

TABLE OF CONTENTS

EXECUTIVE SUMMARY	5
CHAPTER 1: INTRODUCTION.....	9
CHAPTER 2: DEVELOPMENT OF THE ACTION PLAN	13
CHAPTER 3: SUMMARY OF PHASE 1 REPORT	17
CHAPTER 4: SOURCE CONTROL ACTION ITEMS	25
AGRICULTURAL ACTION ITEMS	27
BOATS & MARINAS ACTION ITEMS	35
FOREST PRACTICES ACTION ITEMS	39
ON-SITE SEWAGE ACTION ITEMS.....	43
STORMWATER/EROSION ACTION ITEMS.....	53
OTHER ACTION ITEMS	69
CHAPTER 5: IMPLEMENTATION PROGRAM	81
CHAPTER 6: IMPLEMENTATION STRATEGIES.....	106
CHAPTER 7: MONITORING PROGRAM.....	111
CHAPTER 8: MONITORING STRATEGIES	117
 TABLES	
Table SW-1, Summary of Stormwater Managment Programs in Cities and Towns	56
Table SW-2, Pierce County Drainage Districts	57
Table 1, Estimated Time Frame	88
Table 2, Implementation Budget	93
Table 3, Lead Implementors	97
Table 4, Funding Sources	100

FIGURES

Figure 1, **Plan Area and Jurisdiction Boundaries**..... 4

Figure 2, **Vicinity Map**..... 12

Figure 3, **Plan Area with Subwatersheds** 24

APPENDICES

Washington Administrative Code 400-12

Current Water Quality Programs

KEY TO ACRONYMS

ASCS	Agricultural Stabilization and Conservation Service
BMP	Best Management Practice
CCWF	Centennial Clean Water Fund Grant
CZM	Coastal Zone Management Grant
DCD	Washington Department of Community Development
DNR	Washington Department of Natural Resources
DOE	Washington Department of Ecology
DOH	Washington Department of Health
DOT	Washington Department of Transportation
DOW	Washington Department of Wildlife
EPA	Environmental Protection Agency
FPA	Forest Practices Act
GIS	Geographic Information Systems
GMA	Growth Management Act
IAC	Inter-Agency Committee for Outdoor Recreation
MOA	Memorandum of Agreement
NA	Not Available
NOAA	National Oceanic Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NWI	National Wetland Inventory
PCCD	Pierce County Conservation District
PIE	Public Involvement and Education grant
PIEEP	Public Involvement and Environmental Education Program
PRBC	Puyallup River Basin Council
PSWQA	Puget Sound Water Quality Authority
QA/QC	Quality Assessment/Quality Control
RCW	Revised Code of Washington
SCS	Soil Conservation Service
SRF	State Revolving Loan Fund
SWM	Surface Water Management Entities
TPCHD	Tacoma-Pierce County Health Department
SKCHD	Seattle-King County Health Dept.
USGS	United States Geological Survey
UW	University of Washington
WCAA	Washington Concrete and Aggregate Association
WAC	Washington Administrative Code
WFFA	Washington Farm and Forestry Association
WFPA	Washington Forest Practice Association
WMC	Watershed Management Committee
WSU	Washington State University Cooperative Extension

EXECUTIVE SUMMARY

At first glance, the Puyallup River appears to be beyond hope. It spills into Commencement Bay, long recognized as being one of the most polluted areas in the state of Washington, and classified as Superfund site by the Environmental Protection Agency (EPA). Its lower reaches have been so stringently channelized that it looks more like an aqueduct than a natural river system. Still, there is more to the Puyallup River system than those first few river miles reveal. The system supports four different salmon runs and, a little further upstream, hosts a variety of recreational activities such as swimming and fishing. The river is central to the communities of Tacoma, Fife, Puyallup, Sumner, Orting, Auburn, and the Puyallup and Muckleshoot Indian Tribes. The many streams and creeks flowing into the river impact even more communities and neighborhoods. It is the members of these communities which have come together to create the Lower Puyallup Watershed Action Plan in order to protect the watershed and the many benefits it provides. It is the vision of the Lower Puyallup Watershed Management Committee that has driven the creation of this plan and they see a river system that can and will benefit from its implementation.

FACTS ABOUT THE WATERSHED

A watershed is the geographic region that drains water (and everything water carries) into a river, river stream, or body of water. Since all land within a watershed drains to a common outlet, every activity on land has a potential to be a source of nonpoint pollution and to affect the entire watershed. According to the Puget Sound Water Quality Authority, more than half of all water pollution now comes from nonpoint sources, which generally include such activities as: agriculture, forestry, boats and marinas, on-site sewage disposal, stormwater, household hazardous waste, gravel mining, yard chemicals and other sources.

The Lower Puyallup Watershed covers a 117,000 acre area which includes land from Buckley to Commencement Bay, and south King County to Orting. Over 200,000 residents live within the area and more than a dozen cities and towns have jurisdiction. The predominant waterway is the Puyallup River, which carries the majority of the runoff from tributaries in the watershed. The most significant contributors of flow to the Puyallup River are the White and Carbon rivers.

The types of existing land uses range widely, from forested foothills, dairy farms, and crop lands; to highly intensive industrial, commercial, and residential areas.

EXISTING WATERSHED POLLUTION PROBLEMS

Water quality in the Puyallup watershed has deteriorated substantially as the area has become urbanized over the past century. Wild fish runs have declined and, in the case of the White River Spring Chinook, may be in danger of extinction.

The Washington State Department of Ecology (Ecology) has determined that fishing and swimming are impaired uses within most of the streams and rivers in the watershed. Compliance with State Surface Water Quality Standards (WAC 173-201a) is not occurring within many streams due to high fecal coliform bacteria levels. Toxic levels of metals have been found in more urban creeks.

The Washington legislature, in 1982, in response to the federal Clean Water Act, created RCW 90.70, the Puget Sound Water Quality Authority. The Authority, in turn, created WAC 400-12, which authorized local governments and state agencies to establish planning processes leading to the implementation of watershed action plans for the purpose of reducing nonpoint pollution.

The first step undertaken was to rank each watershed. Decisions on the order were based, primarily, on the degree of degradation, the potential for preservation, and the beneficial uses in need of protection.

In Pierce County, the Lower Puyallup watershed was selected for the first watershed action planning effort. The ranking committee felt that it would provide the best model because it supported the greatest variety of nonpoint sources and allowed opportunities for preventive action.

PUBLIC INVOLVEMENT AND COORDINATION

Pierce County was selected as the lead agency to coordinate the ranking and action plan development process for the Lower Puyallup Watershed. Watershed ranking was performed by a committee of interested and affected parties from within Pierce County and involved approximately 40 people.

A committee of 28 people was created in 1990 by the Pierce County Council and became the Lower Puyallup Watershed Management Committee (LPWMC). The Committee has produced two documents, the Lower Puyallup Watershed Phase 1 Report which characterizes conditions within the watershed and the Lower Puyallup Watershed Action Plan.

The citizen involvement process was a major part of the program to address nonpoint water pollution. Open houses occurred in each of the five subwatershed areas within the Lower Puyallup and information booths were manned for one weekend each at the Tacoma and South Hill Malls. The complete mailing list for the Lower Puyallup project included over three hundred addresses. All meetings were open to the public and a public meeting occurred to allow people the opportunity to comment on the draft Lower Puyallup Watershed Action Plan.

A tremendous effort to coordinate and communicate with all stakeholders - those who might have something to gain or lose in the watershed - was emphasized. These included private sector, federal, state, and local governments.

PLAN DEVELOPMENT

The action items in the Lower Puyallup Watershed Action Plan were developed by dividing the Committee into subcommittees with the intention of addressing each designated source. The subcommittees addressed agriculture, boats and marinas, forest practices, on-site sewage disposal, stormwater and erosion, and other sources. After the action items were drafted they went through a series of reviews to insure that they met the needs of the community and were implementable. Each action item was evaluated for its technical feasibility, legality, ease of implementation, ability to improve water quality, ability to protect beneficial uses, effects on groundwater, ability to control the source, and consistency with other plans. Those action items which did not rank well were removed from the plan.

The action items were then reviewed to insure that a variety of approaches were used to address sources. The plan includes action items which use such tactics as education, financing, coordination, capital improvement, regulatory, voluntary incentives, program development, maintenance and operation, and research. The action items were then evaluated to see if each measure of poor water quality were addressed such as high temperatures, low dissolved oxygen, high metals, etc.. Finally, the concerns that were recorded from the public workshops were listed and the committee reviewed the action items to see that those concerns, if within the scope of the action plan, were addressed.

The resulting action items were assigned lead implmentors, cooperators, an estimated cost, a potential funding source, a suggested type of funding, a description of its benefits, a type of source control, a time frame for implementation, and an anticipated start up date.

A letter of concurrence is expected and requested from each lead implementor. The letter is intended to obligate those individuals to take action and follow through on their respective portion of the plan.

PLAN IMPLEMENTATION

The Action Plan includes an extensive program for implementation and monitoring. Action items for implementing the overall Action Plan were defined and lead implementors will be asked to concur with those strategies as well as those that relate to specific sources. The most significant strategy for implementation involves the creation of a Puyallup River Basin Council. The proposed council would oversee implementation of the plan and would be made up of representatives from affected agencies and organizations within the river basin. The council would facilitate the completion of action items and foster funding sources to cover implementation costs.

CHAPTER 1: INTRODUCTION

The Lower Puyallup Watershed Action Plan represents an effort to improve water quality by reducing sources of nonpoint water pollution in the Lower Puyallup River Watershed.

This document contains:

- !background information on the development of the Action Plan,
- !a summary of the Phase 1 Report (issued March 1992),
- !action items for reducing nonpoint pollution organized by source,
- !an implementation program,
- !a monitoring program,
- !and strategies for executing the implementation and monitoring programs.

The Phase 1 Report is a characterization of the Lower Puyallup Watershed. It includes information on the action planning process, physical features of the watershed, cultural features of the watershed, general watershed condition, subwatershed conditions, and a problem definition.

The substance of the Lower Puyallup Watershed Action Plan may be found in the source control action items and the implementation program. The Lower Puyallup Watershed Management Committee developed the action items for the control, prevention, and mitigation of nonpoint pollution sources.

The following elements have been identified for each action item:

- !details on the actions to be taken,
- !lead implementors and cooperators,
- !estimated cost,
- !potential funding sources and types,
- !implementation benefits,
- !the type of approach,
- !a time frame for implementing the action,
- !and a suggested startup date.

A detailed explanation of each of these elements may be found in the introduction to Chapter 4, "Source Control Action Items". The implementation program identifies a lead agency for the implementation of the Action Plan as a whole and addresses financing and coordination issues. The monitoring program describes the data that will be needed to determine the effectiveness of the Action Plan in reducing nonpoint pollution, and identifies existing conditions which should be monitored. The implementation and monitoring strategies are organized in a manner similar to the source control action items and describe specific tasks to be accomplished in order to successfully implement and monitor the Watershed Action Plan.

PURPOSE

The goal of the plan is embodied in the formal mission statement of the Lower Puyallup Watershed Management Committee:

The Committee's mission is to develop an Action Plan to improve water quality in the Lower Puyallup Watershed and Puget Sound by reducing nonpoint water pollution.

The purpose of the plan is to identify, correct, and prevent nonpoint source pollution and protect beneficial uses of water. Beneficial uses of water include: fish, shellfish, wildlife habitat, recreation, navigation, cultural identity, aesthetics, power generation, and industrial, agricultural, or domestic water supply.

WATERSHEDS AND NONPOINT POLLUTION

Nonpoint water pollution cannot be connected to one specific source. It results from the everyday activities of people who live, work, and recreate in the watershed. Nonpoint pollution is different from "point" sources of water pollution--sewer pipes or industrial waste outlets--because "nonpoint" sources are difficult to identify and control.

Nonpoint sources are associated with agricultural practices, on-site sewage disposal systems, vehicles, boats, stormwater, construction techniques, and other activities. Because activities that cause nonpoint pollution are widespread, the exact sources of the pollution are often difficult or impossible to trace.

The presence of nonpoint source pollution is indicated by measures of water quality. These measures include the cumulative impact of materials entering the water--fecal coliform bacteria, dissolved oxygen, organic compounds, total dissolved gas, pH, turbidity, nitrogen and ammonia, phosphorous, heavy metals and trace elements, as well as riparian zone alteration--temperature.

The U.S. Environmental Protection Agency (EPA) estimates that more than half of all water pollution nationwide comes from nonpoint sources. Similarly, nonpoint sources have a substantial cumulative impact on water quality in the Lower Puyallup Watershed. A watershed is the geographic region that drains water (and everything water carries) into a river, river system, or body of water. In fact, the Lower Puyallup Watershed is comprised of five subdrainage basins: Hylebos Creek, the Lower White River, the Middle Puyallup River, Clear and Clarks Creek, and Commencement Bay. Since all land within a watershed drains to a common outlet, every activity on land has the potential to be a source of nonpoint pollution which cumulatively can affect the entire watershed.

Nonpoint pollution is causing significant problems in the Lower Puyallup Watershed. The watershed collects the cumulative impact of nonpoint sources and flushes into Commencement Bay, (See Figure 1, **Plan Area and Jurisdiction Boundaries**). Commencement Bay is also grouped within the 10 highest priority hazardous waste sites in the United States. The Washington State Department of Ecology has determined that many stream and river reaches within the watershed are unsafe for fishing and swimming. A more detailed explanation of the pollutants found within the watershed and potential pollutant sources may be found in the Phase

1 Report for the Lower Puyallup Watershed. A brief summary of the Phase 1 Report findings may be found in Chapter 3 of this document.

WATERSHED PLANNING - AUTHORITY

The antecedence of the authority for watershed planning in Puget Sound is the Clean Water Act of 1972 (amended in 1977 and 1987). The Puget Sound Water Quality Authority Act of 1985 established the Puget Sound Water Quality Authority. The Authority developed the Puget Sound Water Quality Management Plan (the Puget Sound Plan) in 1987 (revised in 1989 and 1991), which established a system for protecting Puget Sound and its resources from the effects of pollution. As a result of these studies, the Authority promulgated the "Nonpoint Rule", which outlines watershed planning in Chapter 400-12 of the Washington Administrative Code, "Local Planning and Management of Nonpoint Source Pollution".

The Puget Sound Plan directed the 12 counties bordering Puget Sound to develop and carry out action plans to control nonpoint pollution on a watershed basis. The 12 counties identified and ranked their watersheds in priority order for developing watershed action plans. In Pierce County, the Lower Puyallup was ranked number one. Watershed action plans are closely coordinated with the programs of other federal, state, and local agencies.

Pierce County Planning and Land Services has provided staff support to the Lower Puyallup Watershed Management Committee. The project has been funded by a Centennial Clean Water Fund Grant from the Washington State Department of Ecology.

CHAPTER 2: DEVELOPMENT OF THE ACTION PLAN

THE WATERSHED MANAGEMENT COMMITTEE

The Lower Puyallup Watershed Action plan has been developed by the Lower Puyallup Watershed Management Committee, in conformance with Washington Administrative Code (WAC) Chapter 400-12, "Local Planning and Management of Nonpoint Source Pollution" (the "Nonpoint Rule"). Pierce County is the designated lead agency in accordance with WAC 400-12 and Planning and Land Services has provided staff support from the original watershed ranking activities through the formation of the Lower Puyallup Watershed Management Committee. The Committee selection process strictly followed the requirements of WAC 400-12. Planning staff advertised the creation of the committee and solicited applications for committee membership from the general public and identified affected parties. Following review of the application, staff recommended a list of proposed Watershed Management Committee members and alternates to the Pierce County Council. The list was accepted by Council Resolution No. R90-53.

The members of the Committee represent many interests and affected parties within the watershed. Indian tribes, fish hatcheries, environmental groups, fishermen, city governments, public utilities, a conservation district, agencies from two counties, Washington State Department of Fisheries, businesses, and farmers are represented. A list of committee members and their representation is listed on the inside cover of this document.

The Committee chose to make decisions using consensus. They developed the plan using brainstorming techniques to identify as many related issues as possible and to incorporate as many varying opinions as possible. Subcommittees were formed from committee members to evaluate and rank the brainstormed lists of potential action items and gave the Committee their vision of how the action items might be implemented. The Committee as a whole chose to drop certain action items based on their low ranking and the recommendation of the subcommittees other action items were altered to make implementing them easier or more effective. Staff then drafted descriptions of how the action items would be implemented including costs and funding sources. The Committee revised the action items extensively and developed implementation and monitoring programs before choosing to issue a draft for public comment. Most of the work sessions and all of the Committee's regular meetings were open for public comment and participation. A public meeting was held to allow people the opportunity to comment on the plan. The draft plan was made available to the public and a notice was published to that effect. The Proposed Final Watershed Action Plan includes changes resulting from the public hearing and comment process.

THE PLANNING PROCESS

The development of the Action Plan involved a three step process:

- A. In Phase I, the Committee reviewed and adopted the Lower Puyallup Watershed Phase 1 Report. The Phase 1 Report is a characterization of the Lower Puyallup Watershed. It includes information on the action planning process, physical features of the watershed, cultural features of the watershed, general watershed condition, subwatershed conditions, and a problem definition.

- !. In Phase II, the Committee developed source control action items and an implementation/monitoring program. The Draft Lower Puyallup Watershed Action Plan is the result of Phase II activities.
- !. In Phase III, local governments and private groups were given the opportunity to review and comment on the Draft Watershed Action Plan. The Committee responded to the comments and the Action Plan was modified to address significant concerns. At the completion of Phase III, each implementing agency will be requested to submit a *statement of concurrence* to the Watershed Management Committee, indicating its intent to adopt the action items and implementation strategies. An agency may also choose to submit a *statement of nonconcurrence* with the Action Plan, recommending that specific changes be made to sections requiring its involvement. Every reasonable attempt will be made to resolve statements of nonconcurrence.
- !. Implementation will begin after the Washington State Department of Ecology reviews the Final Watershed Action Plan, including statements of concurrence, and verifies that the requirements in Washington Administrative Code 400-12 have been met. A Puyallup River Basin Council will be established to oversee implementation.

DEVELOPMENT OF SOURCE CONTROL ACTION ITEMS

Washington Administrative Code 400-12 directs each watershed committee to address nonpoint pollution caused by six common sources: agricultural practices, boats and marinas, forest practices, on-site sewage disposal, stormwater and erosion, and miscellaneous sources. Six subcommittees were created to develop draft action items for each of the nonpoint pollution source categories. The evaluation of draft action items followed the procedures outlined in WAC 400-12. Each subcommittee analyzed their draft action items based on their:

- !. technical feasibility,
- !. legality,
- !. ease of implementation,
- !. ability to improve water quality,
- !. ability to protect beneficial uses,
- !. effect on groundwater,
- !. ability to control sources of pollution,
- !. consistency with other state and local plans and programs.

Strategic directions adopted by the committee, committee-identified threats to water quality, and the results of public workshops were also used to evaluate draft action items.

A program for implementing the Action Plan was developed under direction of a special watershed subcommittee. The steps and requirements of the implementation program are detailed in WAC 400-12. A summary follows:

- !. Description of action required of each implementing agency.

- !. Identification of an overall lead agency.
- !. A dispute resolution process.
- !. Annual reports.
- !. An implementation schedule with annual milestones.
- !. Provisions for public involvement.
- !. Estimated implementation costs and budget.
- !. An analysis of existing funding sources.
- !. A method of evaluating overall effectiveness of the plan.

PUBLIC INVOLVEMENT

Public participation has been an important element of the planning process. Specific events and efforts have been dedicated to securing public involvement throughout the process. These include five public workshops, five days of outreach to urban malls, a watershed tour for local officials, and generation of news coverage.

COORDINATION WITH GROWTH MANAGEMENT AND OTHER PROJECTS

Lower Puyallup Watershed Management Committee staff has exchanged information with Pierce County staff assigned to Growth Management Act compliance in an effort to cultivate consistency between programs. Presentations have been made before the Growth Management Coordinating and Steering Committees by Lower Puyallup staff members. Project staff has also exchanged draft technical papers, collaborated on production of technical papers, collaborated on production of media events, provided technical support, and exchanged proposed policies for evaluation.

Staff has also worked, throughout the planning process, to collect information on the activities of other agencies which may impact water quality and require adjustments to the Watershed Action Plan. In return, staff and the Lower Puyallup Watershed Management Committee have attempted to make other programs aware of the progress and proposed content of the Action Plan through mailings, public meetings, networking, telephone communications, and personal contact.

