effects

* Identify historical and ongoing sources of contamination

* Rank toxic problem areas and sources (to the extent possible) in terms of priority for development of corrective actions

* Implement corrective actions to reduce or eliminate sources of ongoing pollution.

Based on newer developments in Elliott Bay (discussed in the next section) the following are additional objectives for the future:

* Identify areas of existing aquatic and near-shore habitat that provide critical ecosystem functions to the bay and estuary.

* Protect critical existing habitat from pollution stresses.

* Locate potential opportunities for habitat restoration and pursue habitat creation.

* Restore polluted areas to support natural resources and beneficial uses.

The Elliott Bay Action Program has followed a process in which corrective actions are developed and implemented in phases to take advantage of new scientific data and emerging ideas about practical solutions to toxic contamination problems. First, existing data on sediment contamination and biological effects were analyzed, and priority problem areas were identified. Next, an Interim Action Plan was developed for immediate control of known pollutant sources where adequate information was available. Data gaps were then filled by further sampling and analysis, and the 1988 Action Plan was developed to update priorities for corrective actions (Tetra Tech 1988). This 1993 revision is intended to update information on past accomplishments and current and planned activities of various agencies in Elliott Bay, and to help identify unmet needs to better focus source control, cleanup, and restoration efforts.

Corrective actions begin with source control to reduce or eliminate inputs of toxic contaminants. Sediment cleanup (i.e., remedial) actions and environmental monitoring are potentially long-term components of the Elliott Bay Action Program. Examples of sediment remedial activities include capping contaminated sediments with clean materials or removing the contaminated sediments by dredging.

Sediment remediation is an expensive and complex process that requires considerable site-specific data and review of environmental effects during the planning process. Ideally, source control should be implemented before remedial actions are taken on sediments to avoid recontamination of an area that has been cleaned up. To determine the best course of action, regulatory and resource management agencies must evaluate the environmental benefits and risks of alternative sediment remedial actions relative to costs. Monitoring is important to evaluate the effectiveness of source control and sediment remediation. As of March 27, 1991, Sediment Cleanup Standards adopted by Department of Ecology govern this process.

Another long term component of the program involves habitat restoration. This aspect of the program is usually driven by settlements for resource damages, compensatory mitigation for development in nearshore areas, or volunteer efforts. It is dependent on land availability, funding sources, and potential ecological benefits. Since the last revision of the plan habitat restoration has been given considerable attention. This includes identifying potential sites, small scale intertidal restoration projects and stream restoration. Additional detail is presented later in this document.

Implementation of Action Plans

The 1994 update is intended as a guide for coordinating field investigations, permit review, cleanup, and other activities intended to control specific pollutant sources. The plan builds on earlier efforts of Metro and Ecology and encourages private industries and other responsible parties to take the initiative in reducing or eliminating pollutant discharges.

Ecology staff who have comprised the Elliott Bay Action Team (EBAT) have been responsible for implementing the action plan, in coordination with an interagency work group. There have been two Ecology EBAT coordinators/source control inspectors and one site cleanup manager who has focused exclusively on Harbor Island. Outside of EBAT, other Ecology employees do work at times in Elliott Bay/Duwamish area, including a full-time site cleanup manager for the Port of Seattle Southwest Harbor Project on Elliott Bay. The interagency work group, which until recently met bi-monthly, has been comprised primarily of local agency staff, including Metro, City of Seattle, Port of Seattle, and King County. In addition, staff from the Department of Natural Resources, Puget Sound Water Quality Authority, and EPA occasionally have participated in EBAT interagency work group meetings. The goal of the meetings has been to exchange information to facilitate interagency cooperation in addressing problems in Elliott Bay.

Regulatory authority for EBAT stems primarily from Ecology, which is responsible for permitting and site inspections under state water pollution control laws and regulations, the Federal Clean Water Act, and hazardous substance control programs.

To comply with state and federal requirements for control of combined sewer overflows (CSOs), the City of Seattle and Metro have undertaken extensive sewer separation, flow control and reduction, and source control programs in areas contributing to CSOs. Through the NPDES storm water permit program, Ecology now also has regulatory authority over storm drain systems that discharge to state waters. To comply with their NPDES municipal storm water permits, Seattle and King County have adopted drainage ordinances which give them enforcement authority over discharges to municipally owned storm drains. However, some storm drains are privately owned, including many on waterfront property. Metro owns and operates lift stations, pump stations, regulators, and sewage treatment plants. In addition, Metro is responsible for issuing and enforcing permits for discharges from industrial or commercial facilities to the sanitary sewer system. Under various environmental regulations, other agencies (e.g., the Port of Seattle) and private industries are responsible for pollution prevention and abatement related to their property and activities.

Past Accomplishments

Since 1985, the Elliott Bay Action Team within Ecology has:

* conducted more than 500 inspections, including over 40 facilities on Harbor Island and over 60 facilities in the S. 96th Street drainage basin;

* sent warning letters or initiated formal enforcement resulting in best management practices being implemented at over 300 sites;

* issued 10 NPDES permits with modifications of effluent limitations and monitoring requirements;

* reissued four permits to require more stringent effluent limits and monitoring; and

* worked with responsible industries to clean up 8 leaking underground storage tank sites and 7 small contaminated sites.

During that time, the number of direct dischargers to the lower Duwamish River has been reduced from 57 to 18. This reduction is due to dischargers either going out of business, relocating, hooking up their discharges to the sanitary sewerage system, installing recirculating systems, or otherwise modifying their processes to terminate their discharges. Metro regulates those discharges now going to the sanitary sewer.

These Ecology EBAT accomplishments are only part of the combined efforts of agencies working toward the cleanup of Elliott Bay and the Duwamish Waterway. On-going programs as well as past accomplishments of other local, state, and federal agencies are discussed in the main body of the report.

EXISTING PROGRAMS AND PLANS

Many planned or ongoing actions to control contaminant inputs, cleanup and restore the project area are part of the programs or planning activities of federal, state, and local government agencies. Both long standing and new programs and plans are discussed below. With the exception of the first two entries, which are interagency efforts, the following section is organized according to the primary implementing agency or government body.

Elliott Bay/Duwamish Restoration Program

The Elliott Bay/Duwamish Restoration Program is a major new intergovernmental effort, not anticipated in the 1988 action plan. This program originated as the result of a Natural Resource Damage Assessment (NRDA) lawsuit, initiated by NOAA on behalf of Natural Resource Trustees, against the City of Seattle and Metro. The Natural Resource Trustees are: the federal government, represented by NOAA and the US Fish and Wildlife Service; the State of Washington, represented by the Department of Ecology; the Suquamish Tribe, and the Muckleshoot Indian Tribes. The lawsuit was filed to recover damages for injury to resources caused by contaminants carried in storm drains and CSOs owned by City of Seattle and Metro. Seattle and Metro denied that there was any significant injury to resources, but agreed to settle the lawsuit by spending $24 million to benefit the environment rather that spending it in court.

The Consent Decree agreed to by Seattle and Metro and the Natural Resource Trustees allocates $10 million to habitat restoration projects, $12 million to sediment cleanup, and $2 million to additional source control work. A decision making panel representing the parties to the settlement is overseeing the expenditure of settlement monies. The Panel has been meeting since January 23, 1992, working to set priorities to ensure the money will be spent where it will provide the greatest benefit. In addition, technical working groups have been focusing on sediment remediation and habitat development, identifying sites, developing and applying criteria for site ranking, and developing recommendations for panel action.

The sediment cleanup working group has currently identified three outfall sites as priorities for site characterization and cleanup over the next few years, Duwamish Pump Station, Diagonal Way, and Norfolk CSO. The Duwamish and Diagonal outfalls are located close together across from the north end of Kellogg Island and will be addressed as one site. The Norfolk CSO is located on the east side of the river above the turning basin. Site characterization studies will begin in the summer of 1994. In addition, the working group identified the Seattle waterfront as a high priority area for cleanup. However, recent studies have indicated that there is a potential for recontamination of cleaned up sites along the waterfront from ongoing sources and/or adjacent contaminated areas. The working group is conducting a Waterfront Recontamination Study to determine the rate and sources of recontamination, and to suggest needed source control and cleanup approaches that would have the highest probability of success. If the study shows that cleanup can be conducted successfully, the Panel will proceed with selection and characterization of an additional cleanup site along the Seattle waterfront. The Panel also participated with several other agencies in funding a Sediment Transport Study for Elliott Bay and the Duwamish River.

This study was conducted in the fall of 1993, and identified sediment transport pathways, areas of deposition and erosion, and processes that may be contributing to sediment and contaminant transport in the estuary.

The habitat working group has identified three geographic focus areas, which are the Turning Basin area, the area around Kellog Island, and the Elliott Bay waterfront. The objective is to complete atleast one habitat restoration project in each of these focus areas. As of spring, 1994, the Panel has selected the former Seaboard Lumber site for habitat restoration in the Kellog Island focus area. Assuming a positive conclusion of purchase negotiations, Seattle Parks Department will aquire and manage the site and the restoration project, in cooperation with the habitat working group. Several habitat restoration projects are also being considered in the Turning Basin focus area.

Coastal America Partnership

The Coastal America Partnership is a smaller scale interagency restoration effort in the Duwamish River Estuary. The federally funded Coastal America grant program was created to join federal agencies with tribal, state, local agencies in collaboratively addressing environmental problems along the nations's shorelines. In particular, the Coastal America Partnership focuses on the loss and degradation of habitat, pollution from nonpoint sources, and contaminated sediment. Through this partnership, NOAA's National Marine Fisheries Service, U.S. Fish and Wildlife, EPA, Seattle District/ U.S. Army Corps of Engineers (Corps), General Services Administration, and the Port of Seattle are implementing three pilot intertidal habitat restoration and enhancement projects in the Duwamish River estuary: Federal Center South, the upper turning basin and Terminal 105. In addition to their intrinsic value in providing scarce intertidal habitat, these projects serve as pilot projects for the Elliott Bay/ Duwamish Restoration Program.

U.S. Environmental Protection Agency

Superfund and RCRA

EPA programs under the federal Comprehensive Environmental Response, Compensation, and Liability Act (Superfund, as amended) and the Resource Conservation and Recovery Act (RCRA) result in activities to solve toxic contamination problems in the project area. Under Superfund, EPA, Ecology, or potentially responsible parties investigate the extent of contamination in environmental media, assess chemical risks to human health and the environment, and design and implement cleanup actions to reduce or eliminate risks at hazardous waste sites of national priority. RCRA cleanups go through similar steps, except that they are focused on identified solid waste management units. EPA's Superfund program is important to the Elliott Bay project area, because Harbor Island is designated as a national Superfund site. Wyckoff (now Puget Sound Resources) is also a Superfund site. Seattle Steel (now Salmon Bay Steel and adjacent property retained by CEM Corp.) and Rhone Polenc are sites undergoing RCRA corrective actions.

As part of EPA's Superfund program, contaminated sites on Harbor Island and potential sources of contaminants to the East and West Waterways and Elliott Bay (including CSOs and storm drains) have been investigated. In general, the Superfund process begins with a remedial investigation and feasibility study to characterize site contamination and evaluate cleanup alternatives. Since petroleum is excluded from the federal Superfund statute but is included under the state's Model Toxics Control Act, EPA has designated Ecology as the lead agency for the cleanup of contamination associated with the three petroleum tank farms on Harbor Island. The remedial investigations at the three tank farms were initiated in the spring of 1993. The Lockheed shipyard on Harbor Island has been designated as a separate operable unit and a separate plan for this unit will be issued in 1994. Marine sediments around Harbor Island have also been designated as a separate operable unit and will also be addressed in a proposed plan which EPA intends to issue at the end of 1994.

EPA completed the phase 1 remedial investigation for the Harbor Island Superfund Site in 1990. In 1991 and 1992, EPA conducted the phase 2 investigation, which included collection of soil samples from over 300 locations across the island and installation and sampling from 49 groundwater monitoring wells. Using this data, EPA assessed existing risks and developed cleanup goals. Final design of all elements was completed in 1992. Full utilization of this project is contingent on West Point being on-line in 1995.

National Estuary Program

In 1985, Congress appropriated $4 million to EPA for the study and assessment of four major estuaries. Puget Sound was one of the four estuaries. From 1985 through 1986, the program was administered under existing state and federal authorities. In 1987, Congress amended the CWA to formally establish the National Estuary Program. On March 17, 1988, Puget Sound was designated as an estuary of national significance. The Puget Sound Estuary Program, jointly administered by EPA, Ecology, and PSWQA, was tasked with developing a Comprehensive Conservation and Management Plan (CCMP) for Puget Sound. The 1987 Puget Sound Water Quality Management Plan and the 1989 and 1991 updates, all developed by PSWQA, serve as the CCMP.

Restoration Programs

EPA and the Port of Seattle jointly funded an inventory and analysis of potential restoration sites in the Duwamish River estuary (Tanner, 1991). These agencies viewed this inventory and analysis as an important step toward implementing an estuary-wide habitat restoration and mitigation plan.

Estuarine Habitat Restoration Monitoring Protocol

EPA's Office of Coastal Water funded the development of this approach to quantitative assessment of restoration project habitat function (Simestad et al., 1991). Use of the protocol on habitat restoration projects is intended to help ensure that adequate and consistent procedures are used for measuring project success. It should also help expand the data base of available information on these projects, leading to a greater understanding of restoration techniques.