Lower Puyallup staff members are currently serving on the Pierce County Environmental Education Committee, an informal group of agency representatives, in an effort to maximize the impact of local environmental education projects. Staff is also serving on the Pierce County Conservation District's Focus Group to share information and provide support to the Conservation District as it prepares grants and develops programs.

Coordination efforts have aided the action planning process by promoting concurrence, allowing revisions to the plan which meet the needs of the implementing agencies, provide opportunities for greater public involvement and education, and reducing the number of action items recommending activities which are already occurring.

CHAPTER 3: SUMMARY OF PHASE 1 REPORT

The Lower Puyallup Watershed Phase 1 Report describes the watershed, assesses current watershed conditions including conditions by subwatersheds, lists current water quality programs, and provides a problem definition. The information in this section has been condensed from the Phase 1 Report.

The Lower Puyallup Watershed Management Committee distributed the Phase 1 Report in March 1992 for public comment. The Committee reached consensus that the document appropriately reflects available information on the condition of the watershed. Additional significant information may be attached to the Phase 1 Report as appendices as it becomes available.

The Committee adopted the Phase 1 Report as an element of the Watershed Action Plan. The Phase 1 Report is available from the Pierce County Planning and Land Services Department.

DESCRIPTION OF THE WATERSHED

Location: The watershed covers 117,000 acres and reaches from Buckley to Commencement Bay, and south King County to Orting (See Figure 1, **Plan Area and Jurisdictional Boundaries** and Figure 2, **Vicinity Map**). The plan area includes the cities of Tacoma, Federal Way, Algona, Pacific, Milton, Fife, Puyallup, Sumner, Bonney Lake, Buckley, and Orting. Other jurisdictions include the Port of Tacoma and the Puyallup and Muckleshoot Indian tribes. Over 200,000 residents live within the boundaries of the watershed.

Main waterbodies found within the watershed include the Puyallup River, the White River, Commencement Bay, and Lake Tapps.

Geology: The geology of the area within the Lower Puyallup Watershed is the product of mountain building, volcanic activity, and glaciation over the last fifty million years. Thirty-six million years ago, volcanic activity and the uplift of a volcanic range, ultimately resulted in today's Cascade Range. During the last one million years, glaciation greatly modified the landscape of the Puget Sound lowlands. Repeated glaciation scoured elongated hills and valleys in a south-north orientation throughout Puget Sound, leaving behind the typical sedimentary sequence of glacial deposits. Outwash sediments from the glacier's advance are covered by till (a dense layer of clay, silt, sand, and gravel packed down by the weight of the glacier), that is covered by stream deposits from the melting glacier (U.S. Department of Defense, 1990). The rolling uplands of the South Hill area are characteristic of the topography left by glaciers. Scouring during the Vashon glaciation, about 15,000 years ago resulted in a deepened, northerly trending Puyallup Valley, a major physiographic feature of the Puget Sound lowlands.

Two mudflows occurred within the watershed leaving behind a thick layer of dense, poorly drained soils. About 4800 years ago, the Osceola Mudflow originated at Mount Rainier and

poured down the White River Valley and across the Buckley plain. The Electron mudflow occurred about 500 years ago and flowed down the Puyallup River Valley as far as McMillin (USGS, 1973).

Topography: The lowest point in the Lower Puyallup Watershed is sea level, at Commencement Bay. The highest point in the watershed is approximately 1,100 feet in the area south of Orting. The Lower Puyallup Watershed is, in general, an area of low-lying terraces, dissected by lowland valleys. Lowland valleys are found at the Lower Puyallup River Valley from Commencement Bay through Puyallup, the Orting Valley from Sumner to Orting, and the White River Valley from Sumner to Auburn. The terraces are bordered by high bluffs falling rapidly to lowland valley floors. The upper portion of the terraces consists of undulating plains. In the watershed, terraces are found in the Federal Way area, the Summit-Waller/South Hill area, and in the Buckley and Lake Tapps area.

Climate: The climate of the Lower Puyallup Watershed is heavily influenced by the moderating effects of the Pacific Ocean and the Cascade Mountains. The ocean moderates the climate, resulting in mild winters and temperate summers. The mountains moderate the climate by shielding the watershed from cold arctic air masses and increasing rainfall incidents. Precipitation throughout the watershed is high in volume during the winter and low in volume during the summer. Approximately 75 percent of the annual precipitation occurs between October and March. Annual average precipitation levels vary from 40 inches at Tacoma to 49 inches at Buckley. The majority of precipitation falls as rain. It should be noted that precipitation occurring within the Upper Puyallup Watershed contributes substantially to surface water flows within the Lower Puyallup Watershed.

Waterbodies: Commencement Bay is the saltwater estuary of the Puyallup River. The Puyallup, Carbon, and White Rivers are all branches contributing to the main stem of the Puyallup River. During summer months, melt water from glaciers on Mount Rainier provide a significant level of flow.

The Lower Puyallup Watershed is divided into five subwatersheds (See Figure 3, **Plan Area with Subwatersheds**). The Hylebos, Commencement Bay, Clarks/Clear Creek, Lower White, and Middle Puyallup subwatersheds all combine to make up the Lower Puyallup. Assessments of land use, habitat, and water quality were evaluated within the Phase 1 Report on a subwatershed basis.

Lake Tapps, Panther Lake, Surprise Lake, Bonney Lake, and Rhodes Lake are the most significant lakes found within the watershed. Lake Tapps is an artificially created reservoir that provides flow to the Dieringer Powerhouse. Water is diverted from the White River at Buckley to supply Lake Tapps. Mud Mountain Dam, which is located on the White River in the Upper Puyallup Watershed, is a flood control structure that regulates downstream flows.

Wetlands are found throughout the watershed. West Hylebos Wetland, in the Federal Way area, has been turned into a state park. It provides interpretive information and boardwalk paths. Gog-le-hi-te wetland, found near the Lincoln Street bridge in the Tideflats area, is an artificially created intertidal wetland and one of few existing estuarine wetlands found within the Lower Puyallup Watershed. Rhodes Lake, in the Bonney Lake area, is a peat system wetland that

provides examples of all four wetland classifications (emergent, open water, shrub/scrub, and forested).

CURRENT WATERSHED CONDITIONS

The following section describes the problems found within each subwatershed area in the Lower Puyallup Watershed. Still, general degradation on a watershed-wide basis has been documented.

The Department of Ecology's 1990 Statewide Water Quality Assessment found all of the river and stream reaches tested within the Lower Puyallup Watershed to be moderately or highly impaired, except for the Puyallup River upstream of Orting.

Commencement Bay Subwatershed: In 1981, Commencement Bay was grouped within the highest priority hazardous waste sites in the United States. It is currently undergoing costly and involved Superfund cleanup activities. As Superfund cleanup efforts proceed, it is vital that the waterways not be recontaminated by pollution from nonpoint sources.

Most of the waterways in Commencement Bay were found to have significant metals and organic compound contamination. The Puyallup River was found to have high nutrient and fecal coliform bacteria levels, as well as a substantial suspended sediment load. Fife Ditch had unusually high ammonia levels and low dissolved oxygen levels.

The Commencement Bay subwatershed is the most urbanized. Out of 18,400 acres approximately 50% are dedicated to residential land use. Residential densities are moderate to high. Industrial land uses are the second most common, followed by transportation/communication/ utility uses, and commercial. Population within the subwatershed is expected to increase by 4% by the year 2000.

Habitat in Commencement Bay waterways is characterized by the dominance of a few species of organisms. Less tolerant species were eliminated and opportunistic species tended to achieve higher abundances in stressed areas. The Gog-le-hi-te wetland provides habitat for a number of bird species as well as a family of red fox. Peregrine falcons and bald eagles have been sighted within this subwatershed.

Hylebos Creek Subwatershed: Hylebos Creek was found to have elevated levels of fecal coliform bacteria, phosphorous, nitrogen, suspended solids, copper, lead, mercury, and zinc. King County Surface Water Management identified metals as being the most significant water quality problem in the West Branch Hylebos Creek sub-basin. Surprise Creek had high levels of fecal coliform bacteria. Wapato Creek was found to have temperatures above safety levels for aquatic life, unusually low dissolved oxygen levels, and high fecal coliform levels.

The Hylebos subwatershed includes 18,361 acres, 29% of which is agricultural (primarily small lot) and 23% is residential. Commercial development is predominantly located in Federal Way, along Pacific Highway, and in Fife. Industrial development is located primarily in Fife, due to the proximity of the Port of Tacoma.

Population within the subwatershed was estimated at 37,800 in 1989 and is expected to increase

27% by the year 2000.

Habitat within this subwatershed is severely impaired. Hylebos Creek is threatened by erosion, residential development, and frequent flooding incidents. Wapato Creek is culverted for the first two river miles, experiences low flows due to over appropriation and has had most of its overstory removed. It also suffers from limited water clarity due to high sediment concentrations.

Clarks/Clear Creek Subwatershed: The Puyallup River downstream of Puyallup was found to have high fecal coliform and turbidity levels. Fecal coliform bacteria sampling showed a tremendous increase in bacteria levels between Orting and the City of Puyallup, indicating that significant sources of bacteria exist within the planning area. High turbidity readings usually occurred during the months of July, August, and September. (Note: While there are at least two sewer treatment plants with outfalls into the Puyallup River, the treatment process destroys most bacteria. The average fecal coliform bacteria levels of sewage treatment plant effluent is significantly lower than the bacteria levels found in the receiving waters.)

Swan Creek was found to have high fecal coliform bacteria counts and high levels of nitrogen and phosphorous.

Clear Creek was found to have high fecal coliform levels and the hatchery located near its mouth has experienced a number of fish kills due to flooding and sedimentation.

Clarks Creek is severely impaired by intensive vegetation growth. The vegetation has reduced the carrying capacity of the creek bed and has resulted in flooding conditions even during low flow summer months. This is being caused by high nutrient levels and sedimentation. The ground water that supplies Clarks Creek and its smaller tributaries seems to be inherently high in nitrogen but low in phosphorous. The creek supports a fish hatchery and a park with a large population of ducks. The wastes from both are high in nutrients and the ducks contribute high levels of fecal coliform bacteria. Residential development has encroached upon the creek, resulting in reduced overstory coverage, streambank modifications such as bulkheading, and limited buffer filtering of runoff. High sediment levels have caused fish kills to occur at the hatchery.

Clarks Creek has also been found to host high levels of methylphenol, a compound found in creosote. Diru Creek, a tributary to Clarks Creek, was found to have acutely toxic levels of mercury.

Thirty-one percent of land use within the subwatershed is devoted to residential. Agricultural land uses take up 27%. Approximately, one half of the agricultural acreage is in small farms of 5 acres or less. Commercial development is concentrated in downtown Puyallup and along Meridian Avenue South (Hwy. 161) on Puyallup's South Hill. The City of Puyallup occupies about 25% of the land area of the subwatershed.

The population of the subwatershed is expected to increase by 30% between 1989 and the year 2000. The 1989 population was 69,500 while the 2000 population is expected to be around 90,600.

The habitat within the subwatershed varies widely. The Puyallup River in this subwatershed has been intensely diked and channelized. A recent agreement has allowed some regrowth of trees along the banks, but there are no meanders to support aquatic life which favors slower moving currents. The dikes limit wildlife access to the River. The old ox-bow lakes and meander remnants support unique habitat environments for water fowl and Western pond turtles, a Washington State threatened specie.

The headwaters of the creeks within this subwatershed are located on a plateau south of the Puyallup valley. Habitat protection in this area is limited due to development and the lack of consistent water flows. The creeks flow into canyons downcutting the steep slopes bordering the valley floor. Habitat and riparian zones in these canyons are protected by the severity of the slopes. Once the creeks reach the valley floor they are channelized around along main roadways and around large agricultural parcels.

Lower White River Subwatershed: The Lower White River was found to have high suspended sediment and fecal coliform bacteria levels. The Flume, which carries diverted water from the White River into Lake Tapps, was found to have high fecal coliform bacteria levels. Tests taken from the Flume during a period when the White River diversion was cut off showed a dramatic increase in bacteria. This indicates that runoff from the seven dairies in the area may be draining directly into the Flume, an artificial channel. Salmon Creek was also found to have high bacteria levels and runoff from Highway 410 contributes runoff to Strawberry Ditch, a tributary to Salmon Creek.

The subwatershed contains nearly equal shares of residential (23%), agricultural (24%), and vacant land (22%). The substantial amount of vacant wooded land is mainly due to steep slopes along the valley walls, especially west of Lake Tapps. Urbanized areas containing commercial and industrial land occupy less than ten percent of the subwatershed and are located in the vicinity of Sumner, Algona, and Pacific near the King/Pierce County line.

The population of the Lower White subwatershed was approximately 15,900 in 1989. It is expected to increase by 28% to 20,300 by the year 2000. At least three large residential developments are planned for the area which will convert current agricultural uses to residential.

White River habitat is limited by flood prevention diking. The section of the river downstream of the White River diversion at Buckley has reduced habitat carrying capacity because the amount of flow has been decreased. Lake Tapps provides good habitat with the limitation that residential development along the lake edge limits access and the annual water level drawdown results in a regularly occurring reduction in habitat and a minor fish kill when the event occurs (Washington State Department of Ecology). Jovita Creek has had the culverts under Jovita Boulevard replaced with large, gravel-bottomed, fish accessible culverts but the stream runs in ditches alongside Highway 167 before it ultimately enters the White River.

Middle Puyallup Subwatershed: The Puyallup River at Orting was found to have the highest suspended sediment reading taken in the watershed on January of 1984. Total phosphorous levels did exceed EPA recommended guidelines, primarily during the summer months. The highest turbidity taken in the watershed was collected from the Puyallup River at Orting in the

month of July. High summer turbidity readings are the result of glacial sediments in the runoff from Mount Rainier.

Land use in the Middle Puyallup watershed is 43% vacant forested land, 30% agriculture (primarily large lot), 12% dedicated to natural resource extraction, and 10% residential. Population is expected to increase 27% between 1989 and the year 2000. This would result in an increase from the 1989 population of 28,600 to 36,300 by the year 2000.

Habitat supported by the Puyallup River in this subwatershed is limited by the extensive diking that has occurred for flood control purposes. The dikes prevent wildlife access to the river and the lack of variation in bank habitat reduces the success of certain fish and wildlife species. The dikes were established for economic purposes to protect the agricultural land uses in the floodplain of the Puyallup and White Rivers.

DESIRABLE BUT UNAVAILABLE INFORMATION

Information that would have aided the assessment, characterization, and problem definition for the Lower Puyallup Watershed includes:

- ! Quantitative and site-specific information on the relationship between land use and water quality.
- ! Information on wildlife specific to the watershed.
- ! Site-specific assessments and identification of problem sites.
- ! More extensive water quality monitoring information.
- ! A more thorough wetland inventory for the watershed.
- ! A sociological study of the effects of surface water pollution on Native American and local population culture and quality of life.
- ! List of marine resources and their abundance in Commencement Bay.

Without this information, the Committee was not able to justify site-specific actions to directly deal with individual property owners. It was unable to justify expensive actions to control certain pollutants because insufficient evidence exists to prove that certain pollutants are causing problems. The committee was unable to suggest that specific habitats be protected based on the wildlife they support. Finally, they were unable to make recommendations which would mitigate for the social, cultural, and psychological impacts of water quality degradation.

Many of the threats to water quality were assumed based on studies performed in other locations. Sufficient amounts of scientific data *do* exist to prove that certain activities have a definite potential to cause significant water quality degradation. The Committee felt this information was sufficient to justify their recommendations. The limited site specific data was not used to avoid problems. The Committee addressed this limitation by including a strong data collection element within the plan and choosing nonregulatory approaches when the action items were developed. Although it does not include a site-specific list of capital improvement projects that are needed, the plan incorporates both proven and innovative methods for reducing nonpoint pollution.

CHAPTER 4: SOURCE CONTROL ACTION ITEMS

Nonpoint source pollution is inherently related to the activities and land uses of watershed residents. In order to address the problem it is necessary to address the behaviors. The Lower Puyallup Watershed Management Committee chose to accomplish this by organizing potentially damaging behaviors into six generalized sources: agriculture, boats and marinas, forest practices, on-site sewage disposal, stormwater/erosion, and other. Each source has its own chapter which includes a definition of the problem as it exists within the watershed, an analysis of existing programs for addressing the problems, the goals and objectives of the committee for dealing with the source, and the specific source control action items.

The intent of the source control action items is to describe tasks which, if completed, will improve water quality. In an effort to facilitate implementation of these action items, specific information has been provided. These elements are described below.

Title: In bold lettering, the title describes the main thrust of the action item.

Narrative: The narrative provides an explanation of the intent of the action item and describes the actions to be taken in the course of implementing the action item. One action item may include a number of separate elements to be accomplished. Elements identified by "(1)", "(2)", etc. indicate separate tasks necessary to fully implement an action item. Number designations may be used to separate out costs, funding sources, funding types, time frames, and startup dates which are unique to specific tasks within the action item. If estimated cost, funding sources, funding type, and time frame information are preceded by "a)" or "b)", this represents either startup and operation (startup as "a", operation as "b") or funding that is shared by two funding sources (funding source "a" and funding source "b"). If letter or number designations are absent, then the information applies to all tasks described within the action item.

Lead Implementor: This is the agency which will be held accountable for the implementation of the action item. The Lead Implementor is not necessarily the funding source, but it is the responsibility of the lead implementor to pursue funding sources.

Cooperators: These are groups and agencies which would be asked to participate in the implementation of the action item, or at least consulted.

Estimated Cost: This is an estimate of the amount of funding required by the lead implementor in order to fulfill the terms of the action item. These figures were often estimated from the number of person-hours required to complete the tasks. The cost is expressed as either a one-time cost or a cost per year.

Potential Funding Source: Identifies the agency which will be requested to provide monies to cover the cost of implementation. Sometimes a lead implementor's budget is determined by contributions received from local governments. In those cases, the lead implementor will need to ask the local government for more funding to implement the action item and the local

government is designated as the funding source. If a specific grant program (such as the Centennial Clean Water Fund) is identified, it is assumed that other sources of grant funding will be pursued if the specified grant is not available. The lead implementor will attempt to identify alternate funding sources if the identified funding source is unable to finance the action. It is the responsibility of the lead implementor to secure funding.

Potential Funding Type: This explains how the funding source will support the financing of the action item. Funding types include: grants, fees, general funds, rates, bond, fines, loans, deposits, and allocations. Grants may require the identification of a source of match. Fees are generated by charging for a specific, one time service, such as a building permit. Rates are charged for ongoing, regular services such as water and garbage collection. Allocations refer to contributions by a number of jurisdictions based on the size of their populations.

Benefit: It is assumed that improved water quality is a benefit of every action item. Additional benefits are explained under this heading.

Type of Source Control: This element describes the approach to improving water quality taken within the action item. Approaches include: education, voluntary incentives, maintenance and operations, coordination, regulatory, research, capital improvement, and financing.

Time Frame: This indicates whether or not the action item is a one-time project with a definite end point or an ongoing program.

Startup Date: This element establishes the year and quarter by which the lead implementor would have the action item implemented. The year precedes the slash, with the quarter to the right of the slash (eg. year/quarter). These time frames commence at the date of final Watershed Action Plan approval. All action items should be acted upon within five years, provided resources are available.

AGRICULTURAL ACTION ITEMS

The Committee has chosen to focus many of its agricultural source control action items on preventing and reducing nonpoint pollution from small, noncommercial farms, particularly those supporting livestock. Washington Administrative Code 400-12 requires each watershed action plan to include "an exceptions element stating that any farm implementing an approved farm plan, as agreed upon by the operator and the conservation district shall be exempt from further water quality regulation under this chapter unless there is a water quality violation".

PROBLEM DEFINITION

All types of agricultural practices occur within the Lower Puyallup Watershed, from dairies to crops, and they occur on lots of all sizes. Agriculture is considered to be land upon which crops are grown and harvested, or livestock is kept. (Please note that no consideration was given to commercial viability in defining agricultural use.) All parcels of 1 acre or larger with pasture or crop, are designated as agriculture. Agricultural land use includes both large commercial farms and small personal-interest farms. In the Lower Puyallup Watershed, agricultural land use is divided into three subclasses: small lot - 1.0 to 4.9 acre range, mid-size lot - 5.0 to 9.9 acre range, and large lot - 10 acres or larger. The small lot classification includes parcels containing single family or duplex residences that were assumed, but not confirmed, to support agricultural use. Nonetheless, when agriculture does occur on these small lots, the potential for nonpoint pollution is high due to the limited space available for implementing effective management practices.