Washington Department of Ecology

In addition to the Elliott Bay Action Program, Ecology has a number of ongoing programs and planning activities related to toxic contamination in the Elliott Bay project area. Programs that are most directly related to control of toxic contaminants are described below.

National Pollutant Discharge Elimination System

Point source permits are generally issued on a site-by-site basis and can include more than one discharge or source of pollutants. Permits for municipal wastewater treatment plants authorize discharges throughout the plant's service area, including CSOs. Industrial permits may include a storm drain component (for surface runoff) as well as wastewater discharges. NPDES permits may require effluent limitations (concentration or total loading) for toxic contaminants and may include provisions for instituting best management practices to reduce nonpoint contaminant inputs.

Ecology now maintains 17 NPDES industrial discharge permits in the Elliott Bay project area. Most of the industrial discharges consist of non-contact cooling water or stormwater. There are currently no permitted discharges of process wastewater to waterways of the project area. At the time of the 1988 plan, there were 47 NPDES discharge permits in the Elliott Bay/Duwamish area. The reduction in the number of permits has resulted from installation of recycling systems for non-contact cooling water or from plant closures.

NPDES Storm Water Permits

NPDES storm water permit regulations now require permits for discharge of storm water from most industrial sites. A baseline storm water general permit (Baseline Permit) developed by Ecology covers most industrial categories. Other categories of discharges, such as sand and gravel and associated industries, will be covered by industry specific permits. In general terms, the storm water permits require development and implementation of storm water pollution prevention plans (SWPPPs), which focus on implementation of best management practices (BMPs). The deadline for existing facilities to submit a Notice of Intent to apply for coverage under the Baseline Permit was February 18, 1993. For existing facilities, SWPPPs must be prepared by November 18, 1993, non-capital BMPs must be in place by November 18, 1994, and BMPs requiring capital improvements must be completed by November 18, 1995. Activity at construction sites affecting over five acres also requires coverage by the Baseline Permit.

The NPDES storm water permit regulations also require cities and counties with an urbanized population of 100,000 or larger to apply for an NPDES permit for the discharges from their separate storm sewer systems. This requirement applies to both the City of Seattle and King County. The City and the County have submitted their applications to Ecology. When issued, the municipal storm water permits compel covered cities and counties to be responsible for the quality of the discharges from their storm drains. Because of the permit requirements, both jurisdictions have adopted new drainage ordinances which give them enforcement authority over pollution discharges to their storm drainage systems.

Basin Approach to Water Quality Management

The Water Quality Program is in the process of implementing a plan that will reorganize the program's work on a watershed basis. The plan divides up each of Ecology's regions into watersheds, which in turn will be the focus for completing modeling of waste load allocations and subsequent permitting efforts. In the northwest region, the plan is to begin with the Nooksack River watershed.

Model Toxics Control Act

In March of 1989, the Model Toxics Control Act (MTCA), a citizen mandated toxic waste cleanup law, went into effect in Washington. Ecology adopted the initial cleanup regulation in May, 1990, and amended the regulation in February, 1991. Subsequently, MTCA cleanup of several sites along Elliott Bay and the Duwamish has been initiated under Ecology oversight. Ecology has jurisdiction over the cleanup of the petroleum contaminated sites on the Harbor Island Superfund site, because the federal law does not address petroleum contamination. The Port of Seattle is in the process of evaluating and cleaning up several waterfront sites in conjunction with facility development projects. In some cases, these cleanups may remove upland sources of surface water contamination and/or directly remediate adjacent sediment contamination.

Sediment Remediation

Since the mid-1980's, Ecology has been a lead agency or key participant in several efforts to develop tools for evaluating and managing contaminated sediments [e.g., Commencement Bay Superfund project, Puget Sound Dredged Disposal Analysis (PSDDA), Urban Bay Action Program, and Puget Sound Water Quality Management Plan]. Sediment Management Standards, Chapter 173-204 WAC, were adopted by Ecology on March 27, 1991. These regulations include sediment quality standards, sediment source control standards, and sediment cleanup standards. Ecology has also developed guidance documents to assist in implementing these rules.

Sediment Quality Standards (SQS) establish narrative and numerical long term goals for sediment quality in Washington State waters. Sediments that meet the SQS criteria are expected to have no adverse effects on biological resources and pose no significant risks to human health. Sediment source control standards integrate the SQS with the NPDES permit program, providing procedures for controlling sources based on their sediment impacts, and for determining where sediment impact zones which exceed SQS should be authorized. Finally, Sediment Cleanup Standards set forth a decision process for identifying contaminated sediment areas and determining appropriate cleanup responses.

The sediment cleanup decision process includes screening and ranking of contaminated areas to help focus limited resources on areas of sufficient concern to warrant active cleanup. The process also includes procedures for selecting an appropriate site specific cleanup alternative and cleanup standards. The initial ranking of sediment sites is being undertaken one bay at a time. The ranking of Elliott Bay sediment sites is scheduled to be completed during spring 1994; however, the Sediment Unit intends to release the ranking results from all the urban bays simultaneously, which may delay release of the Elliott Bay data.

Currently the Northwest Regional Office of Ecology is involved in oversight of a number of sediment cleanup projects being conducted in Elliott Bay. A work plan has been approved for characterization of the former product loading dock at the Unocal Marketing facility north of Pier 70. Ecology worked with the Port of Seattle to approve in interim cleanup at Pier 65 in conjunction with development of a short-stay moorage. Ecology has been involved in permitting and oversight of two Metro capping projects at Denny Way and Pier 53. In 1993, Ecology initiated work plan development by DOT for characterization of sediments around the Colman ferry dock in downtown Seattle, in response to a release of contaminated sediments during removal of a wing wall structure. To prevent future releases due to construction activities, Ecology, DOT, and the Port of Seattle cooperated in conducting a workshop to evaluate piling removal methods, associated environmental concerns, preventative measures, and sampling needs for construction projects in contaminated areas.

Ecology provides technical assistance and oversight of EPA Superfund activities at Harbor Island, and will be involved in providing assistance to the Pacific Sound Resources (Wyckoff West Seattle) sediment characterization. In addition, Ecology has participated as a joint lead agency in the development of an EIS/FS for aquatic cleanup at the Port of Seattle's Southwest Harbor Project, as well as overseeing cleanup of numerous upland source areas on Harbor Island and the Southwest Harbor Project under MTCA. Ecology staff participate in the Elliott Bay/Duwamish Restoration Panel, review and approve plans and reports for the Panel's cleanup projects, and manage the Elliott Bay Waterfront Recontamination Study and Sediment Transport Study. Finally, NWRO staff organized and directed an interagency/intergovernment working group to evaluate issues associated with development of a regional disposal facility for contaminated sediments, in conjunction with aquatic cleanup at the Southwest Harbor Project.

Dangerous Waste/Resource Conservation and Recovery Act

Ecology's Hazardous Waste & Toxics Reduction Program (HWTR) administers the federal RCRA program as well as a number of state-specific modifications. The program governs the generation, handling, and disposal of hazardous wastes. Spill prevention and containment measures, material handling requirements, groundwater monitoring, and site cleanup can be required as part of the program.

The HWTR program inspects several major hazardous waste treatment and disposal facilities, as well as large quantity hazardous waste generators, in Elliott Bay on either an annual or biannual basis. Each year additional sites are chosen for unannounced inspections.

Hazardous Waste Reduction Program

The 1990 Hazardous Waste Reduction Act established a non-regulatory, statewide goal of reducing hazardous waste generation 50 percent by 1995. To meet that goal, the act requires certain facilities using hazardous substances or generating hazardous waste to prepare plans for their reduction. The first facilities to prepare plans are generators of greater than 50,000 pounds per year of hazardous waste, excluding nuclear and cleanup wastes, and/or facilities required to report toxic releases under federal Community-Right-to-Know (SARA Title III, Section 113). Subsequently, generators of lesser volumes of hazardous waste will be required to prepare plans.

Ecology provides waste reduction advice and consultation both to businesses required to prepare hazardous waste reduction plans, and to small quantity generators that are not required to prepare plans. Plan implementation is not required, but there are strong incentives to implement waste reduction measures, including significant monetary savings and reduced regulatory requirements. In the first 264 plans submitted, 1,860 waste reduction measures were selected for implementation and 707 for further study, out of over 4,800 opportunities identified. Several of the larger facilities along the Duwamish and Elliott Bay are represented in this first group of plans, and more will be included in subsequent groups.

Oil Spill Contingency/Prevention Plans

Chapter 90.56 RCW, Oil and Hazardous Substance Spill Prevention and Response, requires that bulk oil facilities prepare oil spill contingency and prevention plans. The deadline for submission of draft plans for approval by Ecology was January 1, 1993. The following facilities on Elliott Bay/Duwamish have submitted draft plans: Shell, Texaco, Arco, Rainier Petroleum, and Olympic Pipeline (all on Harbor Island); GATX, Panoco (Pier 91), and Seattle Steam Company.

Shoreline Management Program

Ecology's Shoreline Management Program oversees the development and implementation of local shoreline management ordinances. While the actual shoreline permits are issued by local government agencies, Department of Ecology approval is required for shoreline variances or conditional use permits.

King County Department of Metropolitan Services (Metro)

Metro is responsible for the collection (responsibility shared with the City of Seattle), treatment, and disposal of municipal wastewater in the Elliott Bay project area. Work began in 1991 to upgrade Metro's wastewater facility at West Point from primary to secondary treatment, in accordance with a federal mandate that secondary treatment be in place by the end of 1995. Related responsibilities include industrial pretreatment program management, CSO control, biosolids management, and compliance monitoring. In addition, Metro is involved in regional water quality planning, ambient water quality monitoring, hazardous waste management technical assistance, sediment remediation, and habitat restoration. Metro has played a key role in supporting EBAT, providing space for interagency work group bi-monthly meetings, attending meetings regularly, coordinating with Ecology, and providing some laboratory support.

CSO Control

In June 1988, Metro released its final CSO control plan, which is designed to meet Ecology's requirement for a 75 percent CSO volume reduction in the Metro service area by the year 2005. Progress reports are submitted to Ecology annually. Metro's computer modeling has shown that, by 1996, implementation of the CSO control plan will have resulted in a 34 to 37 percent reduction in annual overflow volumes from baseline 1981-83 measurements. The CSO control projects are described below.

Program Schedule

	Design Initiation	On Line
Parallel Ft. Lawton Tunnel	1987	1991
CATAD Modifications	1986	1993
Hanford/Bayview/Lander	1986/1988	1991/1992
University Regulator	1987	1994
Carkeek Transfer/ CSO Treatment Facility	1988	1996
Alki Transfer/CSO Treatment Facility	1989	1996
Denny Way CSO Control	1994	1999
Diagonal Separation	1995	1999
Michigan Separation	1991	2003
Kingdome Industrial Area Storage/Separation	1991	2006
Brandon Storage/Separation	1991	2004
North Beach Storage/ Pump Station Upgrade	1993	2003
Henderson Pump Station/ Martin Luther King Way	1996	1996

Hanford/Bayview/Lander Sewer Separation -- This project consists of partial separation of the Lander and Hanford drainage basins and reactivation of the previously abandoned Bayview Tunnel.

Hanford -- The Hanford separation project was completed in October 1987. Street storm drains were removed from the sanitary system, partially separating about 1,132 acres of combined sewers upstream of the existing Hanford tunnel. The project also included installation of a new 36-inch sanitary sewer line inside the existing 108-inch Hanford tunnel. The 36-inch line is used to convey partially separated flow to the Elliott Bay Interceptor. The 108-inch tunnel conveys storm water to the Diagonal Way storm drain and then to the Duwamish River. The project eliminated CSO's from the Hanford No.1 Regulator.

Lander/Bayview -- The Lander Street sewer basin covers the area from the East Waterway between Holgate Street and Hanford Street east to Interstate 5. The Lander Street Sewer Separation Project was conducted in two phases. Phase I provided partial separation of the Lander basin through installation of a new 96-inch sanitary trunk line and conversion of the existing 84-inch line to convey storm water. The new 96-inch line provides about 1.4 million gallons of storage capacity. Metro removed 500 tons of debris from the 84-inch line. Metro and the City of Seattle are developing an agreement to maintain the 84-inch line.

Phase II of the project required installation of a new storm water collection system in the basin that is operated and maintained by the City of Seattle. The Bayview Tunnel is used to divert flows from the Hanford Basin to the 96-inch Lander sanitary trunk line. Overflows have been reduced at Lander as a result of the project.

To mitigate impacts to both sanitary and storm sewers, Metro pursued an aggressive industrial inspection program to control toxicant sources. A total of 152 businesses were inspected and approximately one-third of these made changes in their waste disposal practices. In addition, 24 companies stopped using storm drains to dispose of their waste.

Estimated Reduction of Pollutants to Storm Sewers in the Lander Basin from Source Control

Pollutant	Reduction
Wash water (vehicles, equipment)	12,500 gallons/day
Metals (cadmium, copper, zinc, aluminum, zinc, lead, nickel, and chromium)	584.43 lbs./year
Organic toxicants	2.79 lbs/year
Sludges (contaminated sediments)	1,482 lbs/year
Antifreeze, radiator flushes	4,375 gallons/year
Diesel fuel	1,200 gallons/year
Used oil	422 gallons/year

University Regulator CSO and Source Control -- As a result of the University Regulator Project, storm runoff from the Densmore drain, Interstate-5, and outflow from Green Lake will be diverted from Metro's North Interceptor sanitary sewer system to a new storm drain. CSOs into Portage Bay will be reduced significantly when the project is completed.

Metro completed final design and permitting in the first quarter of 1993. Restoration designs were reviewed with the Department of Natural Resources, Seattle Engineering Department, and the community. Construction began in the February 1993.

In conjunction with the construction of the University storm water outfall for the separation project, Metro performed additional source control in the Densmore Drainage basin. The source control efforts in this basin include sampling of storm water discharges and freeway run-off, follow-up inspections of the industrial sources identified in the University Source Control final report, and outreach programs for the community and the area high schools.

Alki Transfer/CSO Treatment Facility -- The Alki project is designed to transfer base flows (2.25 x average wet weather flow (AWWF)) from the Alki drainage basin to the West Point plant for secondary treatment. Flows above this level, to a maximum of 74 million gallons per day (mgd), will receive primary treatment and disinfection at Alki. The existing facility will be modified to permit intermittent discharges and flows will be discharged from the existing outfall. Specific permit conditions for operation of the Alki plant have been negotiated with Ecology. Full utilization of this project is contingent on West Point being on-line in 1995.

Carkeek Transfer/CSO Treatment Facility -- The Carkeek project is designed to transfer base flows (2.25 x AWWF) from the Carkeek drainage basin to the West Point plant for secondary treatment. Flows above this level, to a maximum of 20 mgd, will receive primary treatment and disinfection at the existing Carkeek treatment plant and be discharged through the existing outfall. The existing facility will undergo minor modifications to allow treatment of peak storm related flows up to 20 mgd. Specific permit conditions for operation of the Carkeek storm water plant have been negotiated with Ecology. Final design of all elements was completed in 1992. Full utilization of this project is contingent on West Point being on-line in 1995.

Computer Augmented Treatment and Disposal (CATAD) System Modifications -- Modifications to the CATAD control system are designed to improve system efficiency by more fully utilizing the storage capacity in existing sewers. The previous computer control system utilized 17 to 28 million gallons (MG) or 28 to 47 percent of the storage within the system's estimated 60 MG capacity. The system became fully operational in February 1993.

Fort Lawton Parallel Tunnel -- The West Point Secondary Treatment Plant has a peak capacity of 440 mgd. The new parallel tunnel stores and transports 82 mgd of combined sanitary and storm water flows (over the secondary base flow capacity of 358 mgd) to West Point. This project provides CSO reduction at the Ballard Regulator and Third Avenue West weir. Construction was completed in the summer of 1991 and the tunnel was activated in the fall of 1991.

Kingdome and Michigan Separation projects -- These projects are in the predesign phase. Predesign has helped to identify what, if any, project elements should be constructed to avoid conflict with City of Seattle transportation improvement projects. With the exception of the Kingdome separation, there is no indication that substantial savings or avoidance of environmental impacts would be realized by accelerating completion of these projects. Consequently, work on these and other remaining CSO projects is not anticipated until after 1994.

Michigan Street Basin Source Control Project -- As a component of the separation project, a project team with the Industrial Waste Section, Metro, devised and implemented an inspection program for this basin. This program involved the inspection of 122 businesses and as well as of educational outreach and technical assistance. Low levels of contaminants were found in both the pre-inspection and post-inspection key-manhole sampling events. Because of these low levels (most below detection limits) data was not used to measure the effectiveness of source control.

Denny Way CSO Control Project -- Denny Way CSO outfall is the largest volume overflow point in the Duwamish River estuary. The 1988 plan recommended partial separation of the Denny drainage basins. Metro is reassessing the project and schedule in the context of the CSO Control Plan 5-Year Update and in coordination with the plans of Seattle Drainage and Wastewater Utility for controlling CSOs to Lake Union. Alternatives identified to date include combinations of storage and treatment, or storage, separation and treatment. Design for Phase I, a portion of a new conveyance line on the east side of Lake Union, has been initiated by the City of Seattle.

Assuming congressional reauthorization of the Clean Water Act this year, Metro will submit a Federal Title 2 construction grant application to help fund this project. Completion of the abatement project is targeted for 1999.

Brandon Separation -- The Brandon basin project will involve separation of approximately 1,640 feet of sanitary trunk, partial separation of 52 acres, construction of a new regulator station, and 4.7 MG off-line storage to reduce CSOs.

North Beach Storage/Pump Station Upgrade -- North Beach was added to Metro's CSO control plan because overflows were discovered during the Carkeek predesign effort. The North Beach predesign report recommended overflows be controlled by constructing a storage basin at the site, upgrading the pump station to increase its capacity, and constructing a new pipeline in Carkeek Park to reroute flows from two City of Seattle gravity sewer lines that discharge directly to Metro's force main.

Henderson Street Pump Station/Martin Luther King (MLK) Way -- A portable flow monitor was deployed upstream from the Henderson and MLK Way pump stations in March, 1990 to accurately monitor overflows. Monitoring data have indicated overflows at the Henderson Street in excess of the Ecology requirement. These overflows may be related to the pump station operation and/or partial plugging of the lines. Alternatives to reduce overflows at Henderson/MLK Way will be identified and developed in the CSO Control Plan Five-Year Update.

Key Manhole Program

The key manhole program entails tracing and identifying contaminant sources in distribution systems (e.g., sewer trunk lines and interceptors) within the Metro service area. The first phase of the program, which began in 1985, consisted of comprehensive characterization of the waste stream. This phase began with two 2-week intensive sampling events per year, one each at the West Point and Renton municipal wastewater treatment plants. This sampling was augmented in 1986 by 14 grab samples per month taken from locations in the service areas of the West Point and Renton treatment plants.

The second phase, which consists of source identification and pollutant reduction (with an emphasis on cadmium), began in 1988. The second phase focuses on priority basins to be selected by the following criteria:

* the nature of NPDES discharges within the basin;
* results of previous source tracing studies;
* identified need for separation projects within the basin;
* the number and magnitude of CSO's in the basin;
* discharges from the basin to a water body of concern (e.g., Duwamish River, Elliott Bay, or Lake Union).

Sewage at key junctures (manholes) within a distribution system are sampled and analyzed to trace sources of contaminants within the sewage collection system.

Identification of contaminant sources is aimed at decreasing the amounts of cadmium and other pollutants in treatment plant sludge, decreasing the chance of NPDES violations, and improving the identification of potential sources of spills from industrial facilities.

Hazardous Waste Management Section

In October 1991, the Hazardous Waste Management Section was organized as a new work group within Metro. The section is responsible for implementing the county-wide moderate risk waste plan, as required by the state Hazardous Waste Management Act (RCW 70.105). The section's mission is to help small businesses and households learn about the provisions of the law regarding the disposal of hazardous wastes, and to assist them in reducing and/or disposing of their wastes. Specifically, the Hazardous Waste Management Section: 1) provides free, on site consultations to small businesses regarding hazardous waste issues; 2) coordinates seminars, workshops and classes for business persons, including Metro employees; 3) develops brochures, booklets and other materials; 4) maintains a resource library on hazardous waste issues; 5) provides response services to complaint calls and other agency referrals; 6) performs on-site surveys of business practices; and 7) performs technology evaluations and engineering review of treatment methods.

Implementation of the Local Hazardous Waste Management Plan for Seattle-King County, is a joint effort involving Metro, the Seattle-King County Health Department, King County, the City of Seattle, and twenty-nine suburban cities. Full implementation of the plan began in early 1992.

The Hazardous Waste Management Section incorporates Metro's on-going educational and technical assistance program aimed at small quantity generators. The first phase of the program targeted three groups of small-quantity hazardous waste generators: 1) automotive repair and auto body shops, 2) marine repair facilities and boat yards, and 3) photo-processing, printing, and graphic arts businesses. Educational materials were developed emphasizing the measures each type of business can take to protect Puget Sound, and at the same time minimize or eliminate liabilities and disposal costs by reducing the amount of hazardous waste produced.

Through Ecology referrals, the Hazardous Waste Management Section has also been performing Initial Investigations, responding to complaints of hazardous waste contamination at industrial facilities in King County. This cooperative effort was initiated during the spring of 1993, and is helping to deal with the backlog of environmental complaint reports at Ecology.

Sediment Remediation Efforts

Metro's Marine Assessment Group is involved in a project that focuses on the elimination of chemical hot spots in Elliott Bay. The first project was the Denny Way Sediment Capping Project which was conducted offshore of the Denny Way CSO.

It was conducted as an experimental demonstration project to evaluate the benefits of capping as a means of improving sediment quality in Elliott Bay.

The first phase of the project, completed in the summer of 1989, involved removing contaminated sediments from two sewer lines that are tributary to the Denny Way CSO. The second phase, consisted of delivering a total of thirteen barge loads of clean dredged sand and spreading it over a rectangular capping site (200 ft. x 600 ft.) in a cooperative effort between the Seattle District U.S. Army Corps of Engineers (Corps) and Metro.

In support of the capping operation, Metro conducted pre-dredge testing of capping sediments; dissolved oxygen testing during cap placement; and measurement to determine foundation settlement and cap thickness. Metro is currently conducting a five-year post-capping monitoring program that includes: surface grab sediment sampling to measure cap chemistry for recontamination and benthic taxonomy for recolonization evaluation; video camera surveying to view overall bottom condition; coring with sediment chemical testing to determine cap effectiveness in isolating chemicals; and preparing reports during the monitoring period. A five year project review will be conducted in 1995.

In addition to the Denny Way CSO effort, Metro has sampled several sediment grids along the Seattle south waterfront to better define the impacted areas and evaluate priorities for remedial action. Based, in part, on the results of this sampling, Pier 53-55 was selected for capping with clean sand dredged from the Duwamish Waterway's upper turning basin by the Corps. The cap was completed in early 1992. It was decided by the Elliott Bay/Duwamish Restoration Program Panel to allow the cap to be counted as a sediment remediation pilot project under the NRDA Consent Decree.

Cedar/Green Watershed Planning

Metro is the designated area-wide planning agency for the Cedar River/Green River watershed under section 208 of the 1972 Clean Water Act. The planning boundaries include the lower Duwamish as well as the upper Cedar/Green River watershed area. The plan is intended to be comprehensive, covering the major jurisdictions active in the watershed. Although federal funding for section 208 planning has been terminated, Metro has continued preparing water quality management plans every five years, and the latest plan is due to be updated.

City of Seattle

Since all of Elliott Bay and most of the lower Duwamish River lies within the City of Seattle, the City's involvement in pollution control and cleanup efforts is extensive. In 1989 and 1990, the City cooperated in the Superfund cleanup on Harbor Island by cleaning the entire storm drain system on Harbor Island. By removing contaminated sediments from the pipes, the City eliminated a major source of pollution in Elliott Bay.

Storm Water, Grading and Drainage Control Code

In November, 1992, the Seattle City Council passed a revised grading and drainage ordinance to allow greater regulation of storm water quality and to enhance flood control requirements. A major incentive for developing this ordinance was the implementation of NPDES municipal stormwater permit requirements, which make the City responsible for the quality of the discharge from its storm drains. To help ensure NPDES storm water permit requirements are met, the new drainage code gives the City enforcement authority to control pollution discharges to City storm drains.

Combined Sewer Overflow Control

Since 1968, the City of Seattle has conducted a major program involving sewer separation and construction of storage tanks to reduce combined sewer overflows. Under this program, 50 of 80 CSOs associated with City collection systems had been controlled by 1989. The City developed its 1988 CSO Control Plan in response to requirements imposed by Ecology to reduce CSOs to no more than one overflow per site per year. The plan established the goal of elimination of all but one of the City's CSOs by the year 2006. The City is now expecting to eliminate **all** overflows by 2006. To date, the City has laid 500 miles of pipe and spent about $250 million (in 1992 dollars) reducing combined sewer overflows to one or less per year at all City controlled CSO outfalls to Elliott Bay and the Duwamish River. The remaining City CSOs to be controlled are located on Lake Union and the Ship Canal. (City of Seattle Planning Department, 1992)

As part of its CSO control program, the City of Seattle has completed the following projects:

* Hanford tunnel, sewer/stormwater separation;
* Alaskan Way, sewer/stormwater separation;
* West Waterway, SW Hinds, sewer/stormwater separation;
* Interbay CSO, Pier 91 enhanced storage;
* Vine Street CSO, inlet modification to reduce CSO frequency and intensity;
* partial separation and inlet modification of waterfront CSO's (University Street, Madison Street and Washington Street);
* Diagonal Way CSO, complete separation and storage enhancement;
* SW Hinds Street, reduce CSO overflows from 30 plus times per year to one.

Comprehensive Drainage Plan

In 1988, the Seattle Drainage and Wastewater Utility (DWU) completed a study to provide the City with a coordinated plan for managing the existing urban drainage system.

The purpose of the plan was to address flooding, drainage and water quality problems associated with urban stormwater runoff. The plan includes elements for capital improvements, ongoing maintenance, and monitoring. The plan also identifies alternative solutions to controlling flooding and pollution, such as regulatory controls and public education.

The Comprehensive Drainage Plan calls for a number of actions in two drainage basins that discharge to the Elliott Bay/Duwamish study area: Delridge basin (upper Longfellow Creek) and South Park basin (Duwamish River upstream of W. Marginal Way). Improvements completed for the Delridge basin include a bypass pipeline at SW Juneau Street and some channel enhancements. DWU is currently designing a project in the South Park drainage basin to improve the quality of stormwater released into the Duwamish River. The program includes detention facilities to control flows, treat stormwater, decrease sediment loadings and protect a wetland.