Potential pollutants in runoff from crop farming include sediment from ploughed fields; and the application of fertilizers, herbicides, rodenticides, and pesticides. Farms which raise animals may cause sedimentation from animal access to streams and fecal matter which may come either directly from the animal entering the stream or from inadequate management of manure disposal. Manure is particularly problematic because it rapidly uses up available dissolved oxygen in surface water and, if a significant amount of manure is dumped into a stream, fish kills result. Sediment impacts salmon fisheries by covering up spawning beds, damaging fish gills, and reducing their ability to find food .

Issues related to crop farming, such as pesticide, herbicide, and fertilizer use are addressed under the section dealing with Other action items.

Farm size affects water quality. Small farms may have fewer animals, but they often operate at animal densities higher than those found on larger farms. A large number of small farms may have a cumulative pollution impact in excess of the pollutant contributions from a few large farms. Large acreage farms have the potential to be point sources in certain situations. Farming practices such as field tilling and heavily used livestock holding or feeding areas, may result in soil disturbance. Large areas of impervious surfaces are not commonly associated with agricultural activity.

There are approximately 30,000 acres of land in agricultural use within the watershed. Pierce County Conservation District did a partial survey of the watershed and found 428 farms housing approximately 560 horses, 2530 cows, 134 sheep, a variety of other animals such as donkeys, llamas, mules, goats, and numerous chickens (Pierce County Conservation District). According to the Washington State Department of Ecology, there are 39 dairies within Pierce County. Eighty-two percent, or 32 dairies, have farm plans. Of these 32 dairies, only five percent have fully implemented farm plans, sixty-four percent have partially implemented plans, and thirty-one percent have yet to begin implementation. The number of these dairies that fall within the Lower Puyallup Watershed is uncertain but it is assumed that the rate of implementation for those dairies is probably consistent with the rate for the county as a whole (SCS, 1992).

Commencement Bay subwatershed has very little agricultural land of any size, Hylebos Creek and Clarks/Clear Creek subwatersheds both host a number of small farms. Large farms are found mostly in the Middle Puyallup and Lower White River subwatersheds. Due to urbanization pressures, the expected land use trends indicate a reduction in the number of large farms and an increase in small farms and residential uses.

EXISTING PROGRAMS

The primary agencies working with agricultural land owners are WSU-Pierce County Cooperative Extension, Pierce County Conservation District, Soil Service and the Agricultural Stabilization and Conservation Service (ASCS). Cooperative Extension provides educational services to the agricultural community and technical production assistance for crop, dairy and forest production. The Conservation District develops individualized farm plans to conserve soils and protect water quality by working one-on-one with farmers. Engineering services to support the design of waste and drainage systems is provided by the Soil Conservation Service. ASCS provides federal cost sharing monies for farmers to implement certain soil conserving and pollution preventing measures.

Most, if not all, of the dairies within the watershed have Conservation District approved farm plans but they have not been updated or fully implemented. The Committee addresses dairies by encouraging dairies to obtain updated farm plans and to implement them. There may also be the possibility that dairies may be required to obtain National Pollutant Discharge Elimination System (NPDES) permits within the next two to three years.

The Pierce County Conservation District has developed an existing inventory of farms with implemented farm plans and is currently updating an inventory of other farms. Existing District programs include a corrective action element that includes voluntary measures for farm plan design, implementation, evaluation, and updating. The Pierce County Conservation District is developing programs to increase the number of small farms with plans and the level of plan implementation amongst dairies.

Pierce County open space ordinances provide for agricultural land use taxation benefits. Applicants for agricultural open space taxation must submit Conservation District approved farm plans to the Pierce County Assessor if their application is to be approved. The Pierce County

Comprehensive Plan, generated by the Growth Management Act, requires designation of Agricultural Resource Lands. A cross-jurisdictional identification and protection effort is necessary. A farmland preservation program with financial incentives to protect agricultural land with priority riparian habitat is needed. Further investigation and prioritization of valuable riparian habitat/buffer areas and the overall identification of farmlands requiring priority for preservation are also needed. Agricultural preservation efforts need to be coordinated with forest preservation efforts. A method of rating the importance protecting agricultural and other sensitive land for open space is required.

Overall agricultural education requirements need to be continued with the existing programs and coordinated with the Committee's environmental education strategies. Technical support delivery to small farms need to be developed.

GOALS AND OBJECTIVES

- 1) Protect and preserve farmland. (While agricultural activities may contribute certain types of nonpoint pollution, it is felt that conversion of agricultural land to urban uses results in nonpoint pollution problems that are more difficult to mitigate.)
- 2) Protect riparian areas from livestock.
- 3) Involve the public and utilize volunteers in implementing BMP's.
- 4) Encourage the implementation of agricultural BMP's.
- 5) Improve funding mechanisms.

ACTION ITEMS

AG ! DEVELOP BOND ELECTION FOR PRIORITY FARMLAND PRESERVATION

Develop a Pierce County farmland preservation program for purchasing development rights of agricultural land with priority for riparian rights. A bond issue would be utilized for financing the purchase of priority agricultural land.

The Puyallup River Basin Council, which may oversee the implementation of the overall Watershed Action Plan, or Pierce County, would direct the development of the bond initiative and create a Citizen's Advisory Committee of broad representation committed to reviewing the initiative, advertising its importance to voters, and lobbying for its passage. The River Basin Council will also include among its top priority tasks, the identification of farmlands which should be preserved. Comprehensive planning staff is conducting public opinion surveys regarding agricultural land preservation. Information from these surveys will be used to guide prioritization of land for preservation.

Dairies will be impacted by decisions made associated with this action item. Therefore, dairies should be involved to help in the gathering of any further information and to help incorporate their concerns.

Lead Implementor:	Puyallup River Basin Council
Cooperators:	Pierce County, Cities, Citizen's Advisory Committee
Estimated Cost:	a) \$20,000 startup b) \$30,000,000 over four years
Potential Funding Source:	a) Pierce County b) Bond
Potential Funding Type:	a) General Fund b) Bond
Benefit:	Agriculture land preserved would not be converted to other uses.
Type of Source Control:	Voluntary incentive
Time Frame:	a) One time b) Ongoing
Startup Date:	2/3

AG 1 **DEVELOP A FARM AND FOREST LAND PRESERVATION PROGRAM USING SPECIAL AREAS DESIGNATIONS**

Develop uniform policies and regulations based on county and city compliance with the Growth Management Act to designate and protect farm and timber lands as Resource Management Areas or open space/greenbelt areas.

Lead Implementor:	Pierce County and Cities
Cooperators:	Pierce County and Cities
Estimated Cost:	\$25,000
Potential Funding Source:	Pierce County and Cities
Potential Funding Type:	Existing program
Benefit:	Agriculture land preserved would not be converted to

other uses.
Type of Source Control: Regulatory
Time Frame: One time
Startup Date: 1/2

AG 2 **INCLUDE PROTECTION OF RIPARIAN ZONES ALONG ALL STREAMS/WETLANDS IN COMPREHENSIVE PLANNING**

- (1) Currently, Pierce County has an interim critical areas Fish and Wildlife Ordinance establishing 150 foot buffers on streams and rivers of special concern and 35 foot buffers on all others. Pierce County would evaluate the effectiveness of buffer widths and revise them as appropriate.
- (2) Counties and cities would develop consistent Comprehensive Plan policies and land use regulations encouraging the establishment of riparian zones.
- (3) The Puyallup River Basin Council would provide counties and cities with recommendations on which riparian zone areas most need protection.
- (4) Forest practices associated with a conversion in land use would be consistent with these buffering requirements. All other forest practices should apply buffer widths consistent with forest practice regulations.

Lead Implementor: Cities and Counties
Cooperators: NA
Estimated Cost: \$50,000
Potential Funding Source: Pierce County
Potential Funding Type: Existing program
Benefit: Number of acres of riparian zone land placed under program.
Type of Source Control: Regulatory
Time Frame: One time
Startup Date: Coincide with GMA process

AG 3 **AMEND STATE LAW TO REQUIRE BEST MANAGEMENT PRACTICES (BMPS) FOR FARM AND AGRICULTURAL LAND CURRENT USE ASSESSMENT**

Amend RCW 84 Open Space, Agriculture, and Timber Lands - Current Use Assessment - Conservation Futures to require submittal of a farm or forest management plan to conservation districts for approval, and implementation of the farm or forest plan in order for forest and agricultural land to receive current use valuation of land for property tax assessment purposes. This would apply to new applications for current use valuation only, not to lands currently receiving open space tax credits.

Current lack of funds exists for evaluating the increase number of farm/forest applications. The Pierce County Assessor's Office currently receives 20 - 25 applications for Agricultural Open Space taxation. In order to qualify for this

category of open space taxation the property must be over ten acres and earn over a certain amount per year from agricultural activities. Most of these applications are for farms supporting livestock rather than for crop farming, but it is unclear how many of these applications are for farms with existing plans. The proposed River Basin Council will need to evaluate and suggest alternative funding sources to accommodate this action item.

Lead Implementor:	State Legislature
Cooperators:	Conservation districts, Soil Conservation Service (SCS), Counties and Cities
Estimated Cost:	(Incorporated into AG 8 cost.)
Potential Funding Source:	State Legislature
Potential Funding Type:	Existing program
Benefit:	Implementation of BMPs.
Type of Source Control:	Voluntary incentive
Time Frame:	One time
Startup Date:	4/2

AG 4 CREATE A PUBLIC BENEFIT RATING SYSTEM FOR OPEN SPACE

Pierce County would allow reduced taxes, through current use assessment, for land upon which Best Management Practices are implemented or land that property owners place in undisturbed riparian zone tracts. The program would be implemented through a revision of open space policies to include a Public Benefit Rating System pursuant to RCW 84.34.055. The program would apply only to lands that are not agricultural or timber lands as defined by RCW 84.34.020.

The rating system would evaluate applications for open space based on their benefit to the public. Those with the greatest benefit would be given the largest percentage tax reduction. The rating system would provide a mechanism for protecting sensitive and critical lands which are not regulated.

Lead Implementor:	Pierce County and Cities
Cooperators:	NA
Estimated Cost:	a) \$20,000 setup b) \$10,000 /year (Does not include reduced revenue)
Potential Funding Source:	Pierce County
Potential Funding Type:	General fund
Benefit:	BMP implementation and riparian zone revegetation.
Type of Source Control:	Voluntary incentive
Time Frame:	a) One time b) Ongoing
Startup Date:	2/1

AG 5 MASTER WATER CONSERVATIONIST - STUDENT AND ADULT VOLUNTEER PROGRAM

WSU Pierce County Cooperative Extension in partnership with the Conservation District and school districts will develop a volunteer outreach program to reach both small and large farmers and rural residents with technical information on preventing water pollution. Students would receive the necessary training through in-class curriculum, field studies, and agency internships. Teachers will receive accredited training in order to teach their students. A Master Farmers program, specifically designed to train small farmers to do educational outreach to fellow farmers, would be established. The lead implementor will research the model provided by Snohomish County's Livestock Master program.

Volunteer activities will involve one-on-one consultations, water quality monitoring, educational tours and sponsoring educational workshops.

Lead Implementor:	WSU Pierce County Cooperative Extension
Cooperators:	Pierce County Conservation District, School Districts
Estimated Cost:	\$50,000/year
Potential Funding Source:	Pierce County
Potential Funding Type:	General Funds
Benefit:	Reduced water pollution from farms due increase in BMP implementation and education. Cost effective outreach.
Type of Source Control:	Peer pressure, public involvement, knowledge increase, implementation assistance
Time Frame:	Ongoing
Startup Date:	1/1

AG 6 CONTINUE DEVELOPING AND UPDATING FARM PLANS

Existing programs for helping dairies and small farms develop farm plans and finance the installation of BMPs would be supported and continued. Currently, there are about twenty dairies within the Lower Puyallup Watershed. Four of these dairies have had their farm plans updated within the last five years.

Lead Implementor:	Pierce County Conservation District
Cooperators:	SCS, ASCS
Estimated Cost:	\$120,000/year
Potential Funding Source:	Conservation District, Counties, State, Federal
Potential Funding Type:	General funds, Grants
Benefit:	Increased number of farm plan and water quality facilities installed.
Type of Source Control:	Voluntary incentive
Time Frame:	Ongoing
Startup Date:	1/1

AG 7 MODIFY AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE POLICIES TO MAKE COST-SHARING AVAILABLE TO SMALL FARMERS

ASCS programs would review their cost-sharing policies and reconsider those policies which may hinder participation by small, farmers.

ASCS boards will review the Puyallup River Basin Council's identified priority riparian zones as well as recommendations for priority stream restoration projects when evaluating small farm proposals.

Lead Implementor:	Local ASCS Boards
Cooperators:	Conservation districts, SCS
Estimated Cost:	\$0
Potential Funding Source:	ASCS
Potential Funding Type:	Existing program
Benefit:	Small farms increase use of BMPs.
Type of Source Control:	Finance
Time Frame:	One time
Startup Date:	1/1

BOATS & MARINAS ACTION ITEMS

PROBLEM DEFINITION

Nonpoint pollution from boating stems primarily from the discharge of untreated or inadequately treated sewage, overboard disposal of waste and garbage, and release of chemicals associated with boat fueling, cleaning, and maintenance. Two major sources of this pollution are from activities of recreational and commercial boating.

Recreational boating occurs, primarily, on Commencement Bay and Lake Tapps. There are seven marinas within Commencement Bay with an unknown number of liveaboards. No conclusive water quality sampling has been performed for the purpose of identifying the extent of nonpoint pollution being contributed by these marinas. The Committee has chosen to assume that boats and marinas within Commencement Bay will contribute problems similar to those identified in other areas of Puget Sound. Visual review of the shoreline and litter picking programs such as those sponsored by Citizens for a Healthy Bay have identified significant amounts of shoreline litter and flotsam. Otherwise, there is no documentation to support that a serious problem does or does not exist within the Lower Puyallup Watershed.

The most significant recreational boating related pollution problem is disposal of human waste. Sewage pumpout facilities need to be more accessible and boaters need to be educated in the importance of using these facilities. Vessel maintenance activities, such as scraping and painting hulls, changing engine oil, cleaning bilges, etc., also contribute to nonpoint pollution.

EXISTING PROGRAMS

There exists a Boater's Task Force for Puget Sound which is responsible for planning and implementing boating-related water quality policies of the Puget Sound Water Quality Plan. State agencies addressing boating issues include Washington State Parks and Recreation (Parks) and the Department of Ecology. A number of divisions within the Department of Ecology provide assistance for boating related issues including Water Quality, Water Quality Financial Assistance, and the Shorelands Program.

The task force consists of state agencies (staffed by Puget Sound Water Quality Authority) and has an Advisory Committee, which is composed of boat and marina owners.

A competitive grant program is currently administered by the Washington State Parks to fund pumpout stations. Sewage pumpout facilities need to be more accessible and boaters need to be educated in the importance of using these facilities. Other pumpout funding sources might be the Interagency Committee for Outdoor Recreation (IAC). The IAC collects state marine fuel tax and applies to boating recreation. Pumpouts are eligible. In some years the IAC has had more funds than applications.

Federal grant funding for pumpouts will also be available; a decision on the grant administering agency has yet to be made. Federal agencies with programs effecting Non-point Pollution from boats and marinas include the US Coast Guard, EPA, and NOAA. Also, Ecology Central Programs administers regional Spill Management Units, which are closely involved with marine spills and marine pollution.

Additional agencies with direct interests in boating include the University of Washington through Sea Grant, the Department of Natural Resources Aquatic Lands Division, the Department of Fisheries and Wildlife, the Pierce County Parks Department, Tacoma-Pierce County Health Department, the Pierce County Sheriff's Department, the Indian tribes, Tacoma City Police, and the Port of Tacoma.

New marinas, pumpouts, and other shoreline development must meet local Shoreline Management Use Regulations.

Washington State Parks funds pumpouts through a federal competitive grant program. In the current biennium, 100% of pumpout establishment costs were funded. Recipients must agree to various requirements, including a ten year contract and operation and maintenance of the pumpout.

Many pollutants commonly associated with boating are being addressed through a number of existing programs. Hazardous waste and recycling programs currently operated by cities and counties also serve boaters. Spill prevention programs applicable to boating exist in the spill management programs of Ecology, and in local health departments. Boat maintenance activities, such as hull scraping and painting, are impacted by NPDES permit requirements for marinas. Federal laws now restrict the use of toxins and metals in boat paint products but contamination still exists from the paint residue that has settled into the bottom sediments from previous years of heavy use. Most of these sediment contamination problems are currently being handled under the Commencement Bay restoration plan.

Within marinas, there may be interest in regulating maintenance activities of individual boaters in order to avoid NPDES requirements.

Technical and funding resources are already available to address identified nonpoint concerns. Local identification of projects and a coordinated pursuit of funding for those projects should be developed for the watershed.

A single action item has been developed to establish a local ad hoc marina-boating committee involving marina owners, boaters, local agencies, state agencies, and solid/hazardous waste service providers. The group would be charged with establishing priorities for nonpoint pollution preventing capital improvements. Top priority would be local coordination.

GOALS AND OBJECTIVES

- 1) Increase opportunities for sewage pumpouts.
- 2) Increase programs for solid/hazardous waste collection.

- 3) Control boat maintenance activities.

ACTION ITEMS

BM 1 ESTABLISH COMMENCEMENT BAY BOATING COMMITTEE

The IAC would establish a local ad hoc committee for addressing issues related to marinas and recreational boating. The committee would consist of representatives from marina owners, Metropolitan Parks Department, Port of Tacoma, Pierce County Parks and Recreation, Department of Natural Resources, Puget Sound Water Quality Authority, solid/hazardous waste service providers, and the Puyallup Tribe. The committee would be charged with establishing priorities for nonpoint pollution prevention actions such as human waste disposal, solid/hazardous waste collection, maintenance activities, and other marina related best management practices. The committee would report to the Puyallup River Basin Council (as defined in IM 1, chapter six) and provide a list of site-specific actions and/or programs which should be done to improve water quality within Commencement Bay. These actions or programs should be implemented for freshwater activities as well, where appropriate.

Lead Implementor:	Interagency Committee for Outdoor Recreation (IAC)
Cooperators:	Washington State Parks and Recreation
Estimated Cost:	\$50,000 (\$37,500 grant, \$12,500 match)
Funding Sources:	Coastal Zone Management Grant, Washington State Parks and Recreation match or IAC
Potential Funding Type:	Grant
Benefit:	Coordination and ongoing efforts to reduce boat and marina nonpoint pollution.
Type of Source Control:	Coordination
Time Frame:	One time
Startup Date:	1/2

FOREST PRACTICES ACTION ITEMS

PROBLEM DEFINITION

The Lower Puyallup Watershed contains little forest land compared to other land uses. As a result, logging impacts from land in the watershed boundary are relatively low compared to other nonpoint sources of pollution. Most logging occurs in the upper watershed, which has been excluded from the planning area. The scope of the Lower Puyallup Watershed Action Plan does not address land uses outside of the watershed boundary.

Forest practice concerns within the Lower Puyallup watershed are focussed primarily on small forest lots and land conversions. The Middle Puyallup River Subwatershed is the most rural and is also the largest subwatershed. The most common land use in the subwatershed is vacant forested land (43%) indicating a potential for logging practices to take place.

When performed improperly or illegally, logging has the potential to impact water quality by adding sediment and fine organic debris to rivers and streams, increasing stream temperatures, and potentially introducing pesticides and herbicides. Erosion may occur as a result of removing ground cover and/or improper road siting and maintenance. The "slash," or branches left over from logging, may cause problems if it is allowed to clog a stream channel. The slash can reduce flows and decrease dissolved oxygen levels. Also, if the shade cover over a stream is illegally removed, high water temperatures may threaten salmon runs. These impacts can be avoided if the practice is performed in accordance with existing regulations. Violations are most likely to occur on small timber lots where owners are unaware of the regulations and intend to sell the property shortly after the harvest has occurred.

An emphasis on small lot timber harvest and conversions is reflected in the forest practices action items.

EXISTING PROGRAMS

Washington State University Cooperative Extension and the Department of Natural Resources Land and Water Conservation Division have state-wide responsibility for forest practice education. Education programs administered by the Washington Forest Practice Association (WFPA) and the Washington Farm and Forestry Association (WFFA) address water quality, forest conversion, and reforestation. WSU Cooperative Extension also performs forestry related public education.