Duwamish River Source Control Program

Using an Ecology grant, DWU is conducting a three-year source control program for Elliott Bay and the Duwamish River. The program will improve the operation and maintenance of storm drains and facilitate cleaning and sampling efforts. Water quality inspectors will make site visits, investigating potential sources of pollution and providing information to businesses and property owners on best management practices for water quality protection.

Longfellow Creek Watershed Plan

The purpose of the Longfellow Creek Watershed Plan is to develop a program of control measures which will be effective in preventing and reducing nonpoint pollution in this West Seattle drainage basin. Prior to initiation of the planning effort, DWU conducted a stormwater monitoring program in 1990 to better characterize existing water quality in the basin. The City prepared a water quality assessment comparing historical and 1990 data to state water quality standards and data from similar urban streams in the region. Also, pollutant concentrations during storm flows were compared to pollutant concentrations during low flows. Pollutant concentrations were generally found to be highest during storm flows. The information in the Longfellow Creek Water Quality Assessment provided a basis for subsequent planning efforts.

The Longfellow Creek Watershed Action Plan is a result of a year and a half study of the creek and its surrounding watershed by DWU and the Longfellow Creek Watershed Management Committee. The committee studied the influences which have shaped the watershed, the alterations of its natural functions by human impacts, and the historical uses of the creek. From its review, the committee identified the major nonpoint pollution problems in this watershed, identified the sources of these problems and strategies to combat them, and produced a series of recommendations to reduce nonpoint pollution in this watershed. The public review draft Longfellow Creek Watershed Action Plan was published in July 1992, and was formally agreed to by the Seattle City Council in October 1992.

Public Outreach and Education

DWU has a program to educate citizens about their role in solving water quality problems. The program works through the public schools as well as through direct contact with businesses.

Side Sewer Ordinance

The City of Seattle's Side Sewer Ordinance requires all buildings, plumbing outlets, and ditches be connected to the nearest accessible sanitary sewer, combined sewer system, or storm drain, whenever the sewer or drain is within 300 feet. Detention is required when the system is tributary to a combined sewer.

Sewer Outreach Program

The Sewer Outreach Program, run by the Seattle Engineering Department and the Seattle/King County Health Department, was developed to reduce environmental and health risks from failing septic systems. The Sewer Outreach Program identifies remaining septic systems within the City limits, evaluates their condition, and documents problem areas or potential system failures. When a failure occurs, the City requires property owners to connect to the sewer system, if it is accessible. If it is not, the City works with property owners to extend sewers.

Illegal Dumping and Litter Control

Litter and illegal dumping of large household items, garbage, and yard waste are a problem in the City of Seattle that affects water quality. An ordinance was passed by the City Council in 1987 which improved the City's ability to regulate garbage disposal and control litter. The ordinance increased civil penalties for littering; included the police department in litter enforcement activities; and granted enforcement authority to the Seattle Engineering Department for rights-of-way (including street ends) and to the Department of Construction and Land Use (DCLU) for private property. The ordinance provides that if the illegal dumper cannot be identified, the owner is responsible for cleaning up the property.

The Seattle Solid Waste Utility has implemented curbside recycling of paper, glass, plastic, cans, and yard waste, while actively encouraging composting. In addition, the City participates with community groups in annual cleanups along the Duwamish River and Longfellow Creek. The City hauls and disposes of trash collected by volunteers.

Open Space

By 1984, the City had designated 13 greenbelts within which regulations were proposed on development and/or tree trimming and removal. In 1987 the Mayor's Recommended Open Space Policies, which included regulations and policies for greenbelts, parks and local drainage ravines and ditches, called Natural Areas, were adopted by the City Council; however, the Washington Supreme Court found the Greenbelt Overlay District Regulations to be unconstitutional. Modifications to the Greenbelt Overlay Regulations are currently being considered.

The year following the Supreme Court decision, voters approved the Open Space Bond Issue, which provided $23.5 million for the purchase of greenbelt land and $8.2 million for natural areas purchases. For example, the Seattle Department of Parks and Recreation Open Space Program has purchased 21 parcels of land, totalling eight acres, of undeveloped property along Longfellow Creek, in order to preserve open space and protect the creek. The City also is actively pursuing the purchase of 20 more acres along Longfellow Creek.

Additional money for open space purchases by the City has been provided by Metro as mitigation for the West Point Sewage Treatment Plant expansion and upgrade. Twenty-five million dollars has been dedicated for the Shoreline Parks Improvement Fund (SPIF), providing for shoreland purchase and park improvements City-wide. On the Duwamish Waterway, the former Seaboard Lumber Company site is a likely candidate for purchase by the City with SPIF money. The parcel is also being considered for habitat restoration by the Duwamish Restoration Panel. The Seattle Parks Department and the Panel are coordinating their future plans for the site.

Habitat Improvement

DWU sponsors a work crew from Seattle Conservation Corps every year to clean debris from creeks, build check dams to improve fish passage, provide public access to creeks, and plant stream banks to reduce erosion and improve habitat.

The City has adopted policies and regulations setting standards for development in environmentally critical areas. These policies and regulations include protection measures for wetlands and riparian systems.

King County

Although King County has jurisdiction over only a small portion of the Duwamish within the area covered by this plan, King County does have jurisdiction over a large area of the Green-Duwamish watershed. Therefore, King County programs have an important affect on the quality of the water as it enters the lower Duwamish, as well as on the quality of the habitat for salmon that migrate upstream to spawn.

Watershed Planning

In 1987 the Green/Duwamish River watershed was selected by Ecology as an early action watershed in its nonpoint source control program. King County's Resource Planning Division led the development of the Green-Duwamish Nonpoint Action Plan, which was approved by Ecology in July, 1991. The plan outlines 103 actions to minimize non-point pollution, protect the watershed's resources, improve water quality, and enhance interagency cooperation. King County completed its first progress report on implementation of the plan in May, 1992.

The report found that most of the actions were being implemented; however, funding is lacking for some actions and for continued interjurisdictional coordination.

King County has adopted several other plans to protect the Green River and its tributaries upstream of the dredged waterway. These include the Soos Creek Basin Plan, the Soos Creek Community Plan, the Tahoma-Raven Heights Community Plan, and the Covington Master Drainage Plan. King County is also working on a water quality plan and a special area management plan for Mill Creek, Auburn.

As part of the basin planning program, King County Surface Water Management Division (SWM) intends to develop basin plans for the Duwamish drainages within its jurisdiction. Scoping is scheduled to start in January 1994. A current and future conditions report is scheduled to be completed in February 1995, followed by a draft plan in October 1995. After the plan is adopted, the County will design, construct, and implement the facilities and programs recommended by the plan as funds become available. As part of the current conditions report, SWM will start collecting stormwater samples this year from several drains that discharge into the Duwamish near the upper turning basin.

South 96th Street Drainage

Within the Elliott Bay Action Plan area, King County has received a Centennial Clean Water Fund grant from Ecology to develop a Phase I engineering study to improve water quality in the South 96th Street/Hamm Creek drainage. This drainage has been the focus of recent Ecology EBAT source control efforts. A consultant has been hired by the County to review the existing data, survey the wetlands, do limited sampling, and develop an engineering report. The County anticipates that the South 96th Street drainage improvement work would be coordinated with restoration efforts under the Elliott Bay/Duwamish Restoration Program, if that area is chosen for habitat development work.

Water Quality Ordinance

The King County Council adopted a new water quality ordinance, Ordinance 10636, in November 1992. The ordinance prohibits the discharge of many contaminants to water bodies and storm drainage systems, giving the County enforcement authority over such discharges, in accordance with the NPDES stormwater regulations. The ordinance also requires the development of a best management practices manual. A public review draft was scheduled to be completed in April 1993. SWM has hired staff people to enforce the ordinance. In addition to the water quality enforcement staff, SWM's Facility Maintenance staff has been checking for illicit connections into storm drainage systems. The facility Maintenance staff will also be responsible for inspecting the best management practices required by the new manual.

Port of Seattle

The Port of Seattle has become a major player in the cleanup of contaminated sites and restoring habitat on Elliott Bay. The Port has also been working on controlling pollution from its terminals. Important Port plans and activities relative to Elliott Bay are discussed below.

Container Terminal Development Plan

In order to meet its economic and environmental objectives, the Port of Seattle conducts numerous facility planning activities. The 1991 Container Terminal Development Plan is the most recent element of a marine cargo planning process, which began with compilation of the Port's Harbor Development Strategy for Marine Cargo in 1985. Due to the scope of the 1991 Container Plan, the Port prepared a programmatic environmental impact statement to match the 20 year business/facility plan with a long range environmental plan. The programmatic EIS includes a planning level evaluation of anticipated environmental issues and problems and presents a comprehensive set of environmental guidelines for implementation of any of the development needs identified in the Container Plan.

The Port's objective is that redevelopment of existing Port facilities and former industrial sites in south Elliott Bay be accomplished such that economic and environmental improvement goals are accomplished coincidentally. The Port's intent is to plan, design, and implement redevelopment for container cargo expansion to achieve net environmental improvements, including the following principal areas: (1) remediation of upland soils and aquatic area sediment contamination; (2) control of sources of contamination to prevent recontamination of cleaned up areas; (3) cleaned up and expanded fish and wildlife habitat; (4) provision of public shoreline access to sites emphasizing natural resource values and public participation and support for environmental improvements.

At present, the Port is working to complete environmental review steps pertaining to two redevelopment and cleanup areas identified in the 1991 Container Plan: (1) the Southwest Harbor Cleanup and redevelopment project, and (2) the Terminal 30 Improvement Project (Southeast Harbor area). The Southwest Harbor Project area, as identified for study in the spring of 1991, included the Lockheed Shipyard Number 2 property and the adjacent Wyckoff property. In response to the demand for increased container terminal acreage by the Port's tenant at Terminal 5, American President Lines, the Port has expanded the scope of the project. The Southwest Harbor Project now includes approximately 100 acres of the existing Terminal 5, 80 acres of combined upland and aquatic area at the Lockheed and Wyckoff properties, and 105 acres of area west and south of these sites, for a combined area of 285 acres.

The basic objective of the Southwest Harbor Project is to clean up and redevelop the former shipyard and other adjacent properties for use as a modern container shipping terminal. Corollary project objectives include: implementation of a comprehensive upland and aquatic area cleanup, coincident to redevelopment; preservation and improvements to fish and wildlife habitat and public shoreline access in areas adjacent to the Duwamish estuary and Elliott Bay; and provision of additional opportunities for cleanup of contaminated sediments in the Duwamish estuary and areas of Elliott Bay.

The Port is in the process of preparing a combined environmental impact statement/cleanup feasibility study for the proposed Southwest Harbor Project. The Draft EIS was completed in January 1994. At present, the Port intends to conduct upland soil cleanup at the Lockheed site before the final EIS is completed in the summer of 1994. MTCA public hearings and City of Seattle shoreline and master use permit approvals for the remainder of the site is scheduled for completion in the summer of 1994 and cleanup would be started after all required permits are obtained.

Additional properties under review for cleanup and redevelopment in the Southwest Harbor Project include the Wyckoff site, the former Seattle Steel properties, and a collection of smaller properties. The combined redevelopment area includes 105 acres that will need to be cleaned up. Implementation is scheduled for a three year period following completion of the EIS process in 1994.

Other Cleanup Projects

In the Southeast Harbor area, three projects are planned to go forward over the next 10 years: Pier 34 (GATX), Pier 27/28; and East Marginal Way. Redevelopment of the Pier 27/28 and Pier 34 sites as container yard could be completed within three to five years, to provide for expansion by the Port's tenant at Terminal 30. Site cleanup would be a prerequisite to the planned redevelopment.

In addition to these large projects, the Port is continuing to evaluate the need for retaining underground storage tanks and removing all unused and unneeded tanks. The Port has also assured that spill prevention, control, and countermeasures (SPCC) plans are developed and in effect for all applicable above-ground tanks. The Port continues to remove and clean up leaking underground petroleum storage tanks on its properties.

Other site improvements to benefit the environment include paving and drainage work at Terminal 106 west and drainage improvements at Terminal 5. The T-106 project addresses dust control and reduction of sediments in runoff from the site, which is used for cargo container storage and repair. The T-5 project will provide a separate area for storage and storm water collection for animal hide containers, which tend to leak the brine used for preserving the hides. The brine has been found to exceed acute marine toxicity standards for copper and zinc, but is acceptable for discharge to the Metro sewage treatment system. The Port, through their storm water pollution prevention plans, is in the process of addressing the brine leakage problem at other facilities as well.

Dredging

Dredging is an ongoing Port activity for both construction and maintenance of berth depth at Port properties. The Port's only current dredging plans are to do very limited dredging at Terminal 91, Terminal 5, Terminal 30, and Terminal 115. The Port's dredging plans are affected by their concerns about the lack of cost-effective sites for disposal of contaminated materials and Ecology's plans for sediment cleanups under MTCA and other regulations.

In addition to removal of contaminated sediment by dredging, the Port is monitoring and documenting the efficiency of a nearshore confined disposal project at Terminal 91. Begun in mid-1986, the project consisted of constructing two long berms extending across the 90/91 slip to link the two piers. Each berm contained clean fill with sandy gravel cores, covered with rip-rap to withstand pounding waves. The contaminated dredge materials were then placed between the berms. The fill was completed with uncontaminated sand and gravel and paved with asphalt. A storm water drainage system was installed to safely handle storm water runoff, and a system of monitoring wells was installed.