King and Pierce Counties and the various cities currently have responsibility for forest land conversions within their jurisdictions. Pierce County Planning and Land Services Department reviews permits and administers codes governing development and forest land conversions. An "Open Space" taxation relief program is jointly administered between the County Assessor and Planning. Pierce County's Comprehensive Planning Section has developed land use objectives

for protecting forest land. Pierce County and local cities need to consistently control conversion of forest lands. This includes consistent application of different Clearing and Grading Ordinances within the various jurisdictions.

Tracking of forest practice applications needs improvement. Forest practices that are performed without the intention of converting the land use have an automatic six-year moratorium imposed following the logging practice. Local government staff who accept or review development permit applications do not have adequate resources to identify lands that have had moratoriums imposed. Pierce County has an in-house system to review FPA harvest plans. Uniform enforcement of a moratoriums in all jurisdictions is needed.

GOALS AND OBJECTIVES

- 1) Improve regulation of forest land conversions.
- 2) Establish consistency between local jurisdictions.
- 3) Improve data/projections on conversions.
- 4) Provide technical assistance/education on forest practices.

ACTION ITEMS

FP 1 MEMORANDUM OF AGREEMENT BETWEEN AGENCIES AND JURISDICTIONS.

Develop a Memorandum of Agreement on Conversion (MOA) of Forest Lands. The county and cities would enter into an MOA with the Department of Natural Resources (DNR) addressing the conversion of forest lands. The MOA would address Clearing and Grading Ordinance consistency and the monitoring of conversions. The MOA would allow the conditioning of conversions with requirements equal to or stricter than Forest Practices Act (FPA) standards as administered by DNR, and would provide coordinated processing, approval and enforcement of forest practices. This includes addressing the following conversion impacts: loss of riparian habitat, erosion and sedimentation of stream beds, temperature increases, hazardous materials spillage, grease and oil spillage, increased peak stream flows, decreased base flows, and appropriate application of retention/detention facilities to accommodate increases in impervious surface area.

Local Governments need to develop a tracking system for forest practice applications and development permits to ensure that the county or city has the opportunity to review proposals for changing land use prior to a forest practice activity commencing.

Lead Implementor:	DNR
Cooperators:	Counties and Cities
Estimated Cost:	\$1,000
Potential Funding Source:	Counties and Cities
Potential Funding Type:	General fund
Benefit:	Increased coordination between agencies and increased implementation of BMP's.
Type of Source Control:	Regulatory
Time Frame:	One time
Startup Date:	1/1

FP 2 ADMINISTER FPA HARVEST PLANS IN PIERCE COUNTY

Pierce County has an in-house system to review FPA harvest plans. This may include on-site inspection before conversion and 24 hours notice before work begins.

Lead Implementor:	Pierce County
Cooperators:	Cities, DNR
Estimated Cost:	\$30,000 /year
Potential Funding Source:	Pierce County
Potential Funding Type:	Fees
Benefit:	On-site inspection would increase environmental protection.
Type of Source Control:	Regulatory
Time Frame:	Ongoing
Startup Date:	1/4

FP 3 **TRACK CONVERSION OF FOREST LANDS**

The conversion of forest lands under FPA would be tracked, including enforcement of a six year moratorium as provided in the FPA (RCW 76.09). Six-year conversion moratoriums would be tracked by requiring the filing of a notice of record with the county assessor. This information would be available to local government staff who accept or review development applications through existing computer networks.

Lead Implementor: Pierce County Assessor
Cooperators: DNR, Pierce County Planning Department
Estimated Cost: \$40,000 /year
Potential Funding Source: Pierce County
Potential Funding Type: Fees
Benefit: Consequences for illegal conversions
Type of Source Control: Regulatory
Time Frame: Ongoing
Startup Date: 1/2

FP 4 **PROVIDE TECHNICAL ASSISTANCE AND PUBLIC EDUCATION CONCERNING FOREST CONVERSION/REFORESTATION/BMPS**

Owners of forest lands would be identified and targeted with educational programs addressing water quality and forest conversion. Public education would be coordinated with WSU Cooperative Extension, WFFA, and WFFA as part of an existing Memorandum of Understanding between WSU and the County and between WSU and DNR.

Lead Implementor: WSU Cooperative Extension
Cooperators: Pierce County, DNR, USDA-Soil Conservation Service, Pierce County Conservation District, USDA-Forest Service, P.C. Farm Forestry Assoc., WDOE's TFW staff and WFFA.
Estimated Cost: \$5,000
Potential Funding Source: 319 Grant
Potential Funding Type: Grant
Benefit: Trees planted, land left forested, wildlife habitat established/improved.
Type of Source Control: Education/involvement
Time Frame: One time
Startup Date: 1/2

ON-SITE SEWAGE ACTION ITEMS

PROBLEM DEFINITION

Problem Introduction

On-site sewage disposal systems are common throughout the unincorporated areas of the Lower Puyallup Watershed. They present a potential source of nonpoint pollution when individual systems fail to function properly and/or when they are installed at densities higher than an area's soils can accommodate. The major pollutants in septic tank effluent are nutrients, pathogens, hazardous household wastes, and organic substances, which may all reach surface waters or contaminate ground water in the event of system failure.

Life of On-site Systems

Most septic systems have a 20- to 30-year life expectancy so older residential developments often experience higher rates of septic failures. (It should be noted that septic systems are now being designed to last the lifetime of the structure.) Improper maintenance will cause even a well-designed system to fail in a much shorter period of time. Other reasons for on-site failures include poor design, construction prior to establishment of standards, inadequate design review, and a lack of in-field inspection during construction. Water quality problems arise because of a failure to treat without visible signs of septic failure.

A number of alternative on-site sewage disposal systems can accommodate site limitations that traditional systems cannot.

Soil and Problem Areas

Most of the soil associations dominating the Lower Puyallup Plan area have been identified as having features unfavorable and difficult to overcome for septic drainfield use. The 1979 Soil Survey of Pierce County, Washington, identifies wetness, hard pan layers, slopes, and slow percolation rates as reasons for this conclusion. Both Barneston and Everett Associations are so well drained that potential groundwater contamination from septic tank drainage fields should be considered. Buckley, Puyallup, Scamman, Sultan, and Wilkeson soils all have specific draining problems, and septic fields in these soils do not function properly without extensive design and engineering. Poorly drained soils and areas with high water table levels have a much higher potential for septic failure. Much of Lake Tapps, Browns Point, North Tacoma, and the South Hill area of Puyallup are of the Alderwood-Everett Association, which has substantially increased septic failures.

Certain neighborhoods within the Watershed have been identified as having high septic failure rates. Fife, Fife Heights, Edgewood, Milton, the Summit/Midland area, Fruitland/Woodland Avenue area near South Hill, and North Puyallup along River Road and Valley Avenue, all experience elevated septic failure rates. In the North Hill area, soils are generally unsuitable for on-site sewage disposal. Since septic systems are utilized in this area, septic system failures are likely. Swan Creek, Clear Creek, Rody Creek and Clarks Creek were all found to be marginally impaired by on-site waste treatment (septic systems).

EXISTING PROGRAMS

Permitters

Local on-site sewage programs are administered by TPCHD and SKCHD and are assisted by Washington State Department of Health (WDOH). The State Department of Ecology issues permits for on-site systems greater than 14,500 gallons per day (gpd) and mechanical treatment facilities in excess of 3500 gpd.

Septic or Sewer?

EPA recommends standards for septic design, the WDOH adopts design standards, and the TPCHD approves septic systems. The Pierce County Comprehensive Plan recommends a moratorium on new permanent septic systems within the urban growth boundary, unless it will serve only one home per acre or two homes per acre with sand filter systems. All urban areas are required to be sewerred.

The Pierce County Public Utilities Department operates the waste treatment plant, and related environmental education projects. Overall approaches to sewerred large portions of the county versus alternate design systems should be continuously reviewed by the existing On-Site Sewage Advisory Board, consisting of the development industry, septic tank designers/installers, the real estate industry, public agencies, and TPCHD.

The Environmental Protection Agency, WA Department of Health, and the TPCHD should evaluate alternative technologies for use in areas of poor soil suitability.

Pumpers

The City of Tacoma Sewage Treatment plant is the only plant in the county that accepts septage from septic tank pumpers. They receive 200,000 gallons per month. Many pumpers in Pierce County haul their septage to the Renton Wastewater Treatment Plant because it charges pumpers substantially lower rates.

Areas on Sewer

All of the towns and cities within the watershed are supported by municipal sewer systems. In the unincorporated Pierce County parts of the watershed, South Hill Mall is served by a privately owned sewer district and plans for an extensive sewerred project are being implemented in preparation for a sizable residential development on the ridge west of Orting. All other unincorporated areas, and certain sections of incorporated areas, are dependent upon on-site disposal methods. The cumulative effects of high-density septic systems is a potential nonpoint pollution problem in those areas because of soil limitations.

Floodplains

It is possible that septic drainfields, sewage, fertilizers, and hazardous wastes may pose an environmental/public health threat in the 100-year flood plain of the Puyallup and White Rivers.

Public Education

There is a need for more general public knowledge concerning public septic system selection, installation, and maintenance. Adequate follow up and reminding home owners of maintenance requirements is missing. The Tacoma-Pierce County Health Department (TPCHD), Seattle-King County Health Department (SKCHD), and the Washington State Department of Health (DOH) should evaluate existing programs and develop such a program. The real estate industry can do more to inform buyers that a septic tank is located on their property and how to take care of it.

More attention should be provided by the County Departments to the problems low income households have in maintaining their on-site systems.

Inspection

Existing TPCHD programs concerning new septic field final inspections and compliance of existing systems should be evaluated and, if indicated, modified or expanded. Design standards for on-site systems should be modified to better address groundwater contamination rather than focusing on surfacing failing systems.

GOALS AND OBJECTIVES

- 1) Educate public on sewage disposal issues.
- 2) Encourage regular maintenance of on-site systems.
- 3) Encourage sewers or innovative systems for areas with poor suitability for on-site systems.
- 4) Encourage the update and repair of failing systems.
- 5) Increase inspection/enforcement.
- 6) Improve on-site standards

ACTION ITEMS

The Committee chose two main approaches for decreasing the potential for nonpoint pollution from on-site systems. They chose to address the problem with education and increased public awareness, in conjunction with stricter standards for new and replacement systems.

OS 1 DEVELOP A SEPTIC SYSTEM EDUCATIONAL PROGRAM.

The Tacoma-Pierce County Health Department (TPCHD), Seattle-King County Health Department (SKCHD), WSU Cooperative Extension, and the Washington State Department of Health (DOH) would develop a program and educational materials (i.e., pamphlets, videos, etc.) for educating the public about septic systems and water conservation techniques. Pamphlets (may include existing materials) would be sent to owners with their approved plans. Grants may be used to fund this process. Education needs to be repeated every 3 - 5 years.

1.1 Agencies would review existing septic system educational materials and, if not adequate, develop a program and educational materials.

1.2 Define goals for and fund Community Outreach Coordinator position.

Lead Implementor:	WSU Cooperative Extension
Cooperators:	TPCHD, Realtors, SKCHD
Estimated Cost:	(1.1) \$15,000 video (1.2) \$30,500
Potential Funding Source:	(1.1) Ecology (1.2) TPCHD, SKCHD
Potential Funding Type:	(1.1) Grant (1.2) Fees
Benefit:	Expand public awareness of proper operation and maintenance of on-site systems.
Type of Source Control:	Education
Time Frame:	(1.1) One time (1.2) Ongoing
Startup Date:	(1.1) 1/3 (1.2) 2/1

OS 2 PUMPER NOTIFICATION SYSTEM

TPCHD and SKCHD would cooperatively develop a program, based on the Burley/Minter model, of collecting addresses from pumpers of the systems they service. TPCHD would enter this information into a database and automatically mail reminder cards to homeowners indicating that their system needs to be checked or pumped again.

Lead Implementor:	TPCHD, SKCHD
Cooperators:	Septic tank pumpers
Estimated Cost:	a) \$50,000 b) \$20,000/year
Potential Funding Source:	a) Ecology b) TPCHD, SKCHD
Potential Funding Type:	a) Grant b) Fees
Benefit:	Homeowners would be reminded to service their

systems which would reduce the rate of septic failures.

Type of Source Control: Education

Time Frame: a) One time
b) Ongoing

Startup Date: 1/3

OS 3 SUPPORT THE EXISTING ON-SITE ADVISORY BOARD

There is an existing On-Site Sewage Advisory Board, with members appointed by the Tacoma-Pierce County Health Department Board of Health, that reviews on-site sewage system issues and makes recommendations to the TPCHD. The advisory board would respond to growth management, regulatory, and education issues.

Lead Implementor: TPCHD

Cooperators: Public utilities, development industry, elected officials, environmental interests, real estate industry, public agencies, and septic designers/installers

Estimated Cost: \$1,000/year

Potential Funding Source: TPCHD

Potential Funding Type: General

Benefit: Coordination

Type of Source Control: Coordination

Time Frame: Ongoing

Startup Date: 1/1

OS 4 DISCLOSURE OF SEPTIC INFORMATION AT REAL ESTATE CLOSINGS

An information sheet has been designed by Washington Sea Grant that includes space for mapping the location of a septic tank in relation to the house, information on how to care for the system, and space to record when the system is pumped. Real estate agents would be given these information sheets to post permanently on the property, such as on the inside of the fuse box and, when appropriate, should show the location of inactive septic tanks.

Lead Implementor: Board of Realtors

Cooperators: Real estate agents

Estimated Cost: a) \$1000
b) \$300/year

Potential Funding Source: a) PIE
b) Realtors

Potential Funding Type: a) Grant
b) General fund

Benefit: Education of homeowners, participation by realtors

Type of Source Control: Education/Coordination

Time Frame: Ongoing

Startup Date: 1/2

OS 5 ENCOURAGE USE OF SEWERS AND INNOVATIVE SYSTEMS/ALTERNATIVE TECHNOLOGIES IN AREAS OF POOR SUITABILITY FOR ON-SITE SYSTEMS

This would include established neighborhoods with a history of on-site system failures as well as areas proposed for new development. Local utility planners would give higher priority to providing sewer service to these areas. This strategy is not intended to encourage an increase in density outside of urban growth boundaries as established in local growth management plans.

Lead Implementor: Counties and Cities
Cooperators: Planning Departments, Sewer utilities, Department of Health, TPCHD
Estimated Cost: \$0 (Unknown)
Potential Funding Source: Sewer utilities
Potential Funding Type: Existing program
Benefit: Replacement/removal of septic in areas with widespread failures
Type of Source Control: Capital improvement
Time Frame: One time
Startup Date: 1/1

OS 6 PROVIDE FINANCIAL ASSISTANCE FOR SEPTIC REPLACEMENT, REPAIR, OR UPGRADE

Existing programs would be expanded for need-based financial assistance to replace, repair, or upgrade improperly functioning on-site systems. Pierce County Department of Community Development (PCDCD) will identify a guarantor for financing. TPCHD would inform homeowners of qualifying programs when a failing system is identified. PCDCD will advertise the availability of these programs and target neighborhoods that are considered to be high-risks for septic failures.

Lead Implementor: Pierce County Department of Community Development
Cooperators: TPCHD, Veterans Administration, Ecology, SKCHD, Washington Department of Community Development
Estimated Cost: \$100,000/year
Potential Funding Source: State Revolving Fund, Federal grants
Potential Funding Type: Loans, Grants
Benefit: Septic repairs.
Type of Source Control: Finance
Time Frame: Ongoing
Startup Date: 2/1

OS 7 MODIFY FINAL INSPECTION PROCESS

The TPCHD would continue to ensure that final inspections are performed on all new and newly repaired on-site systems. The final inspection should be modified to include a more thorough examination of the system components to check for construction defects or installation damage.

Lead Implementor:	TPCHD
Cooperators:	NA
Estimated Cost:	0
Potential Funding Source:	TPCHD
Potential Funding Type:	Existing program
Benefit:	Quality assurance and quality control.
Type of Source Control:	Regulatory
Time Frame:	Ongoing
Startup Date:	2/2

OS 8 FURTHER DEVELOP MONITORING AND COMPLIANCE COMPONENTS OF THE TPCHD AND SKCHD ON-SITE SEWAGE PROGRAMS

Current on-site sewage programs include monitoring and compliance components to respond to service requests and perform quality control. TPCHD and SKCHD will analyze operations, programs, and budgets for expansion of current on-site programs to include regular inspection of all on-site sewage systems on a five year rotation. TPCHD and SKCHD will make a recommendation on the feasibility of such a program to the State Board of Health. Periodic progress reports will be made to the Puyallup River Basin Council.

Lead Implementor:	TPCHD
Cooperators:	SKCHD
Estimated Cost:	\$20,000
Potential Funding Source:	CCWF
Potential Funding Type:	Grant
Benefit:	Prevention of future drainfield failures.
Type of Source Control:	Program development
Time Frame:	One-time
Startup Date:	3/2

OS 9 SUPPORT INCREASED VERTICAL SEPARATION STANDARDS

Regulations are currently being developed at a statewide level by the Department of Health that would increase the distance that septic effluent must travel before reaching either an impermeable layer, the water table, or layer of extremely

permeable soils. In the event that statewide standards do not change, TPCHD may pursue an increase in vertical separation standards on a local level, focusing on critical areas.

The additional installation cost to the applicant for each new system is estimated at \$10,000 - \$15,000. This would be a one time cost per each proposed new system with insufficient vertical separation. Approximately, five hundred new construction sites would be affected per year.

Lead Implementor:	TPCHD
Cooperators:	DOH, SKCHD
Estimated Cost:	\$10,000
Potential Funding Source:	TPCHD
Potential Funding Type:	Existing program
Benefit:	Ground/surface water protection.
Type of Source Control:	Regulatory
Time Frame:	One time
Startup Date:	2/2

OS 10 REQUIRE ESTABLISHMENT OF ESCROW FUND FOR COMMUNITY ON-SITE SYSTEMS

Non-county public agencies or Homeowners Associations would develop community drainfield maintenance plans and service community systems based on a set-aside fee program. These funds would be used as a bonding mechanism to enact repairs or maintenance of community on-site systems. The TPCHD must be assured that there is a mechanism for operation, monitoring, maintenance, and repair of the system. This action item is intended to improve O&M of community sewage systems and not to encourage new community systems.

Lead Implementor:	TPCHD, SKCHD
Cooperators:	Homeowner's associations
Estimated Cost:	\$20,000
Potential Funding Source:	TPCHD
Potential Funding Type:	Grant
Benefit:	Maintenance of community-based systems.
Type of Source Control:	Regulatory
Time Frame:	One time
Startup Date:	2/1

OS 11 REQUIRE SEPTIC TANK PUMPOUT PORTS TO BE AT GROUND LEVEL

The Health Department would work to adopt regulations establishing a design standard requiring septic tank pump-out ports to be at ground level. The current code requires that the pump-out port be no deeper than 18". If adopted, TPCHD would

enforce this new standard during the septic design approval process and inspection.

Lead Implementor:	TPCHD
Cooperators:	DOH, SKCHD
Estimated Cost:	\$1,000
Potential Funding Source:	TPCHD
Potential Funding Type:	General fund
Benefit:	Improved servicing.
Type of Source Control:	Regulatory
Time Frame:	One time
Startup Date:	1/4

STORMWATER/EROSION ACTION ITEMS

PROBLEM DEFINITION

Stormwater impacts water quality and habitat in two ways; pollutant loadings and quantity of flow. The two elements are closely linked because water quality often deteriorates during flood events. The problem definition for this chapter focusses first on the general nature of water quality problems associated with urban runoff and then addresses water quality threats that occur during storm events.

Contaminants typically associated with urban stormwater include: (a) suspended sediments, (b) nutrients, (c) pathogens, (d) organic compounds, and (e) metals. While some of these pollutants can be associated with rural uses, organic compounds and metals are most often associated with urban land uses. Commencement Bay is currently undergoing Superfund cleanup efforts to resolve high levels of organic compound and metals contamination.

A number of creeks within the watershed are also experiencing problems with metals contamination, a problem generally associated with runoff from highways and parking lots. Samples from Hylebos Creek have found significant levels of mercury, copper, lead, and zinc. Acutely toxic levels of dissolved copper and mercury have been measured in Swan Creek. Diru and Clarks Creek have high mercury levels. Clarks Creek also has high methylphenol levels, an organic compound (Lower Puyallup Phase 1 Report, 1992).

Water quantity, particularly flooding, impacts water quality in a less direct way. During flood events, pollutants which are not commonly exposed to surface waters may enter a stream. High flow levels may cause streambanks to erode increasing sediments, and flooding problems encourage people to alter natural drainage courses in an effort to minimize the amount of land impacted by flooding. The probability of flooding is increased by land development and impervious surfaces. Impervious surfaces increase the amount of stormwater flowing into a natural system because less water is being absorbed into the soil or by plants. Because impervious surfaces cause the stormwater to reach the creek all at once, streams will carry higher flow levels but for shorter periods of time. This results in scouring of the creek bed, high sediment levels, and degradation of stream banks. Clearing aggravates flooding conditions by making soil available for transport into drainage systems. The sediment impairs the functioning of manmade storm management systems by silting up retention basins and decreases the carrying capacity of streams.

Flooding has been used as a measure of the severity of stormwater issues in the Lower Puyallup Watershed. The Hylebos drainage basin experienced two one-hundred year flood level storm events in 1990 alone. Both the Puyallup and Troutlodge fish hatcheries have experienced sediment related fish kills. Clarks Creek has experienced extensive flooding in both summer and winter months, due to sediments settling within the stream channel. This reduces the stream's carrying capacity and encourages excessive plant growth particularly with the high nutrient levels that are present. When the Puyallup River reaches certain flow levels during storm events,

it exceeds the level of Clarks Creek and the backwater effect results in widespread flooding. On Clear Creek, a flood gate closes when the Puyallup River flow levels are too high and causes flooding by blocking Clear Creek. Diking prevents much of the flooding that historically occurred on the Puyallup and White Rivers. The Washington State Department of Ecology found that siltation impaired the Puyallup River below Orting, Fife Ditch, Clarks Creek, Clear Creek, Meeker Ditch, the White River, and Hylebos Creek.

Urban land uses are expected to increase throughout the basin. The Commencement Bay subwatershed consists almost entirely of urban uses at the present time and is projected to experience a population increase of only 4% by the year 2000. The other subwatersheds will experience the greatest increases in urban uses, particularly within areas that have been designated for possible future annexation by local cities, and they are all projected to experience population increases of 27% or more by the year 2000. One exception might be the Puyallup River floodplain upstream of Sumner which has recently been rezoned to encourage agricultural uses by establishing a minimum future lot size of five acres.

EXISTING PROGRAMS

A number of programs address stormwater for the very reason that stormwater impacts all land within a watershed. There is no jurisdiction upon which rain does not fall. In an effort to limit the scope of this section, it will focus on those agencies which address nonpoint pollution problems associated with *urban* stormwater runoff. Urban stormwater problems most often stem from increases in impervious surfaces and vehicular pollutants.

Federal

The federal Clean Water Act engendered the National Pollutant Discharge Elimination System (NPDES) permitting program. The program requires all point source generators to obtain permits for their discharges. The permits are conditioned to include sampling requirements and restrictions on the amount of pollutants to be discharged. Recently, NPDES permitting was expanded to include the discharges of municipal storm drain systems. Local jurisdictions are now responsible for the quality of the stormwater they convey in to local waterbodies. Noncomplying jurisdictions could face substantial fines if they do not meet the requirements of their permits. Fines will put pressure on jurisdictions to resolve problems with private landowners who may be contributing to permit noncompliance. Jurisdictions within the watershed which are currently required to submit NPDES applications include King County, Pierce County, and the City of Tacoma. Eventually, all jurisdictions will be required to participate.

While EPA is the lead agency for NPDES permits, it the Washington State Department of Ecology's responsibility to review, condition, and issue the permits.

State

Ecology's Water Quality Program has promulgated the State Stormwater Manual. All local jurisdictions are required to adopt the State Stormwater Manual or regulations of equal or greater stringency. The Puget Sound Water Quality Authority drafted many of the stormwater requirements.

The Department of Fisheries has authority to issue Hydraulic Permit Applications for all construction activities that occur within streams and on shorelines. The Department of Transportation is involved in stormwater control because of the impervious surfaces it manages. Community Development's Emergency Management Division has authority in flood plain designation and flood response.

Consolidation of programs should be considered at the state level. An example for consideration is the two efforts of Nonpoint planning and Stormwater planning in the Water Quality Program at the Department of Ecology.

Growth Management Act

In response to the Growth Management Act, the Department of Community Development's Growth Management Division is administering requirements to create land use controls and direct capital improvement planning. The Land Use Element of the Draft Pierce County Comprehensive Plan was completed June 30, 1993.

The Growth Management Act has required all of the counties surrounding Puget Sound to institute Critical Areas Ordinances for the protection of certain environments and sensitive areas such as riparian zones, wetlands, and floodplains. All of the jurisdictions within the watershed have responded to that requirement. Efforts have been made to encourage consistency between the different jurisdictions' ordinances.

The legislature did not direct that the Growth Management Act incorporate water quality planning within comprehensive planning. Local efforts have been made to accommodate this oversight.

Local

The primary stormwater management provider in the watershed is the Pierce County Public Works Surface Water Management Section (SWM). All of the cities and towns within the watershed are responsible for managing stormwater within their jurisdictions. A listing of those municipalities and general information regarding their stormwater management programs may be found in Table SW-1. All of the municipalities listed have expressed an interest in establishing an interlocal agreement to address stormwater issues but there are none in place at this time.

TABLE SW-1: SUMMARY OF STORMWATER MANAGEMENT PROGRAMS IN CITIES AND TOWNS

Jurisdiction	Master Plan	Drainage Ordinance	Fee Schedule	Design Criteria	Interjurisdictional Streams	Problem Areas
Bonney Lake	No	Drafting standards	None	Pierce County	Fennel Creek	None
Buckley	Yes, being updated	Yes	Resid. \$3/mo. Bus. \$3/mo. \$530 one-time facility charge	Pierce County	Spiketown Ditch	Flooding of Spiketown Ditch
Fife	No	No	None (Drainage District 23)	Pierce County	Hylebos Creek Wapato Creek Fife Ditch	Flooding of Hylebos Creek
Milton	No, but has a grant to draft one	Yes	Resid. and Bus. \$5/mo. per 2800 sq. ft. Fees reduced for 25- and 100-yr. flood design	King County	Hylebos Creek	Flooding of Hylebos Creek
Orting	No	Drafting Ordinance				Diking Puyallup River cut off ditch drainage, causes flooding south of town
Puyallup	Yes, being updated	Drafting Ordinance	Resid. \$4.20/mo. Others=(Impervious surface/2800 sq. ft.) x \$4.20/mo.	Yes, being revised, based on State Stormwater Manual	Clarks Creek	Flooding of Clarks Creek due to noxious plant growth
Sumner	Adopted Jan. 1993	Yes	Resid. \$8.75/mo. Bus. per e.s.u.-- equiv. service unit (impervious groundcover)	King Co.	Salmon Creek Drainage Ditch #24	Flooding of Salmon Creek due to noxious plant growth
Tacoma	Yes	Yes	\$1.49/mo. fixed fee plus basic category of development ranging from 5.364 to 42.854 per 500 sq. ft.		Leach Creek Flett Creek McKinley Ave Trunk Salishan Trunk Swan Creek Hylebos Creek Roosevelt Ditch	Flooding of Flett Creek, backup of Hylebos Creeks

Source: Pierce County Storm Drainage and Surface Water Management Plan, Volume 1 (Draft), March 1991 (updated)

There are also ten drainage districts in Pierce County who maintain drainage systems within specific geographic areas. Table SW-2 describes the areas in each drainage district.

TABLE SW-2. Pierce County Drainage Districts		
District	Year Created	Area Served
10	1912	Generally encompasses the Clear Creek drainage area and its tributaries south of the Puyallup River.
11	1913	The eastern portion of Sumner and parts of nearby unincorporated Pierce County.
13	1916	Largest of the districts encompassing more than 3,000 acres in the southwestern corner of the Graham planning area between the Mountain Highway and Highway 161.
14	1920	The upper Swan Creek area. It has entered into mutual agreements with District #10 to serve areas along the Clear Creek drainage system.
19	1922	The North Fork tributary to Clover Creek and includes parts of Parkland, Midland, and a small portion of the City of Tacoma.
21	1935	The Upper Wapato Creek area, north of the Puyallup River.
23	1937	North of the Puyallup River including Fife and the Port Industrial Area in unincorporated Pierce County. It has drainage responsibility for the Fife and Blair Ditches, the Wapato and Hylebos Creeks.
24	1946	Jovita Creek area northwest of Sumner and west of the Stuck River, bordering on Valley Ave.
25		An area on the west side of the Puyallup River in the McMillin area.
26	1950	The Van Ogle Creek area, east of the Puyallup River, south of Bonney Lake.

Source: Pierce County Public Works

Most jurisdictions have some type of inventory of existing stormwater facilities but updates need to be made and plans created to replace inadequate facilities, particularly those that interfere with fish passage.

SWM, established in 1988, prepared a *Comprehensive Storm Drainage Master Plan* in 1991. The plan includes both nonstructural (i.e. education, regulatory) and structural approaches to addressing stormwater issues. The SWM Plan identifies \$55,000,000 in needed capital

improvement projects, \$32,000,000 of that being high priority work proposed to be completed within a six year period. Operating funds for SWM are collected based on a flat service charge for residences and a service charge based on impervious surface area for all other land uses.

NPDES mandated water quality programs are a significant component of SWM (They comprise 35% of the basic programs and 2% of the Optional Capital Improvement Programs). SWM has developed and established a water quality sampling plan to more clearly identify stormwater pollutant problems in the subwatersheds, and to establish baselines for determining the effectiveness of existing and proposed Best Management Practices.

Pierce County is developing a stormwater manual to replace the State Stormwater Manual. This effort includes reviewing and updating drainage, erosion control, and clearing/grading ordinances. Also, design standards for drainage construction, Best Management Practices for new construction, and operation and maintenance standards for both public and private systems will be reviewed.

Inter-jurisdictional agreements for education and retrofitting of structures are needed and have been proposed. The existing stormwater permit requirements of the Department of Ecology will help the smaller urban areas more effectively manage stormwater.

The action item recommending a Puyallup River Basin Council will increase overall coordination between county programs in Planning, Public Works, Health Utilities, and the Drainage Districts concerning surface and groundwater quality and quantity. Policy, testing, planning, research, operation, and program consolidation should eventually be considered by the Council.

Education and Outreach

Great emphasis has been placed on education in the stormwater requirements and NPDES. This emphasis could be coordinated differently from the manner presently in place. The usefulness and efficiency of delivering environmental education programs at a regional level should be evaluated and may result in a smoother implementation process at the local level. Television commercials are one example of an educational tool that would benefit from regional coordination.

A comprehensive education program has been developed to coordinate with other jurisdictions and includes training programs for builders and other professionals, public awareness campaigns, student groups, and formal classes.

GOALS AND OBJECTIVES

The following goals and objectives were developed by the committee as part of three general approaches to the problem: seeking necessary funding and government actions, educating and involving the public, and evaluating conditions, standards, and solutions.

1. Ensure Consistency with the Pierce County Comprehensive Plan, the Surface Water Management Programs, and other programs.

2. Enhance stormdrain stenciling.
3. Encourage use of BMP's.
4. Encourage recycling of car fluids. Educate and promote public awareness.

ACTION ITEMS

In some of the action items, **surface water management entities** have been identified as lead implementors and cooperators. **Surface water management entities** include the Surface Water Management (SWM) utilities of Pierce and King Counties, cities' public works departments, drainage districts, and the Port of Tacoma. Drainage districts have been included because they are charged with resolving site-specific stormwater management problems within their districts.

Many action items that might have been required prior to the adoption of the State Stormwater Manual, the NPDES General Permit, and the Growth Management Act have been reconsidered by the Lower Puyallup Watershed Committee. Still, the following action items have been included because:

- a) in some cases, enforcement stronger than NPDES was considered necessary, but these strategies are not meant to duplicate or conflict with that program;
- b) many smaller cities are not currently subject to NPDES, and source control measures are necessary within their jurisdictions;
- c) direction is needed in the event that the requirements of the Stormwater Manual, NPDES, or the Critical Areas Ordinances are revised;
- d) a record of the work and concerns of the Committee is needed.

SW 1. EDUCATE DEVELOPERS AND OTHERS THROUGH REGIONAL PROGRAM

Inform developers, contractors, and county (public) agents on the need for controlling stormwater (volume duration, rate of flow). It would also include an element on the use of bio-engineered erosion control and riparian zone protection methods. Surface water management entities would develop or expand a regional, coordinated education and training program on the impacts of volume duration, rate of flow, and water quality which includes the development community in conjunction with adoption of stormwater ordinances. This would be a multi-agency coordinated approach. Local governments need to establish parameters for volume, duration, and rate of flow. The audience would include developers, the public, and agency staff.

This program should be coordinated with courses currently offered through the University of Washington in conjunction with the Department of Ecology.

Lead Implementors:	Surface water management entities
Cooperators:	Pierce County, Environmental Education Committee (See IM 3), University of Washington, WSU Cooperative Extension
Estimated Cost:	\$300,000 (\$150,000 grant, \$150,000 match)
Potential Funding Source:	CCWF grant, Counties & Cities match
Potential Funding Type:	Grant
Benefit:	Increased education on stormwater and water quality BMPs.
Type of Source Control:	Education
Timing:	One time
Startup Date:	3/1

SW 2 REQUIRE MAINTENANCE OF STORM DRAINAGE/WATER QUALITY FACILITIES.

Counties and cities would develop a strategy to encourage owners (private and public) to maintain drainages, catchments, and oil separators. Public agencies would commit to maintaining their own facilities and investigate the possibility of establishing a vactor program. Counties and cities would use a certification program to encourage routine maintenance of private facilities. This would include water quality monitoring, evaluation of catchments, and inspection program reports in conjunction with NPDES and municipalities not under NPDES.

Lead Implementors:	Counties and cities
Cooperators:	Owners, Drainage districts
Estimated Cost:	\$40,000/year
Potential Funding Source:	Counties and cities, drainage districts
Potential Funding Type:	Existing program
Benefit:	Properly maintained systems would allow the water quality controls to function efficiently.
Type of Source Control:	Maintenance and operation

Timing: Ongoing
Startup Date: 1/1

SW 3 **UPDATE INVENTORY OF EXISTING STORM DRAINAGE FACILITIES**

Update inventory of retention/detention facilities, catch basins and storm drainage pipes, open ditches and channels, and culverts, noting their size. Identify existing culverts within the watershed that need to be retrofitted to eliminate an existing fish passage problem or to improve the flood carrying capacity of the facility. The Pierce County Surface Water Management Plan should be referenced. The inventory data will be helpful. Also, volunteers may be used to collect added information, particularly about privately owned facilities. This must be done as part of NPDES, but should not be restricted to agencies under NPDES jurisdiction.

The Department of Fisheries would provide the lead implementor with any data they collect regarding fish passage problems.

Lead Implementors: Surface water management entities
Cooperators: Department of Fisheries, Department of Wildlife,, Utilities
Estimated Cost: \$80,000
Potential Funding Type: Fees
Potential Funding Source: Surface water management entities
Benefit: Control of storm drainage
Type of Source Control: Research
Timing: One time
Startup Date: 1/2

SW 4 **EROSION CONTROL/CONTRACTOR COMPLIANCE PROGRAM**

Counties and cities would verify compliance with erosion control plans and enforce standards. Contractors would be required to be "co-permittees" with property owners as part of new state Stormwater Manual. This would compel contractors to serve as co-applicants on all projects and would make them accountable for violations. Currently, only property owners are cited for violations.

Lead Implementor: Counties and cities
Cooperators: Ecology
Estimated Cost: \$20,000
Potential Funding Source: Counties and cities
Potential Funding Type: Fees
Benefit: It would be possible to track contractors with a history of violations and would provide a disincentive for contractors to violate.
Type of Source Control: Regulatory

Timing: One time
Startup Date: 2/1

SW 5 **SUPPORT A SURFACE WATER MANAGEMENT DEPARTMENT IN PIERCE COUNTY THAT ADDRESSES WATER QUANTITY AND QUALITY PROBLEMS.**

The watershed management committee and jurisdictions would work to support Pierce County SWM through public and private statements. Jurisdictions would enter into an interlocal agreement to develop flexible but uniform stormwater management regulations. County surface water management utilities may be contracted to provide services to other jurisdictions through an interlocal agreement.

Lead Implementor: Pierce County and cities
Cooperators: Surface water management entities
Estimated Cost: \$30,000
Potential Funding Source: Counties and cities
Potential Funding Type: Existing program
Benefit: Agency with consistent revenue able to provide education and design review for stormwater and erosion.
Type of Source Control: Coordination
Time Frame: One time
Startup Date: 1/1

SW 6 **RIVER BASIN COUNCIL WILL INVESTIGATE ALTERNATIVES FOR IMPROVING ENFORCEMENT**

The Puyallup River Basin Council (See IM 1) would develop assessment guidelines for enforcement practices which would be distributed to all local jurisdictions with the request that they complete an evaluation of their enforcement practices and policies. Counties and cities would review their internal enforcement procedures for construction erosion control and provide recommendations on the level of inspections needed and other alternatives for improving enforcement. These recommendations would be presented to the Puyallup River Basin Council and to the legislative or administrative bodies directing the participating agencies and jurisdictions.

Lead Implementors: Puyallup River Basin Council
Cooperators: Counties and cities
Estimated Cost: \$5,000
Potential Funding Source: Counties and cities
Potential Funding Type: General fund
Benefit: Enforcement needs would be established and plans made regarding how to meet those needs.
Type of Source Control: Research

Timing: One time
Startup Date: 1/4

SW 7 **USE CIVIC ORGANIZATIONS (E.G. BOY SCOUTS, GIRL SCOUTS, ETC.) TO STENCIL STORM DRAINS**

Ask private organizations to stencil drain signs on both public and private facilities. Pierce County SWM plans to include this activity in their education program. Pierce County SWM, City of Tacoma, and Ecology already provide materials. Each jurisdiction should designate priority areas that would most benefit from storm drain stenciling and make recommendations to participating organizations.

Lead Implementor: Surface water management entities
Cooperators: Civic organizations, Citizens for a Healthy Bay, Public Involvement and Environmental Education staff (See IM 4)
Estimated Cost: \$2,000/year
Potential Funding Source: Surface water management entities
Potential Funding Type: Existing program
Benefit: Public education occurs, warning signs are installed, grass roots action occurs, publicity is received, public awareness is heightened, and storm drains are inventoried.
Type of Source Control: Education
Time Frame: Ongoing
Startup Date: 1/1

SW 8 **REQUIRE STORM DRAIN STENCILLING AS A STANDARD CONDITION OF DEVELOPMENT APPROVALS**

Local jurisdictions would require all new storm drains, priority given to new development, to be stencilled with general information on where runoff entering the drain outfalls. For example, the stencil may explain that the facility drains to Puget Sound or to a creek or river.

Lead Implementor: Counties and cities
Cooperators: Developers and contractors
Estimated Cost: \$1000/year
Potential Funding Source: Counties and cities
Potential Funding Type: General fund
Benefit: Public education occurs, warning signs are installed, public awareness is heightened.
Type of Source Control: Regulatory
Time Frame: Ongoing
Startup Date: 1/4

SW 9 ENCOURAGE BUSINESSES AND CIVIC ORGANIZATIONS TO SPONSOR POLLUTION ABATEMENT, STORMWATER CONTROL, AND HABITAT IMPROVEMENT PROJECTS

Public Involvement and Environmental Education staff would encourage businesses to sponsor pollution abatement, stormwater control, or habitat improvement projects. Businesses would work with volunteer groups, such as Adopt-a-Stream, Stream Team, and Pierce County Water Watchers. In return businesses would be able to advertise their support of these projects.

Any river basin plans that are established as part of the implementation strategies would be used to prioritize stream enhancement activities.