The monitoring results demonstrate that the containment structure meets regulatory and environmental requirements outlined in the governing consent agreement between the Port of Seattle and the Department of Ecology. In addition to the monitoring well data, chronic saltwater bioassay tests were performed to research any biological effects the fill may be having on aquatic organisms. No adverse affects could be found. Containment of organic and inorganic contaminants in the dredged materials was clearly shown to be working within the short fill facility. Overall confinement was shown to be related to the interrelationship between the hydraulics and the biogeochemistry within the facility. Information from this project will assist in siting and designing environmentally acceptable near-shore confined disposal sites.

Tenant inspections

The Port has initiated an inspection program to ensure that tenants are implementing best management practices for water pollution control. This program is being integrated with the development of storm water pollution prevention plans for Port facilities, as required by the NPDES baseline general permit for stormwater.

Habitat Restoration

The Port of Seattle is the local partner for two Coastal America habitat restoration projects, planned in cooperation with the U.S. Fish and Wildlife Service (FWS), EPA, and the Corps. These restoration projects, located at the Turning Basin and at Terminal 105, are both scheduled for implementation in 1993 and 1994.

The Turning Basin project involves restoration of intertidal influence in a shallow embayment at an existing filled upland site. The project covers approximately 0.5 acres and includes additional improvements associated with removal of derelict vessels at the project shoreline. Approximately 5500 square feet of additional area will be restored to estuarine production as a result of the project. The Terminal 105 project includes excavation of existing fill from a former estuarine mudflat location and creating an intertidal channel. The project area is approximately 1.6 acres, including 1.2 acres of intertidal habitat.

The Port and the Muckleshoot Indian Tribe have an agreement for funding habitat restoration and enhancement work in the Duwamish River. The funding is provided by a surcharge on mitigation work done by the Port. Both the Port and the Muckleshoot Indian Tribe draw on this funding for habitat projects.

Thus far, only one project -- construction of terraced slopes in the Duwamish East Waterway -- has been undertaken under this agreement.

In addition to these projects, the Port is involved in habitat restoration efforts in conjunction with facility development projects discussed above. The Port also has been planning for habitat restoration efforts that would be offered for settlement of a potential future Natural Resource Damages lawsuit.

Delayed Release Net Pen

In 1993, the Port of Seattle, the Muckleshoot Indian Tribe, and the Suquamish Tribe applied for permit approvals to locate a delayed release net pen at Pier 86 (Cargill Grain Terminal) in northeast Elliott Bay. The Port has also conducted investigations of an alternative site in southwest Elliott Bay. The purpose of the delayed release pen is to increase the survival of hatchery-raised juvenile salmonids by allowing them to grow larger in salt water prior to release. At the end of October 1993, the required NPDES permit was in draft form and undergoing internal Ecology review, in preparation for the 30 day public comment period. The permit has since been issued and the net pen is in operation off the shore of Elliott Bay Park, as planned.

Seattle-King County Department of Public Health

The Seattle-King County Department of Public Health has three on-going programs that may result in decreases of toxic contaminant inputs to the Elliott Bay project area.

Local Hazardous Waste Plan

In conjunction with Metro, the City of Seattle, and the King County Solid Waste Utility, the Seattle-King County Department of Public Health is implementing a Local Hazardous Waste Plan, initially developed in 1989. The main emphasis of the plan is to provide hazardous waste management education to small quantity generators and household generators of hazardous waste. The Seattle-King County Department of Public Health is conducting audits of individual businesses with histories of improper waste disposal practices (e.g., dry-cleaning establishments, pest-control operators, and auto-body shops). The program is oriented toward education and voluntary participation. The program currently contains no enforcement component.

Hazards Line

The Seattle-King County Department of Public Health provides the Hazards Line as a service to households and businesses in the King County area. The Hazards Line provides information on proper waste disposal methods, recycling opportunities, and alternative nontoxic products. The Hazards Line receives approximately 45 calls per day.

Guide to Small Businesses

The Seattle-King County Department of Public Health provides, on request, a pamphlet entitled Hazardous Waste Disposal: Guide to Businesses. This guide provides information on regulations governing small-quantity generators of hazardous waste, proper recycling and disposal methods, and other information. The guide is updated regularly.

City of Tukwila

The City of Tukwila has jurisdiction over a small area of the Duwamish shoreline north of the turning basin. That area has in the past couple of years grown through annexations, and now includes a portion of the Boeing Duwamish Corridor slated for redevelopment.

While most of the Tukwila's Duwamish and Green River shoreline is south of the turning basin, the City's actions affect both water quality downstream and habitat for fish migrating upstream of the EBAT focus area.

Shoreline Master Program

City planners are in the process of developing a new Tukwila Shoreline Master Program. The program focuses on allowable land uses, public access improvements, and natural shoreline restoration. The regulations governing allowable uses will set standards for shoreline setbacks and mitigation requirements for encroachment or harm to the natural environment. The mitigation requirements will apply to redevelopment of the industrialized shoreline. The new master program will focus on restoring shoreline vegetation in less developed areas upstream of the turning basin. Accordingly, mitigation for some downstream development will likely be allowed in upstream areas. The draft Tukwila Shoreline Master Program is expected to be ready for public review in early to mid-1994.

Source Control

The City of Tukwila has had a surface water utility for four years. Tukwila applies the King County storm water design manual requirements to new development. The city also responds to reports of illegal discharges to the storm drain system.

Tukwila Engineering Department has applied for Centennial Clean Water Fund grants from the Department of Ecology to do source control plans for two drainages. One grant was accepted and the other was rejected. As a result of the rejection of one of the grants, Tukwila will not be spending $500,000 budgeted as the local match for the proposed source control project.

Habitat/Shoreline Restoration

In practice, the City of Tukwila applies King County shoreline restoration criteria wherever there is work done on dikes, levees, or riverbanks. The city's intent is to use these development opportunities to provide habitat.

U.S. Army Corps of Engineers

Puget Sound Dredged Disposal Analysis (PSDDA)

The Corps is one of the principal agencies in Puget Sound responsible for regulating dredging and disposal of dredged material (including contaminated sediments). The Corps has been the lead agency in PSDDA in cooperation with the Washington Department of Natural Resources, EPA, and Ecology. The primary objectives of PSDDA are to:

* Identify acceptable sites for the open-water unconfined disposal of dredged material

* Define dredged material evaluation procedures for sediments that are being considered for disposal at PSDDA sites

* Formulate management plans for disposal sites.

Phase I of the PSDDA program, completed in the fall of 1988, focused on central Puget Sound including Elliott Bay. Phase II, dealing with the remainder of Puget Sound, was completed in 1989. These rules established open-water dredge disposal sites for clean dredged material. The Corps now manages the sediment evaluation and approval process for dredgers wishing to use the sites.

Permitting Responsibilities

The Corps manages dredging and filling under Section 10 of the Rivers and Harbors Appropriation Act of 1899 and Section 404 of the Clean Water Act. Section 10 of the Rivers and Harbors Appropriation Act of 1899 addresses work in navigable waters. CWA Section 404 addresses the discharge of dredged material into all waters of the state (including wetlands). This section authorizes the Corps to issue permits, after notice and opportunity for public hearing, for the discharge of dredge or fill material into the waters of the United States at specified disposal sites. Regulations addressing implementation of CWA Section 404 are currently under revision.

In the past, the Corps' regulatory program was primarily focused on protection of navigation. This program has now evolved into one that includes consideration of the full public interest by balancing the favorable impacts against detrimental impacts. The past program resulted in a nearly 95 percent reduction of wetland resources in the Duwamish waterway.

When evaluating a permit application, the Corps must consider several factors including whether state water quality standards would be violated; whether important wetlands or marine sanctuaries would be altered; possible loss or damage to fish and wildlife; the consistency of the proposed activity with the Coastal Zone Management Program; whether the proposed activity would impact areas with recognized historic, cultural, scenic, conservation, recreation, or other values; whether the proposed activity is associated with federal projects; and the potential impacts on threatened and endangered species. Possible mitigative measures are to be considered throughout the permit process. Losses are to be avoided to the extent practicable; mitigation may occur on-site or at an off-site location.

The Corps can issue three different types of permits under the authority of CWA Section 404 and Section 103 of the Marine Protection, Research, and Sanctuaries Act that address dredge and fill activities: nationwide permits, regional permits, and individual permits. The individual permit authorizes a specific activity and sometimes requires the completion of an environmental impact statement before issuance. The nationwide and regional permits are issued on a nationwide or regional basis for categories of activities that are similar in nature and presumably cause minimal cumulative impact. They are designed to reduce paperwork and unnecessary delay.

Dredging

In addition to its regulatory authority over dredge and fill activities by other parties, the Corps itself is responsible for performing maintenance dredging in federal navigation channels. The Corps does not issue itself a maintenance dredging permit, but does evaluate impacts that may occur from the activity and provides notice to the public of the planned activity.

The Corps has an ongoing maintenance dredging project in the Duwamish Waterway (30 ft. deep for 2.6 miles, 20 ft. deep for 0.8 miles, and 15 ft. deep for 1.8 miles to the head of navigation) and the East and West waterways (34 ft. deep) around Harbor Island. Maintenance dredging (averaging 120,000 cubic yards) of the upper waterway was done in 1984, 1986, 1987, 1990, and 1992. Most of the material has been deposited at the Four Mile Rock and Elliott Bay open-water disposal sites authorized by the Puget Sound Dredged Disposal Analysis (PSDDA). The remaining material has been used to fill or to cap contaminated 0sediments in Elliott Bay. Maintenance dredging of the upper waterway is again scheduled for February and March 1994.

Beneficial Use Studies

The Corps is investigating opportunities for the beneficial uses of dredged materials. The Seattle district has also supported sediment testing at restoration sites in conjunction with sampling undertaken as part of maintenance dredging activities in the Duwamish Waterway. Testing and sampling have included sediment analysis at a potential restoration site in the Duwamish Waterway's upper turning basin. This cooperative effort between the Corps and EPA included a $9,000 contribution from EPA's Environmental Evaluation Branch for analysis of restoration site sediment samples.

Coastal America

The Corps was the primary federal sponsor of the Coastal America habitat restoration project at the General Services Administration (GSA) site on the Duwamish. The Corps involvement included providing staff support in restoration, engineering and construction, as well as participating in negotiations with GSA.

United States Coast Guard

Four separate Coast Guard commands manage and respond to marine activities in Elliott Bay and the Duwamish Waterway. The Puget Sound Vessel Traffic System, the Coast Guard Group Seattle, and the Thirteenth Coast Guard District are primarily concerned with monitoring vessel movements, boating safety, search and rescue incident response, and navigational aids. The Marine Safety Office (MSO) Puget Sound is the command most directly related to water quality concerns in Elliott Bay. MSO Puget Sound inspects commercial vessels and waterfront facilities, investigates marine casualties, responds to pollution discharges, and exercises Captain of the Port authority under the Ports and Waterways Safety Act.

MSO Puget Sound's Marine Environmental Protection Program is divided in to two activities: Prevention and Response.

Prevention. The MSO Puget Sound's focus is on detecting violations and unsafe conditions and correcting them before a pollution incident occurs. Cargo transfers of oil and/or hazardous materials are routinely monitored. Regular safety and pollution prevention inspections are conducted on designated waterfront facilities and vessels in both Elliott Bay and the lower Duwamish Waterway. In additon to the federally mandated schedule of vessel inspections, high risk vessels (based in prior performance or vessels's age and/or length of service) are inspected on a more frequent basis. As part of the port state control initiative, foreign flag vessels in the port are now inspected to the same standards U.S. flag vessels.

Elliott Bay, Harbor Island and the Duwamish Waterway are also targeted for a high frequency of harbor patrols conducted by vehicle, boat and aircraft.

Response. Unit personnel stand a 24 hour watch and thoroughly investigate, and, if warranted, respond to, all reports of pollution in the Puget Sound region. Coast Guard Pollution Investigators generally respond to all reports of pollution in Elliott Bay, but the Seattle Police and Fire Departments, Ecology, and other government agencies also assist them in conducting pollution investigations. Personnel or businesses found to be the cause of a pollution incident may be assessed a civil penalty under Section 311 of the Clean Water Act. This is a remedial penalty assessed to ensure future compliance.

Enactment of the Oil Pollution Act of 1990, following the Exxon Valdez oil spill, sharply focused government and industry attention on pollution caused by oil spills. Requirements that will benefit Elliott Bay include: escort vessel requirements for tank vessels operating east of Port Angeles; requirements for preparation of pollution response plans by certain facilities or vessels that transport or store oil; greater authority by the Federal On-Scene Coordinators to respond to and mitigate pollution and threats of pollution; drafting of a comprehensive area plan by federal, state, and local government agencies, with input from the marine industry, academia, and environmental community.

Local Coast Guard initiatives include installation of a closed circuit television camera system at the First Avenue South Bridge. This system will allow the Vessel Traffic Center to better monitor the lower Duwamish Waterway. The Coast Guard is also involved in the review and construction of a second bridge span at the First Avenue South Bridge and reconstruction of the 14th Avenue South Bridge.

Puget Sound Water Quality Authority

The legislation creating the Puget Sound Water Quality Authority in 1985 required PSWQA to "prepare and adopt a comprehensive Puget Sound water quality management plan . . ." (RCW 90.70.055).