Lead Implementors:	Public Involvement and Environmental Education staff
Cooperators:	Water Watchers, Adopt-a-Stream, local businesses, public works departments, SWMs, development community, Citizens for a Healthy Bay
Estimated Cost:	(See Public Involvement and Environmental Education strategy, IM 4.)
Potential Funding Source:	Pierce County
Potential Funding Type:	General fund
Benefit:	There is a need for a strong incentive program because incentives are not covered in NPDES. Grass roots involvement.
Type of Source Control:	Voluntary incentive
Timing:	Ongoing
Startup Date:	1/2

SW 10 ESTABLISH/ENCOURAGE BMP'S (Best Management Practices) TO MANAGE STORMWATER FROM IMPERVIOUS SURFACES

Counties and cities would: use existing strategies (swales, existing regulations, buffers, etc.) as per state manuals, coordinate efforts with growth management plan objectives, and establish BMP's for areas surrounding impervious surfaces that would improve the quality of the runoff. (For example, below-grade level biofiltration bordering impervious surfaces).

Lead Implementors:	Counties and cities
Cooperators:	Surface water management entities, Ecology
Estimated Cost:	\$15,000/year
Potential Funding Source:	Counties and cities
Potential Funding Type:	General fund
Benefit:	Additional treatment of impervious surface runoff.

Type of Source Control: Regulatory
Timing: Ongoing
Startup Date: 1/3

SW 11 MINIMIZE BUILDING AND CLEARING IN SENSITIVE AREAS.

Reduce the extent of building and clearing in environmentally sensitive areas, [defined to include all "critical areas" designated pursuant to RCW Sec. 36.70A.030(5)(Wetlands, aquifer recharge areas, sensitive habitat, conservation areas, flood plains, and geologically hazardous areas)]. (These efforts should be linked with agricultural BMP implementation, riparian zone protection, open space taxation, and the public benefit rating system action items found in the chapter on Agricultural Action Items.) Implementation of these regulations would be used to emphasize the need for stewardship.

Lead Implementors: Counties and cities
Cooperators: NA
Estimated Cost: \$25,000
Potential Funding Source: Counties and cities
Potential Funding Type: General fund
Benefit: Improved water quality and habitat.
Type of Source Control: Regulatory
Time Frame: One time
Startup Date: 1/3

SW 12 CONTINUOUS COLLECTION OF CAR FLUIDS.

DOE, Pierce and King Counties, and affected jurisdictions would investigate expanding current collection programs. For example: Gas stations could serve as vehicle fluids (and fluid packaging) collection sites for home mechanics. This program should be coordinated and consistent with Local Hazardous Waste Management Plans.

Lead Implementor: Local solid waste programs
Cooperators: Ecology, oil companies, gas stations, fleet maintenance facilities
Estimated Cost: \$100,000/year
Potential Funding Source: Existing program
Potential Funding Type: Rates, Tipping fees, Grants
Benefit: Home mechanics would have convenient locations for disposing of fluids. Gas stations could monitor collection to prevent contamination of collected oil.
Type of Source Control: Voluntary incentive
Time Frame: Ongoing
Startup Date: 2/1

SW 13 RIPARIAN ZONE REPLANTING.

Promote and initiate public involvement in replanting efforts for Riparian Zones adjacent to streams, ditches, and storm channels. Identify stream section where riparian zones are currently denuded or the stream reach has been clogged by invasive plant growth. Support incentives for public/private property owners to replant zones.

Work with Drainage Districts to develop revegetation programs for their projects. Use of native riparian plant species would be encouraged. Labor for work could be provided by fishing clubs, Adopt-a-Stream groups, boy scouts, school classes, etc.

The Puyallup River Basin Council will provide volunteer groups and volunteer coordinating agencies with recommendations for priority restoration projects.

Lead Implementor:	River Basin Council (See IM 1)
Cooperators:	Public involvement and Environmental Education staff (see IM 4), Commencement Bay Board of Trustees, Property owners, civic groups, Drainage Districts, Adopt-a-Stream, utilities, cities and counties
Estimated Cost:	(See Public Involvement and Environmental Education strategy, IM 4)
Potential Funding Source:	Pierce County and Washington EcoSystems Conservation Program
Potential Funding Type:	General fund, Grants
Benefit:	Grass roots action, replanted banks would shade creek, reduce erosion, stabilize banks, reduce water temperatures
Type of Source Control:	Voluntary incentive
Time Frame:	Ongoing
Startup Date:	1/3

SW 14 LITTER REMOVAL

Litter removal alternatives: encourage volunteer programs to remove litter, help curtail illegal dumping, etc. For example, property owners along streams could be educated by trained Water Watchers concerning which debris should be left and litter which should be removed. Some natural debris is beneficial and litter removal/debris protection would be site specific. Fishing clubs and boy scouts could help with large and small projects.

Lead Implementor:	WSU Cooperative Extension or Snake Lake Nature Center (to be decided by the Environmental Education Committee)
Cooperators:	Public Involvement and Environmental Education staff, Water Watchers, Fisheries, SWM

Estimated Cost:	(See Public Involvement and Environmental Education strategy, IM 4)
Potential Funding Source:	Pierce County
Potential Funding Type:	General fund
Benefit:	Low-cost source of labor, promotes community involvement, removes litter from creeks
Type of Source Control:	Voluntary incentive
Time Frame:	Ongoing
Startup Date:	1/3

SW 15 **PROMOTE SPILL RESPONSE PROGRAMS**

Department of Community Development would educate Fire Departments concerning "Spill Response" procedures. Containment rather than the practice of dispersing small spills would be encouraged. Dispersment often results in the spill being washed into the storm drain system. Smaller jurisdictions and volunteer fire departments would be targeted.

Lead Implementor:	Department of Community Development
Cooperators:	Fire Districts and Fire Departments, EPA, WDOT, Trucking firms, Railroads, SWM, Ecology, Coast Guard
Estimated Cost:	\$10,000/year
Potential Funding Source:	Department of Community Development
Potential Funding Type:	General fund
Benefit:	Encourages inter-jurisdictional coordination, prevents spills from causing fish kills and polluting surface waters
Type of Source Control:	Education
Time Frame:	Ongoing
Startup Date:	2/1

OTHER ACTION ITEMS

WAC 400-12 directs watershed management committees to evaluate the need for source control action items to control pollution from pesticides, landfills, sludge, contaminated sites, and anything else that might be a source of nonpoint pollution. This section is intended to address sources that did not fall under any of the preceding categories.

PROBLEM DEFINITION

Household Hazardous Waste

Household hazardous waste has the potential to be a significant problem within the watershed. In 1992, supermarkets in King and Pierce County sold \$12 million dollars worth of household cleaners including: oven cleaners, drain cleaners, furniture polishes, general use cleaners, detergents, and floor cleaners. They also sold \$2.6 million dollars worth of indoor pest control products such as bug sprays, baits, foggers, and traps (Information Resources Inc., 1992). On average, each Pierce County household generates approximately 25 pounds of hazardous waste annually (Pierce County Hazardous Waste Management Plan, 1991). Based on that estimate, households in the Lower Puyallup Watershed may be generating over 2 million pounds of hazardous waste each year.

Pesticides

Due to insufficient information/water quality data regarding the extent and impact of pesticides within the watershed, the Committee chose to focus its action items on reducing the amount of chemicals used by home gardeners. Pesticide action items may need review if evidence of pesticide contamination is revealed. Pierce County Surface Water Management will be testing for pesticides as part of their compliance with the NPDES permit process, as will the City of Tacoma. According to the 1991 Puget Sound Water Quality Management Plan, home use accounts for approximately 20% of all pesticide use in Puget Sound, but unlike other pesticide users, home gardeners are not trained in proper application or in choosing appropriate chemicals. Also, homeowners apply pesticides at rates significantly higher than other pesticide users. Household applications may reach up to 10 pounds per acre while the heaviest commercial rates are about 2 pounds per acre (Pesticides of Concern in the Puget Sound Basin: A Review of Contemporary Pesticide Usage, USEPA, 1988).

Landfills

The only active landfill within the watershed is Hidden Valley Landfill located near Highway 162 (Meridian Avenue) south of Thun Field airport. Hidden Valley is currently undergoing extensive cleanup actions and is proposed for closure within the next three years. Two old landfills exist in the Tideflats area but are not in current use. The landfills are all considered to be point sources and programs exist for resolving the contamination issues associated with all three sites. The average Pierce County resident generates over 8 pounds of solid waste on a daily basis (Steve Wamback, pers. comm, August 1993). Based on this estimate, Lower Puyallup Watershed residents are generating about 1.6 million pounds of solid waste daily.

Illegal Dumping

Illegal dumping is a continuing problem within Pierce County and the Tacoma-Pierce County Health Department (TPCHD) reports that dumping incidents are definitely on the rise. This increase has been attributed to increases in landfill dumping fees. TPCHD reports that the most significant increase has been in the illegal dumping of commercial and construction materials which are more difficult to trace.

Surface Mines

The Committee has identified at least 19 surface mines within the Lower Puyallup Watershed. Gravel is also extracted from the Puyallup and White River beds with conditions from local and state agencies.

Sludge

Sludge application within the Lower Puyallup Watershed amounts to approximately 925 dry tons per year. Most is spread on farms in the Puyallup River valley, many of which are near Sumner. Some sludge from the Tacoma Wastewater Treatment Plant is mixed with soil and sawdust and distributed to small property owners but this amounts for only a small portion of sludge distribution. The sludge is applied at 40% of the maximum nutrient level that the soil and plants can absorb (Mel Kemper, pers. comm., August 25, 1993).

EXISTING PROGRAMS**Household Hazardous Waste**

Both King and Pierce County have established hazardous waste management plans. In Pierce County, the Tacoma-Pierce County Health Department, Pierce County Utilities Department, Snake Lake Nature Center, WSU Cooperative Extension, and the City of Tacoma are all involved in programs to educate the public about hazardous waste. The City of Tacoma currently spends about \$500,000 annually for its Hazardous Waste Collection Program. Pierce County needs to establish a system for regular hazardous waste collection. Collection needs to occur on a more regular basis and at locations that are more accessible to the outlying areas of the county. All of the hazardous waste education providers should be coordinating their programs to maximize their combined level of impact.

The Washington State Department of Ecology (DOE) has both education and enforcement programs for addressing hazardous wastes from commercial sites. These programs, combined with efforts to clean up existing contamination, are requiring local businesses to assess the wastes they produce and handle them with greater care. These programs might be improved by increasing the amount of education available to small business owners regarding options to using hazardous substances.

Pesticides

Herbicide, pesticide, and fertilizer uses are regulated by the Department of Ecology's Hazardous Substance programs and by the Department of Agriculture. Commercial applicators are required to obtain licensing in order to do business. Farmers may apply chemicals under certain circumstances if they follow application limitations and keep records of their application

practices. Due to the limited amount of information available on pesticide levels in the watershed, it is assumed that existing programs will address pesticide issues on commercial farms. However, steps do need to be taken to reduce the amount of chemicals being applied by individual homeowners. WSU Cooperative Extension and Snake Lake Nature Center provide existing programs for educating the public about yard chemicals, but they are not sufficient to compete with the advertising campaigns of the garden chemical industry. Additional programs are needed to encourage the use of nonchemical alternatives and to educate homeowners on the importance of properly using the chemicals they buy.

Landfills

Landfills are regulated by the Department of Ecology and TPCHD. Both entities are involved in the cleanup and regulatory actions taking place regarding Hidden Valley Landfill and the two abandoned landfills in the tideflats. A number of abandoned landfills may exist throughout the county which are not undergoing cleanup action. Ecology and local health departments need to identify these landfills and determine the level of threat they may pose.

While residents are still generating solid waste, recycling programs have diverted over 40% of the waste stream away from local landfills. Currently, 81% of Pierce County's curbside trash collection customers are also receiving curbside recycling for newsprint, glass, tin, aluminium, and junk mail. Twenty-six percent of all households are receiving curbside yardwaste recycling pickup. In 1992, curbside recycling reduced each participating household's landfill contribution by 41 pounds per month. During the same year, each household participating in the yardwaste collection program reduced their landfill contribution by 65 pounds per month. Preliminary figures for 1993 indicate that yardwaste recycling participants are generating three times the 1992 amounts because higher rainfall levels have promoted faster plant growth. In addition, other programs are available to divert yardwaste from landfill capacity. Yard waste recycling collection has been established at both of Pierce County's landfills for random haul-ins. There is a substantial cost savings for participants to direct their waste into the recycling division rather than dumping it as regular garbage (Steve Wamback, Pierce County Utilities Department, pers. comm, August 18, 1993). These programs are relatively recent but they have been phenomenally successful when compared to other recycling programs nationwide. Over time, it is expected that these programs will continue to be successful if they are adequately funded, reasonably priced, and well advertised. The yardwaste recycling program needs program support to establish additional composting facilities. The benefits of yardwaste collection are apparent by the high volumes of yardwaste that each participant is generating. When it is possible to accommodate the additional service level, the program will need to advertise its services to increase the number of participants. Markets need to be developed to make the recycling of plastic products feasible. In addition, recycling or composting alternatives need to be established to reduce kitchen waste. A program or approach also needs to be identified to address pet wastes.

Illegal Dumping

Illegal dumping issues are handled by the Tacoma-Pierce County Health Department. Incidents are reported to the department and investigations ensue to identify the source of the garbage. There are currently four people assigned to handling illegal dumping cases with TPCHD. The Sheriff's department is authorized to issue citations and enforce a \$1000 fine if they encounter the violator in the act of dumping. If the dumper is not caught in the act, TPCHD investigates

the dump. If they are able to identify the dumper through the contents of the material or if a license plate number is reported, TPCHD first requires that the violator cleanup the site. With sufficient evidence or a reluctance on the part of the violator, the illegal dumping ordinance allows TPCHD to issue fines or press for prosecution, with a maximum penalty of 90 days in jail. In the event that the dumper is not identified, the property owner is responsible for cleanup.

An effort needs to be made to educate the public on which agency to contact when they find an illegal dump site and the value of recording the license plate numbers of violators. Advertising the penalties for illegal dumping may also help to reduce the amount of dumping occurring. Encouraging volunteer groups to participate in litter collection programs would help in cleaning up areas where enforcement action is not cost effective, such as along highways. These groups would remove the litter and build an anti-litter ethic.

Surface Mines

The Department of Natural Resources licenses surface mines and requires the submittal of appropriate management plans. Additional work could be done to educate surface mine owners and contractors on the value and importance of protecting habitat and water quality. Detailed BMP's should be provided to surface mine owners to aid them in implementation.

Instream gravel mining has occurred on the White and Puyallup Rivers for a number of years. These activities now require shoreline permits from local agencies and Hydraulic Project Approval permits from the Washington State Department of Fisheries. Gravel removal projects are supported by the Puyallup River Flood Control Management Plan and the Inter-County River Improvement District as a means of increasing the carrying capacity of the rivers. This particular flood control activity has the potential to directly threaten fish and wildlife, and steps should be taken to insure that beneficial uses are not impacted.

Sludge

The Tacoma-Pierce County Health Department issues permits for all sludge application activities in Pierce County. All sites greater than one acre require SEPA review by the agency with jurisdiction. Careful records are kept on the sites and the amount of sludge applied. The existing programs seem to be effectively preventing nonpoint source pollution problems related to sludge application. Public education efforts are needed to decrease public opposition to appropriate sludge application.

General Programs

The variety and complexity of programs available for addressing nonpoint sources of pollution have created a great deal of frustration for agencies and also the public. Creating a telephone directory and information pamphlet that educates agencies and the public would have value. Residents within the watershed need to know where services are located and whom to contact when they need information about activities that may result in nonpoint source pollution. They also need to know whom to contact when they wish to report a problem. Agencies would benefit from such a publication because they also need to know whom to contact about water quality related issues.

GOALS AND OBJECTIVES

- 1) Encourage composting and alternatives to herbicides, pesticides, and fertilizers.
- 2) Increase education for contractor and surface mine operators, and the public.
- 3) Encourage recycling and composting programs.
- 4) Increase hazardous waste collection.
- 5) Work with and enhance existing programs.

ACTION ITEMS

A) Household Hazardous WasteOT 1 **INCREASE HAZARDOUS WASTE COLLECTION**

Solid Waste Utilities and the Department of Ecology would develop plans for basin-wide, frequent, hazardous waste collection, including marinas. Hazardous waste collection would be made available at all landfill and transfer station locations on a full-time basis. The program would need to be consistent with Local Hazardous Waste Management Plans. The program would include elements for monitoring increases in collected materials and controlled pickup. It would also advertise collection opportunities and educate the public on which products they should bring.

Lead Implementor:	Solid waste entities
Cooperators:	Counties and Cities, Landfill and Transfer Station operators, Ecology, EPA
Estimated Cost:	\$500,000/year
Funding Sources:	Solid waste entities
Potential Funding Type:	Rates
Benefit:	Reduced hazardous waste in septic and stormwater. Decrease incidence of improperly dumped hazardous waste.
Type of Source Control:	Maintenance and operation
Time Frame:	Ongoing
Startup Date:	1/4

B) PesticidesOT 2 **ENCOURAGE COMPOSTING AND ALTERNATIVES TO HERBICIDES, PESTICIDES AND FERTILIZERS**

1.1 WSU Cooperative Extension would develop a Master Composter volunteer program that will help educate residents. The volunteers will be trained and will offer demonstration sites throughout the County. This effort could encourage the use of alternatives to pesticides.

1.2 Establish a yard chemicals alternatives demonstration site. Site would be developed, operated, and maintained through programs administrated by WSU Cooperative Extension. Educate the public on the use of native plants and drought-loving yards.

Lead Implementor:	WSU Cooperative Extension, and Master Gardeners
Cooperators:	Pierce County Solid Waste Division, WDOE, Environmental Educational Committee
Estimated Cost:	(1.1) \$20,000 (1.2)) \$50,000/year
Potential Funding Source:	(1.1) PIE Grant (1.2) WSU Cooperative Extension

Potential Funding Type:	(1.1) Grant (1.2) General fund
Benefit:	Reduce use of hazardous chemicals
Type of Source Control:	Education
Time Frame:	(1.1) One time (1.2) Ongoing
Startup Date:	(1.1) 2/2 (1.2) 2/4

C) Landfills

OT 3 **ASSESS AND DEVELOP PROGRAM FOR ADDRESSING ABANDONED LANDFILLS**

Health and solid waste utility departments will coordinate on a project to locate abandoned landfills, determine the extent of possible contamination, and develop a program for corrective actions.

Lead Implementor:	TPCHD
Cooperators:	Solid waste entities, Ecology
Estimated Cost:	\$75,000
Potential Funding Source:	CCWF or DOH
Potential Funding Type:	Grant
Benefit:	Reduce the amount of ground and surface water contamination from old landfills.
Type of Source Control:	Research
Time Frame:	One time
Startup Date:	2/1

OT 4 **EDUCATE PUBLIC ABOUT CONCERN FOR ANIMAL AND PET WASTE ENTERING STREAMS THROUGH STORMWATER**

Pierce County Conservation District would use existing statewide programs or develop programs through 4-H and junior and senior high schools. Program would include water quality monitoring, visual checks by the conservation district, and farm water quality plans. The lead implementor would contact research agencies regarding options for composting or otherwise disposing of pet waste.

Lead Implementor:	WSU Cooperative
Cooperators:	Conservation Districts, Granges, Schools, SCS, Humane Society, Horsemen's Associations, 4-H, FFA, Veterinarians
Estimated Cost:	a) \$20,000 b) \$20,000/year
Potential Funding Source:	a) PIE grant b) SCS, Humane Society, Dairy Commission,

Potential Funding Type:	Cattlemen's Associations, Horsemen's Associations
Benefit:	Grant
Type of Source Control:	Animal waste would be prevented from entering stormwater systems.
Time Frame:	Education
Startup Date:	a) One time b) Ongoing
	1/4

OT 5 YARD WASTE RECYCLING PROGRAMS

Continue to support existing programs. Research and monitor new technologies and markets. Advertise benefits of participation.

Estimated costs are not available and are not considered crucial to implementation because the program is already in place. Utility fees support the collection of the yard waste and the composted product is sold to generate additional income.

Lead Implementor:	Pierce County
Cooperators:	
Estimated Cost:	NA (See text above.)
Potential Funding Source:	Utility fees
Potential Funding Type:	Existing program
Benefit:	Proper disposal of yard waste and reduced volume to landfills
Type of Source Control:	Voluntary incentive
Time Frame:	Ongoing
Startup Date:	1/1

OT 6 KITCHEN WASTE COMPOST/DISPOSAL PROJECT

Research would be performed to determine viable organic waste disposal alternatives for wide scale implementation.