Puget Sound Water Quality Management Plan

The Puget Sound Water Quality Management Plan was adopted in December 1986 and is reviewed and revised every two years as required by RCW 90.70.055(3). The 1991 Puget Sound Water Quality Management Plan, the third and most recent version, is also the federally adopted comprehensive conservation and management plan under the National Estuary Program.

The stated goal of the plan is: "To restore and protect the biological health and diversity of Puget Sound, by preserving and restoring wetlands and aquatic habitats, preventing increases in the introduction of pollutants to the Sound and its watersheds, and reducing and ultimately eliminating harm from the entry of pollutants to the water, sediments, and shorelines of Puget Sound."

To achieve this goal, federal and state agencies and local and tribal governments are to take into consideration the net environmental effect of their decisions in order to minimize the transfer of pollutants from one environmental medium to another.

The plan is based on the premise of shared responsibility among all agencies in the Puget Sound region and recognizes that fish, wildlife, water, and pollutants cross jurisdictional lines.

The plan identifies specific goals and actions with respect to many state agency programs including sediment, habitat, storm water, shellfish, and wetland programs nonpoint source pollution, municipal and industrial discharges, and spill prevention and response. PSWQA is responsible for overseeing and implementation of the plan's requirements by the various affected resource agencies.

Sediments

The requirement that Ecology develop and adopt sediment quality standards is perhaps the most important aspect of the plan for current and future Elliott Bay cleanup efforts. These standards provide Ecology the tool to move from source control to sediment cleanup, thereby addressing the critical long term problem of toxic sediment contamination from historical sources.

Monitoring

PSWQA provides technical and administrative support to the Puget Sound Ambient Monitoring Program (PSAMP). PSAMP provides a comprehensive, long-term monitoring program designed to: assist agencies by characterizing and interpreting spacial and temporal trends and identifying problem areas; take measurements to support specific program elements and measure the success of the Puget Sound plan; and provide an ongoing assessment of the health of Puget Sound and the risk to human health from consuming seafood from the sound. PSWQA facilitates cooperation among the state agencies implementing PSAMP, manages data, and distributes integrated, interpretive reports of PSAMP results.

The actual monitoring responsibility is divided among state and federal agencies as follows:

Ecology -- sediments, marine water column, and fresh water;
Department of Natural Resourses -- nearshore habitat;
Department of Health -- commercial and recreational shellfish beds;
Department of Fish and Wildlife -- fish abundance, contaminants in fish, and liver abnormalities; bird abundance and marine mammals;
US Fish & Wildlife Service -- contaminants in birds.

All monitoring tasks, except for shellfish, have stations in the Elliott Bay/Duwamish area. The fresh water monitoring stations in the watershed are in the Duwamish and Green Rivers, upstream from action program focus area. Ecology has two sediment monitoring stations and one marine water quality monitoring station in Elliott Bay. DNR is still working on its methodology for nearshore habitat monitoring.

Public Involvement and Education (PIE) Fund

PSWQA administers the PIE Fund, which was created by the state legislature in 1987. The fund sponsors model projects for public involvement and education, community cleanup activities and environmental monitoring. Recipients of PIE Fund grants are primarily community and environmental groups.

Washington State Department of Natural Resources (DNR)

DNR was created in 1957. The state, through DNR, owns over 2 million acres of aquatic land (both marine and fresh water) statewide. "Aquatic lands" are defined in the aquatic lands section of the public lands statute (Title 79, Chapter 79.90 RCW) as "all state-owned tidelands, shorelands, harbor areas, and the bed of navigable waters" (RCW 79.90.010). State-owned aquatic lands include approximately 1,300 miles of tidelands, 6,700 acres of constitutionally established harbor areas, and all of the submerged land below extreme low tide (including some 2,000 mi^2 of marine beds of navigation and an undetermined amount of freshwater shoreland and beds) (WAC 332-30-100).

Submerged lands are held by the state in trust for the benefit of the people of the state and may not be sold or otherwise alienated by the state except in a manner that promotes the public interest. Prior to 1971, a significant amount of tideland/shoreland area outside of harbor areas was sold. The sale of tideland/shoreland in harbor areas and bedland has never been allowed. According to the state constitution, harbor areas are to be "forever reserved for landings, wharves, streets and other conveniences of navigation and commerce" (Article XV, Washington State Constitution; RCW 79.90.020). DNR leases tidelands and bedlands for various purposes. DNR maintains public trust responsibilities on submerged lands that have been sold or are leased. Lease payments are used to fund the cost of managing the leased property and to fund public access projects.

DNR is an important player in Elliott Bay cleanup issues by virtue of its role as an aquatic lands manager. Under the Model Toxics Control Act, DNR is a potentially liable person for cleanup of sediment contamination caused by tenants on DNR lands. DNR leases shellfish beds and has an interest in protecting them from contamination. DNR also is responsible for nearshore habitat monitoring under the Puget Sound Ambient Monitoring Program.

Elliott Bay Cooperative Management Plan

This DNR-directed program addresses issues and potential conflicts in managing the natural resources of Elliott Bay and the Duwamish River. Participants in this inter-agency, intergovernmental program include NOAA, FWS, the Corps, U.S. Coast Guard, EPA, the Suquamish Tribe, the Muckleshoot Indian Tribe, Ecology, State Fisheries and Wildlife, PSWQA, Port of Seattle, City of Tukwila, City of Seattle, King County, Metro, and Boeing. The program's goal is to "reduce to an acceptable level any conflicts concerning issues such as contaminated sediment cleanup, habitat restoration, recreation, fishing, navigation and commerce, and other shoreline uses of Elliott Bay and the Duwamish River". The program, which began in mid-1992, produced its final report in June 1993.

U.S. Fish and Wildlife Service

The primary issues of concern to FWS for the purposes of Elliott Bay cleanup include reviewing dredge and fill or other project permit applications, enforcement of the Endangered Species Act, habitat protection and restoration planning and implementation, and federal natural resource trustee responsibilities.

Federal Projects

Under provisions of the Fish and Wildlife Coordination Act (16 USC §§ 661667e), consultation with FWS is required where the "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted . . . or otherwise controlled or modified" by any agency under a federal permit or license. Projects involving federal funding also require consultation with FWS. Consultation is to be undertaken for the purpose of "preventing loss of and damage to wildlife resources". Staff in the federal projects program are, therefore, involved in commenting on impacts of projects such as dams, reservoirs, and other diversions; navigational improvements; and flood control projects.

In the Duwamish Estuary, the maintenance and improvement of navigation by the Corps is the type of project most likely to require consultation with FWS federal project staff. While all of the wildlife that use Elliott Bay and the Duwamish River are significant to FWS, it is the importance of the estuary to juvenile salmonids that is of particular concern. Salmonids have especially high commercial, cultural, and social value, and juvenile survival for several species is closely linked to estuarine habitat quality and quantity. Protection, restoration, and enhancement of intertidal habitats that support these fish remain a priority and are strongly preferred to artificial propagation.

Permits

The Fish and Wildlife Coordination Act also gives FWS the authority to comment on federal permits. The permits staff regularly receive and comment on permit applications under Section 10 of the River and Harbors Act (33 USC § 403) and on CWA Section 404 (33 USC §§ 1251-1376). Staff review impacts to fish and wildlife resources and the sufficiency of mitigation proposals in eliminating these impacts. Since 1981, FWS has had a specific habitat mitigation policy that includes habitat values, associated designation criteria, and mitigation goals.

FWS believes that limited habitat resources in the Duwamish warrant a strong concern for the reduction of adverse project impacts. Habitat value remains important in this system despite its degraded nature, and degraded wetlands often present important opportunities for enhancement and restoration. FWS considers both area and function in assessing the impacts to habitat from development and benefits from mitigation projects.

To verify that lost habitat value has been replaced by a mitigation project, FWS will require monitoring of these sites. Depending on project size and complexity, 5-10 years is likely the minimum monitoring period for most intertidal habitat mitigation projects.

In addition to monitoring, FWS would seek assurances of long-term protection, maintenance, and contingency measures for habitat mitigation sites.

Endangered Species

The Endangered Species Act of 1973 provides for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife and plants depend. FWS and the National Marine Fisheries Service (NMFS) share responsibility for enforcing the Endangered Species Act, including listing species as threatened or endangered, developing recovery plans for listed species, taking pre-listing actions to preclude a species from being listed, consulting on federal actions that may affect listed species (including permit actions), and making permit decisions where a non-federal action might "take" a listed species. It is important to note that NMFS has responsibility for listed anadromous fish species.

Bald eagles, federally listed as threatened in Washington state, are known to use portions of Elliott Bay. Projects with potential adverse impacts to bald eagle areas would be regulated by FWS. Of equal importance to FWS is the prevention of declines in populations that ultimately necessitate listing under the Endangered Species Act. Salmonid stocks are on the decline in many portions of Puget Sound and may warrant consideration of protection under this act. In the Duwamish, it is the FWS objective to prevent further habitat deterioration that threatens ecosystem health. Chum salmon represent an example of animals dependent on estuarine habitat for survival that are declining in this watershed.

Contaminants

The FWS Environmental Contaminants Program addresses impacts to fish and wildlife due to pollution, and includes oil spill response and fish and wildlife contaminants investigations. As a natural resource trustee, FWS conducts damage assessments to identify injuries to fish and wildlife trust resources resulting from oil and hazardous substance discharges and recovers damages from polluters to use for restoring the injured natural resources.

Private Lands

The FWS Partners for Wildlife Program and Washington State Ecosystems Conservation Program both make funds available for habitat conservation and restoration on private lands on a cost-share basis, targeting wetland and riparian habitat. Though traditionally this program has worked primarily with farmers and other private landowners, there are opportunities to work with public and private landowners in the Green/Duwamish River watershed, which would help downstream resources in the Duwamish Estuary.

Puget Sound Program

The Puget Sound Program addresses habitat restoration planning and project implementation from an ecosystem perspective. The program responds to the Puget Sound Water Quality Management Plan, which directs FWS, along with EPA, the Corps, and Ecology to develop a program of wetland restoration.

FWS is working closely with these agencies in pursuing several pilot restoration projects in the Puget Sound region, including three projects in the Duwamish. The Puget Sound Program is also developing a long-term monitoring program to evaluate contaminants in Puget Sound water birds, with plans to include work in Elliott Bay. This monitoring is being implemented as part of PSAMP. In addition to in-kind support for technical assistance to local sponsors, the FWS is contributing about $60,000 for habitat restoration activities in Puget Sound between 1991 and 1993.

Washington Department of Fish and Wildlife (WDFW)

In general, WDFW and other resource agencies manage for habitat, not particular species. The underlying assumption is that it is best to restore habitat as closely as possible to the habitat present before its alteration, with an emphasis on restoring habitat most limiting to target species' needs. Addressing target species' needs in turn meets the needs of the aquatic community.

WDFW is primarily concerned with the management of fisheries habitat. The habitat management policy has the following four components:

* Preserve, protect, perpetuate, and manage food fish and shellfish in state waters;

* Seek a net gain of habitat productive capacity;

* Emphasize habitat values over populations;

* Encourage mitigation that emphasizes replacement of natural values over artificial compensation.

WDFW has a "no net loss/net gain" strategy for managing habitat. The primary goal of the habitat policy and this management strategy is to manage habitat in the following order of priorities: 1) maintain current habitat capacity, 2) restore degraded habitat capacity, 3) enhance existing habitat capacity, and 3) develop new habitat capacity. The primary regulatory authorities relied on to enforce the habitat management policy include the Fisheries Code (RCW 75.20 et. seq.), the Hydraulics Code (WAC 220-110 et. seq.), and SEPA review responsibilities.

Hydraulics Code

Under the Hydraulics Code, WDFW issues permits for work within the ordinary high water mark, which will use, divert, obstruct, or change the natural flow or bed. The Hydraulics Code does not require public involvement in the review of hydraulics project approval (HPA) permit applications. In addition, HPA permits can be issued without SEPA review.

WDFW has the authority to place conditions on or deny HPA permits only for the protection of fish life. If fish could be affected, an HPA permit may be approved with conditions (e.g., the work may not be done at the time of year when juvenile salmonids are passing through, or silting must be minimized).

For Elliott Bay in particular, salmon, herring, ling cod, smelt, shellfish, eelgrass, and other resources would be considered when deciding the conditions to be placed on an HPA permit.

When evaluating a permit application, WDFW considers mitigation for the proposed project in the following sequence: avoid damage; minimize unavoidable damage; replace damaged capacity (from in-place, in-kind to out-of-place, out-of-kind); and, finally, oppose the project. WDFW does oppose projects when satisfactory mitigation is not possible.

Habitat Restoration

With specific reference to habitat restoration activities in Elliott Bay, WDFW is primarily concerned with nearshore habitat for juvenile salmonid feeding, migration, and rearing. Habitat restoration projects should strive to ameliorate past losses, enhance early marine survival, and provide secondary benefits to other marine species. Consistent with the agency's "no net loss/net gain" strategy, the goals for nearshore habitat restoration in the bay are to retain and enhance existing habitat, to restore lost habitat, and to create new habitat. The mechanisms for achieving these goals include adhering to agency habitat management policies, cooperating with other authorities, using an integrated planned approach, controlling sources of contamination, scattering the cumulative effects of cleanup (e.g., getting the public involved), and avoiding further habitat loss. WDFW is currently evaluating the impacts of nearshore contained disposal and over-water structures on nearshore habitat.

Hatchery Programs

Considerable resources are expended by WDFW and other entities and private organizations on hatcheries in an attempt to sustain commercial and recreational fisheries in the Duwamish/ Green River system. Combined hatchery programs plant about 7 million chinook, 1.5 million coho and several hundred thousand steelhead fry annually in the Green River and other tributaries of the Duwamish River.

Muckleshoot Indian Tribe

The Muckleshoot Indian Tribe is both a resource manager and user. In these contexts, the tribe's four primary interests include fishing, fisheries enhancement, fisheries habitat, and environmental cleanup. The tribe is concerned about having enough fish available to maintain (and enlarge) the fishery and having the physical access necessary to actually conduct the fishery. The Muckleshoot Indian Tribe also has natural resource trustee rights under Superfund.

Fisheries

The Muckleshoot fishermen use both drift and set nets. In the Duwamish River, there is an issue of compatibility between shoreline uses (i.e., structures along the shoreline) and the ability to use the nets (e.g., where set nets can be placed, the effects of the tides on drift nets). This issue is currently addressed on a case-by-case basis. The tribe would like to act proactively in planning how to accommodate both shoreline projects and the net fisheries.

The Treaty of Point Elliott, case law (e.g., *United States v. Washington, Muckleshoot v. Hall*), and federal and state laws (e.g., CERCLA and SEPA) are the primary authorities that the tribe relies on when addressing environmental concerns. Article 5 guarantees "access to usual and accustomed fishing grounds and stations". The Treaty of Point Elliott is the highest authority, but in many cases its provisions do not coincide with state and local laws or policies. For example, local shoreline plans do not address fishing, and treaty rights are not recognized in shoreline substantial development permits.

The fishing access issue is considered in the context of permits issued by the Corps under Section 10 of the Rivers and Harbors Appropriation Act of 1899 and Clean Water Act (CWA) Section 404. In general, the Corps cannot issue a permit under these authorities that impacts access to usual and accustomed fishing grounds and stations without the consent or agreement of the tribes or an act of Congress. Because local shoreline substantial development permits do not recognize treaty rights, the tribe has to work through the Corps permit process to have any involvement in these permit activities.

Environmental Review

The Muckleshoot Indian Tribe is becoming more involved in the review of permit applications under SEPA. Also, because land use planning affects tribal resources, the tribe is working with other government entities in the implementation of the Growth Management Act. There is some recognition that tribal resource concerns should be recognized in this process.

The Suquamish Tribe of the Port Madison Indian Reservation

The term "Suquamish" is from "d'sug'wub", meaning "Place of Clear Waters". The 8,000-acre Port Madison Indian Reservation of the Suwamish Tribe was established in 1855 by the Treaty of Point Elliott. Like the Muckleshoot Indian Tribe, the Treaty of Point Elliott is the highest authority of the Suquamish Tribe. The Suquamish Tribe also has natural resource trustee rights and obligations under Superfund, and the tribe enters into government-to-government agreements, protocols, and other arrangements denoting coordination and cooperation with other regulatory authorities.

Fisheries

The streams and other areas that serve as migration paths and habitat for fish have been significantly altered, thereby affecting the tribe's sustainable fishery. The Suquamish Tribe is cooperating with the Muckleshoot Indian Tribe regarding a delayed-release net-pen placement near the Cargill grain facility in Elliott Bay. The Suquamish Tribe also has a hatchery program. Together with eggboxes, rearing ponds, and other efforts, the tribe is able to make a significant contribution to the total number and variety of fish available to all fisheries. The tribe is also working to educate the public about the importance of wetlands and water quality and the effects of farm discharges on the aquatic environment and is engaged in habitat restoration and enhancement projects with schools and with sports, civic, and volunteer groups. The Suquamish Tribe currently harvests shellfish on several beaches and co-manages federal- and state-owned tidelands with WDFW.

The Suquamish Tribe reserved its right to aquatic resources at "all usual and accustomed grounds and stations" through Article 5 of the Treaty of Point Elliott. The usual and accustomed fishing places of the Suquamish Tribe include the marine waters of Puget Sound from the northern tip of Vashon Island to the Fraser River, including Haro and Rosario straits; the streams draining into the western side of this portion of Puget Sound; and Hood Canal (Order of April 18, 1975, *United States v. Washington*). Incorporated in the Suquamish Tribe's reservation of the right to aquatic resources is the tribe's right to have the fishery resources protected. Hence, the destruction or injury of resources, either directly or indirectly, or through other man-made limitations of productive ability, jeopardize the rights secured to the tribe by treaty.

Environmental Review

The Suquamish Tribe both monitors and cooperates with federal, state, and local agencies with respect to the review of proposed projects that affect aquatic resources within its usual and accustomed area. Through coordinating with the Corps, WDF, and other federal, state, and local agencies involved in the permitting process, the tribe protects and promotes cultural awareness, including, but not limited to, fisheries access and opportunity; protection of gear; cultural understanding, particularly relating to archaeological investigations; and the public trust of fish and wildlife habitat.

National Oceanic and Atmospheric Administration (NOAA)/National Marine Fisheries Service

Federal Natural Resource Trustee Activities

Under the authorities of Superfund, CWA, the Marine Protection, Research and Sanctuaries Act, and the Oil Pollution Act of 1990, NOAA acts as a federal trustee for natural resources. As a federal trustee, NOAA acts on behalf of the public to assess and claim damages (compensation) for injuries to natural resources resulting from discharges of oil or releases of hazardous substances. Recovered damages are to be used to restore, replace, or acquire the equivalent of the injured resources (42 USC 9607(f)).

Natural resources for which NOAA serves as trustee include all life stages of fishery resources of the exclusive economic zone and continental shelf, anadromous and catadromous species throughout their ranges, certain endangered and threatened species and marine mammals, tidal wetlands and other habitats providing support to these resources, and resources of national sanctuaries and reserves. In some cases, NOAA may share trusteeship with the U.S. Department of the Interior, other federal land-managing agencies, states, and Native American tribes.

To enhance NOAA's effectiveness as a federal trustee for natural resources, the Damage Assessment and Restoration Program (DARP) within NOAA with its two components—the Damage Assessment Center and the Restoration Center—was established in 1991. The objective of DARP is to assess damages and restore coastal and marine habitats and resources under NOAA's trusteeship that have been adversely affected by releases of oil or hazardous substances.

The Restoration Center develops and directs national expertise in habitat restoration by focusing on the following areas: identifying and evaluating restoration methods for specific cases in the damage assessment process; using recovered funds to restore the injured resources; and addressing research and development priorities necessary for successful resource habitat restoration.

Comprehensive Restoration Planning

Under the authorities of the Magnuson Fisheries Conservation and Management Act, the Marine Mammal Protection Act, the Endangered Species Act, and other legislation, NOAA is required to protect and restore living marine resources and their habitats. In addition, in response to a policy statement issued in 1992 by the DARP Board of Directors, the Seattle DARP office is interested in developing comprehensive restoration plans. The national office is providing recommendations to the Seattle DARP office for what should be included in a plan for Elliott Bay. Key components identified to date include the following:

* The plan should address the alleged injuries that led to the filing of the Elliott Bay NRDA lawsuit.

* Endangered species should be given priority in habitat creation activities.

* The plan should include long-term (e.g., 20 years) monitoring of restoration projects.

* The plan should take a comprehensive, rather than site-specific, approach; Elliott Bay should be looked at as a whole.

* There should be both peer and public review of the plan.

In developing comprehensive restoration plans for Elliott Bay, the Seattle DARP office is taking into consideration other issues such as land use and contaminated sediment cleanup because these activities affect restoration planning.

Environmental Review

NOAA is also responsible for reviewing and providing comments on CWA Section 404 permit applications and EISs to determine whether trustee resources might be adversely affected by proposed projects.

Boeing Company

Boeing is the only private business included in this report because of its extensive property ownership along the Duwamish, and its unique ability to affect both water quality and shoreline habitat values.

Water Quality Initiatives

During the past five years Boeing has implemented a variety of company-wide initiatives to improve water quality impacts to the Duwamish.

To better understand its water discharge system, Boeing identified all its storm drain and sewer lines and compared them to existing maps of the present infrastructure. This process produced maps that have correct information regarding the line locations and routes. Boeing currently cleans out storm and sewer systems at least annually and in some instances twice a year. In accordance with current NPDES storm water permit requirements, pollution prevention plans are being implemented at all facilities. As part of planning for the storm water permit requirements, Boeing maintains oil/water separators both within the facility and in catch basins that drain the parking lots. Maintenance includes monthly inspections and cleaning as needed. Capital upgrades include biofiltration swales to treat surface water and concrete pads to serve as spill control devices. Finally, direct discharge of cooling water from some facilities has been reduced by installing recirculating systems. All direct discharge of cooling water is expected to be eliminated by the end of 1994.

Boeing reported that it has significantly reduced the amount of hazardous material stored at its sites by implementing a just-in-time management policy. This policy specifies that, under most circumstances, only a one-month's supply of materials should be stored at the warehouse, and only enough material for three shifts is allowed in work areas at any one time. Hazardous materials are managed by site environmental personnel using individual bar-codes. Waste minimization programs are in place, as well as a substitution program to replace chlorinated solvents with biodegradable solvents. Boeing trains all workers to be aware of correct handling, storage and disposal practices for hazardous waste.

Boeing has reduced its fuel storage to one-half of the previous volume stored at the facilities. Fuel is contained in above ground storage tanks with the appropriate monitoring and control devices.

Twenty-four hour spill control is administered by several specialized teams of Boeing workers who assist the Coast Guard in locating sources of discharge. The workers have received extensive training and support Boeing Field, Plant II and the Development Center, as well as other Boeing facilities along the Duwamish. In addition, two boats provide immediate support for any spill along the Duwamish corridor.

Under an EPA consent order, Boeing is currently conducting a RCRA Facility Investigation (RFI) to characterize the nature, extent, and rate of past contaminate releases at Plant II. Boeing is nearing completion of a program to remove or upgrade all underground tanks at its facilities along the corridor and remediate impacted soils, where necessary. Boeing has discontinued the use of transportation, storage and disposal (TSD) facilities along the corridor and each TSD is conducting closure activities.

The Boeing Defense Group is also involved in Adopt a Stream activities and in particular has helped stock and renovate a stream that runs along the Metro South Park property.

Duwamish Corridor Redevelopment Plan

The Boeing Company has proposed to redevelop approximately 30 percent of its existing manufacturing facilities in the Duwamish corridor. This activity would take place over a ten year period, 1993 through 2003. Future construction will emphasize laboratory, office, and developmental manufacturing uses.

The majority of the project area lies within the City of Tukwila, with portions in King County and Seattle. There are presently ten major Boeing sites located in the Duwamish corridor. This includes ownership and leases of 600 acres and about 9.9 million acre feet of floor area. The proposal would involve demolition of about 3.7 million square feet of floor area and construction of about 4.3 million square feet of new floor area. Each of the individual projects are planned to undergo separate environmental reviews corresponding with separate permitting activities.

In May 1993, the Boeing Company completed a non-project Final Environmental Impact Statement for the corridor redevelopment proposals. The City of Tukwila entered into an agreement with the City of Seattle and King County to coordinate review of this non-project EIS to assure consistency. The City of Tukwila anticipates entering into a mitigation agreement with the Boeing Company during or following environmental review of the proposal. The agreement would allow the City to monitor individual projects and determine when phased mitigation payments, improvements, or other activities are required.

It is anticipated that impacts to the shoreline in the Duwamish corridor will be beneficial. The Boeing Company intends to increase the amount of square footage devoted to non-water dependent uses. Redevelopment would occur on sites with approximately 4,800 linear feet of shoreline. The majority of the sites are located within the City of Tukwila, which currently uses the King County Shoreline Master Program for review of development proposals in the area.

The Boeing Company's proposed shoreline access plan would enhance approximately 4,800 linear feet of existing shoreline access. Improvements would include trails, viewpoints, and a canoe launch at the Oxbow site. Enhanced connections with the Green River Trail and the Museum of Flight would also be a benefit to the regional trail system.

Stream-bank enhancement will occur in conjunction with the development of employee shoreline access along those sites proposed for redevelopment. Cooperation with the Muckleshoot Tribe and state and federal fish and wildlife agencies is anticipated to result in the enhancement of fish habitat in the Duwamish River estuary.

Stormwater Management

Changes in the regulations for stormwater and water quality monitoring requirements will result in new approaches to addressing the problems of water quality impacts of stormwater. Boeing anticipates three approaches to dealing with this problem. The first would be a site specific review on a project by project basis, which would include permit requirements for compliance with applicable stormwater collection and discharge regulations. Second, Boeing will participate in a regional basin planning effort to be initiated by the affected jurisdictions. Third, upon completion of a regional stormwater basin plan, Boeing will develop a comprehensive stormwater drainage master plan for its properties in the Duwamish corridor, consistent with the regional basin planning effort.

A LOOK TO THE FUTURE

The preceding summary makes it clear that source control, traditionally a major EBAT focus, is now well covered by local government initiatives. We will never be able to say that source control is finished. Especially in this highly urbanized and industrialized watershed, source control requires a continuous and on-going effort. However, with all the Metro, Seattle, and King County inspectors out doing the job, the additional effort of two EBAT inspectors/coordinators seems relatively minor.

Cleanup of upland sites is proceeding at an accelerated rate, thanks to the Port's development efforts, as well as other cleanup activities under Superfund, RCRA, and MTCA. These cleanups have proceeded without significant involvement of the two EBAT coordinators. Ecology site managers will continue to be involved in cleanup of sites along the Duwamish and Seattle waterfront regardless of whether there is an Elliott Bay Action Team as such.