Lead Implementor:	Pierce County Solid Waste Division
Cooperators:	WSU Cooperative Extension, Clean Washington Center, Pierce County Purdy Facility
Estimated Cost:	\$50,000
Potential Funding Source:	Private grant funding sources
Potential Funding Type:	Grant
Benefit:	Alternatives established to dispose of these wastes.
Type of Source Control:	Research
Time Frame:	One time
Startup Date:	2/1

D) Illegal DumpingOT 7 **ILLEGAL GARBAGE CLEANUP, REWARD, AND ENFORCEMENT PROGRAM**

Agencies would make enforcement responses and illegal dumping cleanup actions higher priority and publicize a telephone number for reporting violations and dumping sites. Dumping sites near or in streams would be given special priority for cleanup. Agencies would investigate ways to reduce illegal dumping, particularly of hazardous wastes and tires. This might include placing greater emphasis on recycling and hazardous waste collection programs.

Lead Implementor:	DOH
Cooperators:	Solid waste utilities, TPCHD
Estimated Cost:	\$100,000/year
Potential Funding Source:	DOH
Potential Funding Type:	General fund
Benefit:	Litter in streams reduced. Method established for identifying illegal dumpers of hazardous wastes.
Type of Source Control:	Regulatory
Time Frame:	Ongoing
Startup Date:	2/4

E) Surface MinesOT 8 **CLARIFY/STRENGTHEN EXISTING REGULATIONS REGARDING IN-STREAM GRAVEL BAR REMOVAL**

Amend, clarify, and strengthen Shoreline Program and Puyallup River Flood Control Management Plan to restrict in-stream, below ordinary high water line gravel mining to circumstances where public health or safety is threatened.

Lead Implementor:	Pierce County
Cooperators:	Ecology, WDNR, Department of Fisheries
Estimated Cost:	\$10,000
Potential Funding Source:	Pierce County
Potential Funding Type:	General funds
Benefit:	Reduced instream habitat disturbance and siltation.
Type of Source Control:	Regulatory
Time Frame:	One time
Startup Date:	2/3

OT 9 EDUCATION PROGRAM FOR SURFACE MINES & EXCAVATION

WA Department of Natural Resources would develop a booklet/pamphlet for contractors and surface mine operators on: problems, applicable regulations, revegetation with trees, and effective methods (BMPs) to prevent erosion, leachate, and water pollution. The Association of General Contractors (AGC) has produced a manual on construction and excavation that would be used as a model. Also, AGC will be consulted in the development of the program.

Lead Implementor:	Washington Concrete and Aggregate Association
Cooperators:	WDNR, WDOE, Health Depts., and Association of General Contractors
Estimated Cost:	\$20,000
Potential Funding Source:	PIE grant
Potential Funding Type:	Grant
Benefit:	Increased awareness and control of pollution impacts from landfills.
Type of Source Control:	Education
Time Frame:	One time
Startup Date:	2/2

G) General Programs

OT 10 EXPAND COMMUNITY INVOLVEMENT PROGRAMS FOR STREAM PROTECTION

Advertise creation of community involvement programs for individual streams. Contact homeowners and businesses requesting their participation. Coordinate applications for appropriate permits.

Lead Implementor:	Pierce County
Cooperators:	WSU Cooperative Extension, Snake Lake Nature Center, King County, Adopt-A-Stream, Schools
Estimated Cost:	\$22,500
Potential Funding Source:	Counties and Cities
Potential Funding Type:	General fund
Benefit:	Grass roots involvement, businesses involved in community, significantly reduce cost of stream improvement and testing activities.
Type of Source Control:	Voluntary incentive
Time Frame:	Ongoing
Startup Date:	1/2

OT 11 CREATE A COUNTY INFORMATIONAL PAMPHLET

The Chamber of Commerce or Board of Realtors would create an informational guide to Pierce County. The pamphlet would contain such information as: location of landfills, locations of transfer stations, location of hazardous waste collection sites, location of fire stations, septic tank maintenance guidelines, and contact numbers for local agencies. Contact telephone numbers would be provided to answer questions regarding: streams, wetlands, animal keeping, boating concerns, yard chemicals, septic tanks, sewers, soil types, drinking water supplies, clearing, wildlife, fish, shellfish, construction, existence of local clubs and organizations, etc.. The Chamber of Commerce and local realtors would distribute the pamphlets to business, home, and property buyers. The cost would also cover regular updating and reprinting of the pamphlet

Lead Implementor:	Chamber of Commerce
Cooperators:	Board of Realtors, Citizens for a Healthy Bay, Pierce County Utilities
Estimated Cost:	\$15,000
Potential Funding Source:	PIE
Potential Funding Type:	Grant
Benefit:	New residents would be made aware of local services and issues
Type of Source Control:	Education
Time Frame:	One time
Startup Date:	1/2

CHAPTER 5: IMPLEMENTATION PROGRAM

The plan recommends 50 action items to control nonpoint pollution and protect water quality in the Lower Puyallup Watershed. Preliminary costs for the first year of funding total \$1,374,750, including estimates for existing program costs which are currently funded. Preliminary costs for action plan implementation total \$38,659,050.

LEAD AGENCY

The interim lead agency for the Lower Puyallup Watershed Action Plan following adoption will be Pierce County.

Subsequent to this interim period, a Puyallup River Basin Council would be created through an interlocal agreement. It would be the responsibility of the interim lead agency (Pierce County) to provide staff support for the establishment and initial convening of the Puyallup River Basin Council.

The Puyallup River Basin Council would be the lead agency responsible for overall coordination of plan implementation and public involvement as described in Chapter 6 of the plan. Other agencies cooperating in implementation of the plan include Pierce County Public Works, Pierce County Planning, the cities of Tacoma, Auburn, Puyallup, Sumner, Buckley, Milton, Fife, Federal Way, Bonney Lake, Orting, Algona, Pacific, Tacoma-Pierce County Health Department, Seattle-King County Health Department, King County, the Puyallup Indian Tribe, the Muckleshoot Indian Tribe, Pierce County Solid Waste Division, Pierce County Cooperative Extension, the Pierce County Conservation District, and a number of State agencies including Fisheries, Agriculture, Health, Ecology, Parks and Recreation, and Natural Resources. Private organizations which have been identified as potential cooperators include Adopt-a-Stream, Bay Watchers, and Water Watchers.

The Puyallup River Basin Council would be modelled on the approaches taken by the Nisqually River Basin Council and the Stillaguamish Implementation Review Committee. Such a body would effectively coordinate the two counties and the large number of affected parties. It would also coordinate the various related issues involving animal habitat, recreation, industrial uses, aquifer recharge, bond initiative development, and water volume. The body will consist of a small, voting committee, and a non-voting advisory committee.

ANNUAL MILESTONES

Table 1 lists source control action items by category and estimates a time frame for startup, operation, and completion. This schedule displays annual milestones and a time frame for achieving action plan objectives. Additional milestones may be established once priority riparian areas and restoration projects have been identified.

ESTIMATED COSTS AND BUDGET

Costs have been estimated for implementation of source control action items and monitoring and implementation strategies. These cost estimates are contained in Table 2.

Table 2, **Implementation Budget**, lists source control action items and implementation and monitoring strategies in the order that the action items and strategies appear in Chapter 4, "Source Control Action Items", Chapter 6, "Implementation Strategies", and Chapter 8, "Monitoring Strategies". Estimated costs are shown for each action item/strategy for each of five years of implementation, and a total is shown of the estimated five year cost. Costs could occur for ongoing programs beyond five years, but no attempt has been made to estimate those costs. Subtotals are provided for the source control action item categories, and for implementation and monitoring strategies. A grand total for the five years of implementation is also shown.

For each funding source, costs are divided into categories of *existing programs* and *new programs* with subtotals shown for each. It is assumed that existing programs are currently budgeted by each funding source, and therefore, do not represent new fiscal burdens. New programs would be additional fiscal obligations for the funding sources.

LEAD IMPLEMENTORS

Table 3, **Lead Implementors**, provides a listing of the lead implementors and the source control action items, implementation strategies, and monitoring strategies for which the lead implementors would be responsible.

FINANCING ELEMENT

Implementation of Lower Puyallup Watershed Management Plan actions are contingent on available funding and the ability of the individual implementing agencies to incorporate and prioritize the actions into their existing programs and budgets. It is likely that the majority of projected costs for implementing the action items are not currently budgeted items for the funding entities. Costs may exceed available funding and additional revenue sources will be required. Possible revenue sources to help fund implementation of the Lower Puyallup Watershed Management Plan are presented below.

Table 4, **Funding Sources**, shows action items and strategies, along with the five year estimated costs, organized by the funding source. Existing programs have been removed from this table

and only programs requiring new funding sources are listed. Action items which recommend grant funding suggest potential funding sources for both the grant and the local match needed to meet the terms of the grant.

Grants: Federal and state grant programs can be used to help fund implementation of selected watershed actions. The most obvious state grant source is the Centennial Clean Water Fund administered by the Department of Ecology. Centennial Grants will fund up to 75% of the total cost for planning, designing, and constructing water quality projects. Centennial construction grants require a minimum 50% match from local funds.

Section 319H under the Clean Water Act provides nonpoint implementation grants of approximately \$100,000 per year. They are administered by the EPA through the Department of Ecology for Puget Sound counties. EPA Annual Education Grants are also available.

The United States Department of Agriculture (USDA) also offers grant programs through the SCS and ASCS.

Referendum 39 monies for shellfish protection offer state grant programs that could be used to help implement plan actions. CZM Part 306 grants, and Federal 205(j) grants (1) may also be available for funding plan implementation. All of these grants are administered by the Department of Ecology.

The Department of Ecology also administers Coordinated Prevention Grants which are funded through the Model Toxics Control Accounts. These funds may be used to support household hazardous waste programs and solid waste enforcement programs.

Public Involvement and Education (PIE) fund grants are available for projects that involve and educate the public on water quality issues. PIE fund grants are administered by the Puget Sound Water Quality Authority. There is currently a great deal of competition for PIE grants.

Grant funds have several limitations. Substantial effort is required for application; receipt of grant funds is competitive and not guaranteed, and existing grant funds may not be sufficient to meet current demands. Also, administration and record keeping for grants can be time consuming.

Loans from the State Revolving Fund (SRF) program might be used for financing mandatory projects on private land that will also benefit the public, such as the installation of BMP's like farm fencing. Repayment will be the landowner's responsibility.

Private Funds: Private sources of funding may also be sought. Possibilities of private funding include Puget Sound Bank, the Bell Foundation, the Audubon Society, Microsoft, and various other industries.

Pierce County Surface Water Management Division (SWM) will assess fees to support their work within the Public Works Department. Although an initiative had been submitted to the Pierce County electorate which prevented the County Council from passing a fee assessment, it was ruled illegal by the Pierce County Superior Court. This ruling was affirmed in a review by

the Washington State Appellate Court Commissioner. Pierce County SWM will not assess fees in incorporated areas.

King County currently assesses fees for a surface water management division in their Public Works Department, and this effort is applicable to the upper portion of the Hylebos subwatershed. King County has allocated funds for implementation of the Hylebos Creek and Lower Puget Sound Basin Plan, but cost shares between the jurisdictions are still under negotiation. A bond election will be required for implementation of capital improvement projects.

Areas of the watershed within the incorporated boundaries of cities may have to work within their respective jurisdictions to create fee structures for the support of stormwater management activities. This money would probably be targeted to fund water management programs (i.e., drainage service requests, enforcement, detention pond maintenance, sampling, public education) and capital projects. Drainage Districts use their funding solely for capital improvement and drainage course maintenance activities.

Shellfish Protection District (SPD's)

Shellfish Protection Districts are authorized by RCW. The boundaries of an SPD are determined by the area of land draining into a shellfish growing area. Land owners within the drainage area would be assessed a fee and the monies would be used to prevent contamination of the shellfish bed. Such districts have limited applicability, and numerous exemptions, but tax revenues are possible. SPD's are likely not applicable in the Lower Puyallup Watershed since historic shellfish resources have been decimated.

Septic Maintenance Districts function like SPDs. All property owners within an area known to experience frequent septic tank failures might be assessed a fee to support the inspection, maintenance, repair, or replacement of systems within the district.

Existing Local Revenues

Unless new revenue can be generated on a watershed or regional basis, general fund revenues from the various jurisdictions will be the primary local means of financing actions. Fees may also be a funding mechanism.

Bond elections for special purposes related to construction of facilities and cleanup projects are possible through Pierce County.

Intergovernmental Cost Sharing

Implementation of the Lower Puyallup Watershed Action Plan will require cooperation between the Puyallup River Basin Council and other jurisdictions, both in terms of funding and responsibility. Pierce County, the cities of Tacoma, Sumner, Buckley, and Milton, the Tacoma - Pierce County Health Department, and the Pierce County Conservation District would explore entering into interlocal agreements as a way to help fund selected plan actions. This includes the establishment of the Puyallup River Basin Council.

The Lower Puyallup Watershed Management Committee recognizes that limited funding may prevent full implementation of the watershed plan within 5 years. Plan implementation must

include efforts to prioritize expenditures and identify additional funding sources. The Puyallup River Basin Council will work refining and prioritizing actions during the implementation stage.

COORDINATION AND EVALUATION

As the Council for overall coordination and implementation of the plan, the Puyallup River Basin Council will work with all implementing agencies to evaluate the effectiveness of the proposed actions in controlling nonpoint pollution and water quantity and quality problems within the watershed. The Council will hold annual evaluation meetings with affected agencies/parties to coordinate action items and overall implementation strategies and to help assess the effectiveness of the plan. Quarterly meetings will be organized to develop a working relationship between agencies, share information, and track progress. Quarterly meetings will facilitate the decision making that needs to occur at annual meetings. These annual meetings with affected agencies/parties will undertake the following tasks:

- .! Resolution of any disputes through discussion and arbitration. The Council will approve the final dispute resolution format but the Committee recommends that the Council contract with a professional facilitator to develop an effective dispute resolution process.
- .! Coordination and integration with planning and management programs including: local, state, federal, and tribal plans and programs, comprehensive land use plans under the Growth Management Act, storm water and highway runoff plans, drainage basin plans, ground water management programs, flood control plans, wetlands management and protection programs, Coastal Zone Management Act Section 6217 coastal nonpoint pollution control programs, the Shoreline Master Program (Chapter 173-19 WAC), Critical Areas Ordinances, shellfish and fisheries management programs, and others as appropriate.
- .! The Council will evaluate the overall effectiveness of the Action Plan based on progress reports from implementing agencies. Annual reports will evaluate plan implementation and progress on the prevention and correction of nonpoint pollution, ground and surface water pollution, and will also evaluate the protection of beneficial uses .
- .! The Council will chronicle results from the annual evaluation meeting and report to the Washington State Department of Ecology within two months after the meeting.
- .! Every other year (coinciding with Ecology's biennial audit), the lead agency will incorporate the results of long-term monitoring in their annual report.
- .! The first evaluation meeting for the Lower Puyallup Watershed Action Plan will be within one year after final certification of the plan by the Department of Ecology.

PUBLIC INVOLVEMENT

The Puyallup River Basin Council [or lead agency] will be convened concurrently with the annual evaluation. The body will seek public comment on ongoing and proposed implementation activities.

REVISIONS TO THE PLAN

Watershed plans such as the Lower Puyallup Watershed Action Plan are meant to be adaptive as new information or methods to control nonpoint pollution and information on other water quality and quantity problems become available. As a result, the Lower Puyallup Watershed Action Plan should be re-evaluated annually and revised in five years from the date of approval by the Department of Ecology. At that time, the Puyallup River Basin Council will convene to revise the plan.

If the annual evaluation meeting or annual report identifies a need to revise the plan, the lead agency will consider submitting a revision of the plan to the Puyallup River Basin Council before five years. All efforts to revise the plan will incorporate public involvement and education.

KEY TO TABLES

ASCS	Agricultural Stabilization and Conservation Service	WSU	Washington State University Cooperative Extension
CCWF	Centennial Clean Water Fund Grant	WSUP	Washington State University - Pullman
CHAMB	Chambers of Commerce		
CO/CI	Counties and Cities		
CZM	Coastal Zone Management Grant		
DCD	Washington Department of Community Development		
DMV	Washington Department of Motor Vehicles		
DNR	Washington Department of Natural Resources		
DOE	Washington Department of Ecology		
DOH	Washington Department of Health		
DOL	Washington Department of Licensing		
DOT	Washington Department of Transportation		
ECOL	Washington Department of Ecology		
IAC	Inter-Agency Committee for Outdoor Recreation		
LEGIS	Legislature		
MULT	Multiple Entities		
PARKS	Washington State Parks and Recreation		
PCCD	Pierce County Conservation District		
PIE	Public Involvement and Education Grant		
PIEEP	Public Involvement and Environmental Education Program		
PIERCE	Pierce County		
PRBC	Puyallup River Basin Council		
PRIV	Private Grants		
REALT	Realtors Organizations		
SEWER	Wastewater Treatment Utilities		
SOLIDS	Solid Waste Utilities		
SRF	State Revolving Loan Fund		
SWME	Surface Water Management Entities		
TPCHD	Tacoma-Pierce County Health Department		
TP/SK	Tacoma-Pierce & Seattle-King County Health Dept.		
WCAA	Washington Concrete and Aggregate Association		

CHAPTER 6: IMPLEMENTATION STRATEGIES

IM 1 ESTABLISH PUYALLUP RIVER BASIN COUNCIL

The Lower Puyallup Watershed Committee would convene a Puyallup River Basin Council. Possible models for the council would be the Nisqually River Council and the Stillaguamish River Implementation Review Committee. Pierce County will provide initial staff and support. Key affected parties and interlocal agreements would be considered to provide funding for future support staff.

The council will coordinate both King and Pierce Counties and the large number of affected parties. It is also the most effective approach to coordinate various related issues including habitat, recreation, industry, water quality, developing bond initiatives, and water volume. Specific coordination activities would include the following:

- (1) Administer action item implementation.
- (2) Develop implementation priorities based on water quality data and monitoring programs.
- (3) Develop site specific priorities for restoration projects and identify riparian zones most in need of preservation.
- (4) Consult with Hylebos and Lower Puget Sound Basin Plan implementing agencies.
- (5) Pursue improved ordinance enforcement practices.

(The costs listed below apply only to the establishment of the Council. The ongoing cost and responsibility of supporting the Council may be found in IM 2.)

Lead Implementor:	Pierce County
Cooperators:	Lower Puyallup Watershed Committee
Estimated Cost:	\$15,000 (\$11,250 grant, \$3,750 match)
Potential Funding Source:	CZM grant, Pierce County match
Potential Funding Type:	Grant, general fund
Benefit:	Action Plan implemented, costs eventually shared by cooperating jurisdictions
Time Frame:	One time
Startup Date:	1/2

IM 2 SUPPORT PUYALLUP RIVER BASIN COUNCIL

Supporting the Puyallup River Basin Council means funding staff and other needs once the Council is established. Staff will: organize meetings of executive and advisory committees, publish minutes and agendas, compile and publish findings from long-term monitoring research, pursue grant funding of Puyallup River Basin Council activities, coordinate activities of lead implementors, facilitate completion of action plan tasks by lead implementors, perform public outreach, track environmental education efforts, track action plan progress and report to the Puyallup River Basin Council and Ecology, participate in additional planning efforts occurring within the watershed (such as the establishment of shellfish protection districts or surface water management utilities), and field public input related to the Action Plan. It is expected that a large part of the annual cost will be supported by grants and private donations.

Lead Implementor:	Puyallup River Basin Council
Cooperators:	Affected parties
Estimated Cost:	\$75,000/year
Potential Funding Source:	Counties and cities
Potential Funding Type:	Allocation
Benefit:	Costs are shared, communication between jurisdictions is facilitated, recommendations come from multi-jurisdictional source
Time Frame:	Ongoing
Startup Date:	2/2

IM 3 ESTABLISH ENVIRONMENTAL EDUCATION COMMITTEE

An Environmental Education Committee would be established consisting of representatives from: TPCHD, Metro, Cooperative Extension, Ecology, Conservation District, Metropolitan Parks District, Solid waste utilities, SWM, Pierce County's Public Involvement and Environmental Education coordination positions (see IM 4) and the public.

The Committee would expand existing programs addressing yard and household chemicals to include the following elements: buffers and revegetation, safe storage of products (particularly during flooding conditions), alternative products, product application, pesticide alternatives demonstration projects, distribution of information through realtors when people change residences, options for targetting adult audiences, and multilingual education.

The Committee would coordinate activities between existing programs and combine their efforts and programs when necessary. The Committee would research and identify funding sources to implement educational programs.