A decision has been made to suspend Ecology's involvement in the Elliott Bay Action Team and concentrate our limited urban bay resources in other bays. This decision was partially based on our observation, documented above, that the last six years have seen a significant increase in activity by both government and non-government entities with the intent to improve the ecological health of the Duwamish/Elliott Bay watershed. As a result there are new local ordinances with new teams of field inspectors to address the multiple issues of source control and waste management; some of the most significant point sources of pollution are being addressed; many of the CSO's have been eliminated or controlled; educational outreach efforts have been initiated; cleanup efforts at some of the most contaminated sites in the bay have been initiated; the massive job of sediment cleanup has begun; and habitat restoration has been initiated.

Cumulatively, these and other efforts outlined in this document are demonstrations of the recent strong interest to not only improve pollution control in the bay but restore some of the natural features as well. We are optimistic that the ecological health of Elliott Bay and the Duwamish may actually improve from a fibrillating condition to a weak but noticeable pulse. Ecology's primary role in source control and enforcement is not as critically needed with the new local authorities to do the same. Ecology will continue to be active in cleanup, waste management, permitting, emergency response and other important functions in the bay. Therefore, we believe that the discontuation of EBAT will not jeopardize finding that pulse.

With 98 percent of the original nearshore habitat in the bay destroyed, ecological health is only relative to what can be reasonably achieved. What is reasonable or achievable are questions that are continually debated. This path of achievement is very complicated and not without its problems. In researching this, we came across a few ideas which, if implemented could reduce some of the complications.

From Michigan Street Source Control Project, Lee, H., Metro:

"The new regulations and liabilities associated with storm water discharges have pointed to a need for more coordination between Metro and the City of Seattle. The creation of storm water outfalls requires that a long-term storm water management program be established. This program must take into account the entire drainage system, not just isolated drainage basins. Problems associated with duplication of services and conflicting priorities between local regulatory agencies can be minimized by developing a plan for the entire basin.

"A long-term storm water management program must address the issue of source control. The responsibility for regulating industrial sources discharging to new storm water outfalls as a result of combined sewer separation projects must be identified as the City of Seattle's or Metro's, or shared between them. If one of these regulatory agencies is given responsibility for storm water discharges, that regulatory agency would be able to develop an effective link with local businesses. With the creation of dedicated storm water outfalls over different parts of the City, the tactic of assuming isolated responsibility only for discharges in the drainage basin in which the agency initiates the CSO project will not promote long-term discharge compliance. The creation of multiple programs within these two separate agencies may be an ineffective use of resources and may be counterproductive to gaining compliance from industrial sources.

"Businesses visited in the Michigan Street basin were concerned that the agencies that regulated their discharges did not have a coordinated approach. Many business owners complained that they were getting contradictory mandates from the City, Metro, and Ecology. Some businesses were visited by four regulatory agencies in a one-week period. A coordinated effort would allow agencies to share information about the characteristics of industrial sources, monitoring data, and outfall characteristics so that costs could be shared and efforts would not be duplicated. Therefore, it is necessary to have a specific plan for the delegation of authority to regulate storm water discharges."

From Restoring the Ecological Health of the Elliott Bay/Duwamish River Estuarine System: A Proposal for Habitat Restoration, Fischer, A. et al, University of Washington:

"Institutional and Policy Gaps: Management and restoration on an ecosystem-wide basis is a scientific and societal imperative (Simenstad and Thom, 1992). To approach the problem on this scale requires the cooperation of many agencies with a variety of legal, legislative or political mandates, constraints and priorities, as well as societal support from individuals or groups with economic, environmental or recreational interests. There are significant research and monitoring needs that would be best addressed in a coordinated effort to avoid duplication. The fragmented nature of jurisdictional and financial responsibility for source control, sediment remediation, habitat restoration efforts and protection of fish and wildlife will be a reality for the foreseeable future. The creation of an agency with funding and oversight of all restoration efforts would be ideal, however this is not likely to happen. One interesting possibility is that the merger between King County and Metro will result in a more regionally focused water quality agency in the area that may take the responsibility.

"The problem may be best addressed by an integrated environmental management approach which can be regarded as 'coordinated control, direction or influence of all human activities in a defined environmental system to achieve and balance the broadest possible range of short and long term objectives' (Cairns)"

Bay-wide Restoration

As more upland sources of pollution are controlled, it becomes increasingly clear that the most serious continuing threats to the Elliott Bay/Duwamish ecosystem are contaminated sediments and despoiled habitat. The Elliott Bay/Duwamish Restoration Program is beginning to address these issues, but is limited by the scope of the consent decree and the money available. A few habitat sites will be restored and a few sediment sites will be remediated as a result of the Elliott Bay/Duwamish Restoration Program, but our understanding of restoration techniques and sediment dynamics and cleanup will be greatly increased. More sediment cleanup and habitat restorations efforts will continue to be undertaken in conjunction with various development projects, or future NRDA settlements.

While restoration of the Duwamish River estuary is receiving increasing attention, there is no estuary-wide restoration plan guiding these efforts. Various agencies, including Ecology, EPA, NOAA, Port of Seattle, Metro, and the City of Seattle will continue respond to opportunities to undertake cleanup and restoration projects in Elliott Bay and the Duwamish River. These agencies will attempt to work together building on the information and interagency working relationships established by the Elliott Bay Action Team, the Elliott Bay Coop, and the Elliott Bay/Duwamish Restoration Panel. The Elliott Bay/Duwamish Restoration Program's work combined with the management framework developed by the Elliott Bay Cooperative could provide the basis of a bay-wide restoration plan. Such a plan would provide a vision of a revitalized Duwamish River Estuary, establishing priorities for future habitat restoration coordinated with sediment remediation.

Watershed Approach

There is an initiative within Ecology to move toward operating cross-programmatically on a watershed basis. This initiative goes beyond the plan in the Water Quality Program to focus permitting efforts on one watershed at a time. The idea is promote coordination between programs (Water Quality, Water Resources, Toxic Cleanup, Solid Waste Services, Hazardous Waste/Toxic Reduction) working within a geographic area. As described in a brief working paper, Vision: Watershed Approach: "A watershed approach would promote holistic environmental management and decision-making. It would support more effective and efficient use of resources. And it would provide a focus for improved tribal, local government, and public involvement in environmental decision-making."

In many ways, the Watershed Approach sounds much like an expansion of the Urban Bay Action Team idea. As proposed to be implemented in pilot projects, staff from each program would be assigned to work within the watershed, but would remain part of their separated programs. There would be a coordinator who, much like the Urban Bay Action Team Coordinators, would be the focus of activity within the watershed.

The level of effort would depend on the nature of the environmental issues within designated watershed. Ultimately, all Ecology regional staff may be assigned to a watershed, but that level of organization would not be reached for several years.

At some point, there may be a group within Ecology focusing their efforts on the Elliott Bay/Duwamish/Green River Watershed. We cannot predict when or if that will happen. Until then, Ecology presence will still be felt in Elliott Bay through the regular activities of the various programs, in addition to our continued representation on the Elliott Bay/Duwamish Restoration Panel and technical working groups. Our hope is that local governments will take over where EBAT left off, working together effectively for the betterment of the environment of Elliott Bay and the Duwamish River.

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Agency Activity Matrix
Part 1, page 1

AGENCY	CSO CONTROL	SOURCE CONTROL	WATER QUALITY PERMITTING	HAZ-WASTE REDUC/MGMT	UPLAND SITE CLEANUP	SEDIMENT REMEDIATION	HABITAT RESTORATION
U.S. Environmental protection Agency		RCRA inspections	Oversight of Ecology's NPDES program	Oversight of Ecology's RCRA program; RCRA inspections	Superfund, Harbor Isle; RCRA corrective actions	Sediment remediation in conjunction with Superfund cleanups and possibly RCRA corrective actions	Federal Coastal America sponsor
WA Dept. of Ecology	Oversight of local programs	EBAT inspections and warning letters by drainage basin	NPDES industrial and stormwater permits	RCRA program, Hazardous Waste Reduction Program	MTCA program, RCRA corrective actions, Harbor Isle and other sites	Sediment Management Standards, sediment site ranking	NRDA Trustee, oversight role.
METRO	Most CSOs controlled or in process. Denny Way CSO control in planning	Small quantity generator program and industrial waste inspections	Pretreatment permits for discharges to sanitary sewer	Small quantity generator program, industry specific efforts		Party to NRDA settlement, Pier 53-56 capping project	Party to NRDA settlement, mitigation funding of shoreline improvement projects
City of Seattle	Completed control of all city-owned CSOs discharging to Elliot Bay/Duwamish	Ecology source control grant, implementation of new drainage ordinance				Party to NRDA settlement, Pier 53-56 capping project	Party to NRDA settlement, shoreline Improvement Fund projects, Seattle Conservation Corps projects.
King County		Authority to control discharges to county storm water drainage system		Authority under Health code Title 8	Capitol Improvement Project (CIP) cleanups	CIP cleanups	Stream Restoration Program, Rivers Program
Port of Seattle		Tenant Inspections			Numerous cleanups undertaken or planned as part of port development projects	Dredging removes contaminated sediments; potential confined disposal site at T-3	Local Coastal America Partner; habitat restoration included in port development projects

Agency Activity Matrix
Part 1, page 2

AGENCY	CSO CONTROL	SOURCE CONTROL	WATER QUALITY PERMITTING	HAZ-WASTE REDUC/MGMT	UPLAND SITE CLEANUP	SEDIMENT REMEDIATION	HABITAT RESTORATION
Seattle-King County Health Department				Small quantity generator program			
U.S. Army Corps of Engineers			Section 404 permits required for dredging/ filling wetlands and aquatic lands			Maintenance dredging provides some clean sediments for capping project	Federal Coastal America Sponsor
U.S. Coast Guard							
Puget Sound Water Quality Authority	Addressed in Puget Sound Plan	Addressed in Puget Sound Plan	Addressed in Puget Sound Plan	Addressed in Puget Sound Plan		Addressed in Puget Sound Plan	Focus of Puget Sound Plan is primarily on protection of existing habitat
WA Dept. of Natural Resources		BMPs and tenant inspections on leased lands				PLP for contaminated state-owned aquatic lands	
Boeing Company		Controls own discharges		Implemented "just in time" policy to minimize waste and spills of hazardous materials	Has completed cleanups on several upland sites		Duwamish corridor redevelopment plan includes habitat restoration

Agency Activity Matrix
Part 2, page 1

AGENCY	SPILL RESPONSE	COMPLAINT RESPONSE	EDUCATION	ENFORCEMENT: WQ/HW	WATERSHED PLANNING	SHORELINE MANAGEMENT	MONITORING: SED/WQ
U.S. Environmental Protection Agency			Prepares informational brochures on various environmental topics	Superfund, RCRA, Clean Water Act			Superfund sites
WA Dept. of Ecology	Spill Response Section, notification, response, cleanup, NRDA, enforcement	EBAT inspections, sometimes water quality or RCRA inspections	Waste reduction, recycling, and litter control program	RCRA, State Water Pollution Control Act, MTCA	Funding and oversight of local efforts	Oversight of local programs and actions	Ambient water quality monitoring
Metro	Responds to spills to sanitary sewers	Small quantity generator program responds to haz-waste complaints	Numerous publications and educational efforts	Enforcement authority over discharges to sanitary sewer	Prepares 5-year updates to Cedar-Green watershed water quality plan		Ambient water quality monitoring; monitors sewage treatment plant discharges; key manhole program
City of Seattle	Fire department responds to some spills	Responds to complaints of illegal dumping on city property	Water quality education program aimed at public schools and industry	Authority to control discharges to city-owned storm drains	Completed Longfellow Creek watershed plan	City shoreline management program controls development	
King County	Fire Department and Public Works Road Division respond to some spills	SWM responds to illegal storm drainage discharges; BALD responds on grading/land use	SWM public involvement, volunteer programs, workshops	Enforcement authority under new drainage ordinance	Has prepared watershed plans for upper-Duwamish drainage	Local shoreline management program controls shoreline development	Post CIP project-gauging on streams quantity and quality; lake monitoring
Port of Seattle		Responds to complaints concerning port properties	Tenant inspections			Facility development plans have major impact on shoreline	
Seattle-King County Health Department			Haz-waste info-line; publishes Guide for Hazardous Waste Generators				

Agency Activity Matrix
Part 2, page 2

AGENCY	SPILL RESPONSE	COMPLAINT RESPONSE	EDUCATION	ENFORCEMENT: WQ/HW	WATERSHED PLANNING	SHORELINE MANAGEMENT	MONITORING: SED/WQ
U.S. Army Corps of Engineers							
U.S. Coast Guard	Spill response and prevention in Elliott Bay and lower Duwamish		Marine safety education	Enforcement and cost recovery for spills			
Puget Sound Water Quality Authority	Addressed in Puget Sound Plan		Publishes Soundwaves; Puget Sound Plan established grant program for local education efforts		Puget Sound Plan established framework for local watershed planning		Developed procedures for monitoring in Puget Sound
WA Dept. of Natural Resources			Tenant inspections and education	Tenant inspections and lease agreements	Initiated Elliott Bay Cooperative Management Plan effort	Controls land use on state owned lands	
Boeing Company	Equipped spill response boat, assists Coast Guard in locating sources, spill containment		Extensive hazardous materials training; environmental education program for employees				Monitors own discharges in conformance with permit requirements