The Committee would identify problems associated with poor product labelling and lobby for improvements in labelling requirements.

The Committee would also develop or oversee the development of radio and television public service announcements on home hazardous waste for the Puget Sound Region. This may include coordinating with other agencies to develop a statewide advertising campaign.

The Environmental Education Committee would coordinate with the Puyallup River Basin Council.

Finally, the Committee would provide a forum for resolving any problems with the lead implementors designated for other education strategies listed in this plan.

Lead Implementor:	WSU Cooperative Extension/Metropolitan Parks District
Cooperators:	Metro, EPA, Ecology, Conservation District, FDA, State Department of Agriculture, Solid waste utilities, Surface water management entities, Pierce County, TPCHD, Cities, and the public
Estimated Cost:	(See IM 4)
Potential Funding Source:	(See IM 4)
Potential Funding Type:	(See IM 4)
Benefit:	Increased coordination between agencies and comprehensive approach to public education.
Time Frame:	Ongoing
Startup Date:	1/1

IM 4 PROVIDE FOR PUBLIC INVOLVEMENT AND ENVIRONMENTAL EDUCATION

Create ongoing staff positions with the responsibility of educating the public about environmental issues and volunteer activities. The positions would work with the Environmental Education Committee, the Puyallup River Basin Council, and also with existing education providing agencies such as the Metropolitan Parks District, WSU Cooperative Extension, and the Pierce County Conservation District.

Environmental Education staff would develop an Environmental Volunteer Program which would support volunteers and organizations wishing to perform improvement tasks, such as: stenciling storm drains, riparian zone replanting, in-stream debris removal, water quality sampling, and habitat improvement projects. The program would build on or continue the Pierce County Conservation District's existing volunteer coordination efforts. The program would seek prioritized lists of projects for volunteer work from the Puyallup Tribe, Fisheries, and other agencies to rehabilitate specific reaches of the Puyallup River drainage and assist volunteers by obtaining the appropriate permits.

Environmental Education staff would complete the education element associated with wetland, critical areas, ground water, and other ordinances.

The staff positions would be accompanied by a toll-free information line. This line will be advertised as a resource for obtaining information on environmental activities within Pierce County.

Environmental Education staff would contact businesses and civic organizations about sponsoring or participating in water quality improvement projects, and would also research and apply for grants to support their efforts, as well as those grants needed to implement the Source Control Strategies.

Lead Implementor: Pierce County
Cooperators: Environmental Education Committee, Metropolitan Parks District and Committee Constituents, Pierce County Surface Water Management, WSU Cooperative Extension, Pierce County Conservation District
Estimated Cost: \$120,000/year
Potential Funding Source: Pierce County
Potential Funding Type: General fund
Benefit: Meets education requirements of county ordinances. Volunteer groups would have an established contact and organizational agency.
Time Frame: Ongoing
Startup Date: 2/1

IM 5 SUPPORT TRANSPORTATION PLAN POLICIES TO INCREASE ALTERNATE TRANSPORTATION

Counties and cities would review methods to increase alternative transportation with regional agencies. An appropriate program would be selected. Incentives for car pooling, public transit, and other conserving methods would be encouraged. If successful, reduced single occupancy vehicle travel would reduce the amount of impervious surfaces need to provide parking and decrease the amount of vehicle fluids found in stormwater runoff.

Lead Implementors: Counties and cities
Cooperators: Department of Transportation, Department of Community Development
Estimated Cost: \$25,000
Potential Funding Source: Counties and cities
Potential Funding Type: Existing program
Benefit: Increased alternative transportation
Timing: One time
Startup Date: 1/1

IM 6 GROWTH MANAGEMENT

Nonpoint pollution control strategies would be incorporated into the comprehensive plans and development regulations of the jurisdictions within the watershed. Also, inter-jurisdictional coordination is encouraged to develop consistent policies and regulations for protecting water quality.

Lead Implementor:	Counties and cities
Cooperators:	Department of Community Development
Estimated Cost:	\$20,000
Potential Funding Source:	Counties and cities
Potential Funding Type:	Existing program
Benefit:	Growth management would provide long term development plans that would prevent continued water quality degradation.
Time Frame:	One time
Startup Date:	1/3

CHAPTER 7: MONITORING PROGRAM

The Lower Puyallup Watershed Management Committee has identified data necessary to determine the success of the Action Plan in preventing and correcting surface and ground water nonpoint pollution and in protecting beneficial uses.

The following long-range monitoring and evaluation plan incorporates existing data collection programs and proposes additional research. Changes or trends in water quality, habitat, biological conditions and land use will be tracked and reported annually to the Puyallup River Basin Council. Additional data, identified as "desirable but unavailable" during the compilation of the Phase 1 Report will also be collected. An official report of findings will be published biennially by the Puyallup River Basin Council and made available for all audits of the Watershed Action Plan. The Puyallup River Basin Council will evaluate findings and suggest necessary alterations to the Watershed Action Plan.

Methodology and cost data are included for each recommended monitoring action. Some recommendations identify existing, on-going programs which will require continued financing from implementors, but not additional financing. Monitoring actions which will require original or additional research are discussed in Chapter 8 as Action Plan implementation strategies.

LONG TERM MONITORING

Objectives

The objectives of Long-term Monitoring were created with the intention of meeting the requirements of WAC 400-12 and the Strategic Directions of the Watershed Management Committee using as efficient an approach as possible. Sampling will be targeted toward identifying specific nonpoint pollution sources in the watershed.

- .! Build upon data collection that has already been performed, and strive to limit the creation of new sampling programs. This approach will conserve resources and promote coordination between agencies.

(Sampling results from tests performed 10 years ago or longer, are unlike the results of current sampling efforts. Procedures and detection levels for many tests have improved significantly. Still, baseline measurements are comparable.)

- .! Volunteers will be utilized for data collection when appropriate. Use of volunteers will conserve agency resources and promote public education and grass roots involvement. Volunteer sampling will be supervised by a trained, professional coordinator. Specific strategies of volunteer use are detailed in Chapter 6, Action Item IM 4.

- .! Respond to site specific problems in the watershed. A three step process will be

used to approach site specific evaluations:

- .∇ Identification of the problems that need to be investigated and resolved, based on priorities established by the Puyallup River Basin Council.
 - .∇ A monitoring plan will be developed identifying sampling locations and tests to be performed, and
 - .∇ Quality Assurance and Quality Control (QA/QC) Procedures, meeting the Washington Department of Ecology's requirements will be adopted where appropriate. This will allow comparison of data sampling programs and will encourage consistency. Standard procedures for data collection is a major part of coordination between agencies.
- .! Collect information directly associated with "desirable but unavailable information" as identified in Lower Puyallup Watershed Phase 1 Report. Data collection will occur only to the extent that such efforts meet clear needs.

TRENDS RELATED TO LAND USE, WATER QUALITY, HABITAT, AND BIOLOGICAL CONDITIONS WILL BE IDENTIFIED

Water Quality

Water quality testing will include storm event ambient and site specific monitoring. It will be used to detect trends and identify problem locations where beneficial uses may be imminently threatened. Sampling will be tailored to identify possible sources of pollution. For example, samples found to have metals identify problems associated with stormwater and highway runoff. Sampling may also be used to indicate habitat degradation by measuring temperature and dissolved oxygen levels.

Existing and Planned Monitoring: Existing and planned monitoring will be conducted by the Surface Water Management (SWM) program within the Pierce County Department of Public Works. SWM is the implementing agency for Pierce County's NPDES (National Pollutant Discharge Elimination System) permit. SWM is establishing 4 ambient monitoring stations within Pierce County and will sample 3 storm events during 1992 and 1993.

NPDES requires ambient and storm event monitoring and SWM will have access to site specific monitoring information from other permit holders. This monitoring/sampling effort will follow Ecology guidelines. The exact requirements of "basic characterization" will be described in the guidelines. Costs are expected to be high.

The NPDES and Surface Water Management water quality data collection should be supported in the various jurisdictions. This data would be used to target areas needed for increased monitoring (new and existing development) and for the development of additional strategies as needed. Testing results can be used to determine actual water quality problems and support the need for action. They will also measure improvements from actions that are implemented.

All future monitoring should use the 1987 USGS "Water Quality in the Lower Puyallup River Valley and Adjacent Uplands, Pierce County, Washington" monitoring and testing report as a source for baseline data. Future monitoring will build on past USGS baseline measurements of

dissolved oxygen, conductivity, and nutrients. Other comparisons will be considered, but changes in technique and accuracy limit the comparability of past and future measurements for most other tests.

USGS work generally focuses on intense, short term, water quality studies. They often cooperate with cities and counties to complete projects within 2 to 4-year time frames. Recent USGS work in Pierce County has been funded by Centennial Clean Water Fund Grants. An advantage of local jurisdictions cooperating with USGS for water quality testing is that common QA/QC procedures are developed.

USGS is performing long term monitoring on the Puyallup River near the mouth of Clarks Creek.

Ecology currently has three ambient sampling locations within the Lower Puyallup Watershed. Sampling is occurring on the Puyallup River at the Meridian Street bridge, on the Puyallup River at the Orting-Kapowsin Road bridge, and on the White River at the Main Street bridge in Sumner. Exact descriptions of methodology and cost can be obtained through Ecology's Environmental Investigations and Laboratory Services Program.

Original research needed: Five components of original research are identified and described in the Monitoring Strategies found in Chapter 8.

- .! Most of the Monitoring Strategies found in Chapter 8, build on past testing projects such as the Conservation District's 1990 and 1991 efforts.
- .! Original research and computer modelling on the relationship between land use, water quality and rate of flow is described in MO 0.
- .! Regular testing of outlying, rural area stream reaches is also described in MO 0.
- .! Before and after testing will be performed by implementors of future stream improvement projects in order to determine beneficial results. This will be required by the River Basin Council.
- .! Use of aerial photography to assess habitat conditions based on changes to vegetative coverage. Identify trends based on comparing these photographs over an extended time span. Utilize the Forest Practice Board Manual for watershed analysis to evaluate water temperature on fish bearing streams using aerial photos.

Habitat

The Department of Wildlife (DOW) currently has inventories of priority species and habitats including riparian habitats of exceptional quality. Wildlife also maintains the Washington Rivers Information System, an inventory of hydrography, anadromous fish runs, and resident fish habitat areas ranked by quality and resource. Wildlife's existing programs and updating practices will provide information on trends regarding priority species, fish runs, and exceptional habitats, but additional information is needed in order to effectively evaluate trends in the condition of riparian habitat and wetlands.

In some instances, more site specific information is required. Implementation Strategy #1 recommends that existing assessments be used in undertaking volunteer restoration projects. Stream walks and developing a system for tracking the information collected might also be

developed through Implementation Strategy #4, as part of the duties of the Public Involvement and Environmental Education Program. The stream walks and enhancement activities will utilize available volunteer resources, encouraging education and grass roots involvement. The Puyallup River Basin Council should also direct staff to collect additional information from the Washington State Department of Wildlife and the Indian Tribes concerning wildlife species and habitat found within watershed boundaries.

A computerized system for tracking wetlands would be valuable in evaluation trends related to wetlands, and the Department of Ecology provides digitized National Wetland Inventory (NWI) files for Geographic Information Systems (GIS). Although the NWI is available in computer format, the Pierce County Wetland Inventory is more detailed and accurate. The Pierce County Inventory is updated by wetland reports received in the course of the environmental review process and includes the categorization of the wetlands. Also, GIS wetland information would be more valuable on a parcel basis using the Pierce County Wetland Inventory. The amount of acreage covered by wetlands within the County would be available and trends easily monitored. The inclusion of categorization information would provide valuable data on the amount of wetland acreage by category. It would also be possible to create a visual record of the distribution of wetlands within the watershed and identify important wetland resource areas.

Biological Conditions

An effective monitoring program for biological conditions should measure aquatic population sizes and health as well as fish kill incidents. There are a number of existing monitoring programs which will provide sufficient information for identifying trends.

Anadromous fish run sizes will be monitored by reviewing fish count information collected by the Department of Fisheries and Indian Tribes. Fish Disease data from the EPA in relation to Commencement Bay Cleanup and other available data will be compiled and reviewed for progress. Data collection is ongoing as part of Superfund cleanup activities and natural resource damage assessment. Information related to fish kills will be compiled from the Department of Fisheries and the state interagency Resource Damage Assessment Team headed by Ecology.

Health assessments of anadromous and resident fish found in rivers and streams have been performed by Wildlife and the Indian Tribes. These assessments would be identified and researched. Evaluations of population size and location for non-fish aquatic life by Wildlife, the Indian Tribes, and other sources also need to be identified and researched. These evaluations include significant indicator insect and bird species. Diseases which may be attributed to or aggravated by nonpoint source pollution and overall problems with fish and aquatic life populations will be identified as a result of this research.

Additional methods may be utilized to assess habitat and biological conditions. The TFW Ambient Monitoring Manual and rapid assessment procedures for benthic communities would both provide applicable data.

Land Use

Monitoring will measure changes in parcel use and population growth. Area-wide septic failure rates will also be researched. The impacts of pollution on cultural and quality-of-life beneficial uses will be monitored. The land use inventory should be "dovetailed" with the habitat (land

cover) inventory, because of their close relationship. Current GIS programs in Pierce & King Counties, the City of Tacoma and the other cities will develop parcel specific land use databases. Information Management projects in support of Comprehensive Land Use Plans, tracking of rezones and special use permits are currently in progress in the watershed. Monitoring Strategy #0 describes coordination, methodology, and associated costs.

A sociological study of the effects of surface water pollution on Culture and Quality of Life for both Native Americans and the population as a whole is recommended. Monitoring Strategy #0 describes methodology and costs.

METHODS FOR COMPILING AND REPORTING RESULTS

The Lead implementor will assign staff and resources for the creation of annual or biennial monitoring reports. These reports will be appended to the Lower Puyallup Phase 1 Report.

ANNUAL REVIEW BY LEAD IMPLEMENTOR

The Puyallup River Basin Council will establish the priority for implementing watershed action items. It will also develop criteria for judging the effectiveness of the Action Plan. This will include a means of evaluating implementation of action items based on the source control type as listed in Table 2. The criteria will assist the Council in pursuing a variety of approaches based on the effectiveness of the implemented action items.

The Puyallup River Basin Council will publish research findings with appropriate recommendations for plan changes on an annual basis.

RESULTS OF LONG TERM MONITORING

As mentioned previously, the results of biennial monitoring will be included. The Puyallup River Basin Council will meet to develop criteria for judging the effectiveness of long-term monitoring with appropriate recommendations for plan changes.

The results of long-term monitoring will be reviewed and findings of the Puyallup River Basin Council will be published for review by agencies, organizations, media, and concerned citizens. Comments will be accepted and incorporated into the final document.

CHAPTER 8: MONITORING STRATEGIES

MO 1 IDENTIFY PROBLEMS AND GENERAL TRENDS IN RELATION TO WATER QUALITY

The Puyallup River Basin Council and WSU Cooperative Extension would work with USGS, Ecology's Water Quality Investigations section, Pierce County, and affected parties to identify water quality sampling needs in excess of existing sampling. They will evaluate the costs and benefits of repeating the sampling documented in the "Water Quality in the Lower Puyallup River Valley and Adjacent Uplands, Pierce County, Washington" report (1987) and Pierce County Conservation District studies (1988 and 1989) to establish trends. Any future sampling will be closely coordinated with King and Pierce County Surface Water Management departments, TPCHD, SKCHD, and the EPA. Upon completion of the evaluation, needed sampling will be performed. If necessary, computer modelling in the Lower Puyallup Watershed will be developed. All activities are to take place over a three year time period.

The Puyallup River Basin Council will review monitoring information and prioritize needed restoration activities and action item implementation.

Lead Implementor: Puyallup River Basin Council
Cooperators: WSU Cooperative Extension, Pierce County, USGS, Indian Tribes, Department of Agriculture, SWM
Estimated Cost: \$292,100 (\$220,000 grant, \$72,100 match)
Potential Funding Source: Centennial Clean Water Fund grant, Puyallup River Basin Council match
Potential Funding Type: Grant
Benefit: Establish typical sources of certain pollutant types, able to focus source control activities on actual problems.
Time Frame: One time
Startup Date: 3/1

MO 2 REGULAR TESTING OF RURAL STREAM REACHES

The Public Involvement and Environmental Education Coordinator will direct the establishment of a volunteer water quality sampling program of small and rural area creeks. This effort will be supervised by a trained professional in water quality sampling procedures. Particular attention will be paid to creeks with viable salmon spawning areas. Urban areas with potential habitat will also be considered. This data will not be legally admissible, nor necessarily meet all QA/QC requirements. A database will be developed using this and other data to provide basic trends in the quality of water of the creeks. This sampling may be used to indicate a problem which could be followed up with more sampling and enforcement. This program would be established within a three-year time frame. Alternate funding sources would need to be identified to support the program beyond three years.

Lead Implementor: Public Involvement and Environmental Education staff (see IM 4)
Cooperators: Pierce County Conservation District, Ecology,

Estimated Cost: Fisheries, Indian tribes
 \$40,000 (\$30,000 grant, \$10,000 match)
Potential Funding Source: CCWF grant, private match
Potential Funding Type: Grant
Benefit: Additional knowledge of nonpoint pollution impacts to small rural streams
Time Frame: One time
Startup Date: 2/2

MO 3 ENCOURAGE CITIZEN REPORTING AND TRACK DATA COLLECTED

Create a telephone directory of responsible agencies to guide citizens and agencies in reporting pollutant level increases and visible water quality problems. Example problems will be described with the name and telephone number of the agency to contact. Each agency listed will track the number and type of citizen generated requests for action received on an annual basis. Each agency will share this information with the Puyallup River Basin Council. Puyallup River Basin Council staff will compile the telephone directory. Costs include staff time.

Lead Implementor: Puyallup River Basin Council
Cooperators: Department of Wildlife, DNR, Department of Fisheries, Ecology, EPA, Cities and Counties
Estimated Cost: \$30,000
Potential Funding Source: PIE
Potential Funding Type: Grants
Benefit: Established directory will support the quick reporting of problems.
Time Frame: One time
Startup Date: 3/1

MO 4 CREATE DATABASE OF WETLANDS INFORMATION

Recording the information currently contained in the Pierce County Wetland Atlas onto the Pierce County Geographic Information System (GIS) would make it possible to identify the locations of wetlands within a watershed and determine the amount of wetland acreage. It would also be possible to determine the amount of acreage devoted to different categories of wetlands. A preliminary assessment of information requirements and modifications to the Pierce County Wetland Atlas would be a first step. The inventory data will eventually be associated with the Pierce County Parcel Data Base.

Lead Implementor: Pierce County
Cooperators: Cities
Estimated Cost: \$80,000 (\$60,000 grant, \$20,000 match)
Potential Funding Source: CZM grant, Pierce County match

Potential Funding Type: Grant
Benefit: Inventory of wetland resources and easy access to information.
Time Frame: One time
Startup Date: 2/4

MO 5 GIS DATABASE OF PARCEL INFORMATION

A computer database of parcel information for the Pierce County GIS system is currently being performed cooperatively between Pierce County and the City of Tacoma. Digitizing for the City of Tacoma and the University Place portion of Pierce County is scheduled for completion within the space of two years. Digitization of the remainder of Pierce County should take place in an additional two to three year time period. Relating the parcel based information with other databases on land use will provide current, accurate information on land use trends. A parcel-based GIS system could be related to: land use, Pierce County Wetlands Atlas digitizing, National Wetland Inventory digital file integration, the Development Center permit tracking system, and Surface Water Management's impervious surface stormflow model of the county.

Lead Implementor: Pierce County
Cooperators: City of Tacoma
Estimated Cost: \$500,000 (\$100,000/year over 5 years)
Potential Funding Source: Pierce County
Potential Funding Type: Existing program
Benefit: Immediate access to current land use information and proposed changes, ability to identify trends
Time Frame: One time
Startup Date: 1/1

MO 6 SOCIOLOGICAL STUDY

The impacts of water pollution on Culture and Quality of Life for both Native American communities and the population as a whole would be investigated. Graduate students could perform substantial portions of the study.

Lead Implementor: Washington State University, Pullman
Cooperators: Indian Tribes
Estimated Cost: \$15,000
Potential Funding Source: Washington State University, Pullman
Potential Funding Type: General fund
Benefit: Conclusions would provide direction for water quality improvement and planning.
Time Frame: One time
Startup Date: 2/3